- *Basic Research*

Effect of Artificial Intelligence Awareness on Staff Nurses' Perception of Digital Competence

Amira Fathy Akeel[1], Ahmed Gamal Lashen[2**]

[1]Assistant professor of Nursing Administration, Faculty of Nursing - Modern University for Technology and Information (MTI), Cairo, Egypt. [2**]Lecturer of Nursing Administration, Faculty of Nursing - Modern University for Technology and Information (MTI), Cairo, Egypt.
*Corresponding author E-mail: amira.akeel@nur.mti.edu.eg
Contributing authors: phdahmedgamallashen@gmail.com

Abstract

Background: Recently, the integration of artificial intelligence into healthcare systems, has changed its process including nursing care practices. Staff nurses are responsible to keep their practice current and develop their abilities to use knowledge, skill, judgment, attitudes, values and beliefs to perform in advanced technological environment. **Aim of the study:** This research was conducted to explore the effect of artificial intelligence awareness sessions on staff nurses' perception of digital competence. **Design:** A quasi-experimental research design was utilized to achieve the aim of the study. **Subjects:** A total of 560 staff nurses were participated in the study. **Setting:** The study was conducted in " Samannoud Central Hospital" which is one of " Egyptian Ministry of Health hospitals". **Tools of data collection:** Researchers gathered data using: Artificial Intelligence Knowledge Questionnaire, Artificial Intelligence perception Scale, and Digital Competence Questionnaire. **Results:** After implementing the awareness sessions, there was a highly statistically significant improvement in artificial intelligence knowledge, and perception levels (p=0.001) among staff nurses. Furthermore, artificial intelligence awareness sessions positively were correlated to staff nurses' perception of digital competence. **Conclusion:** Artificial Intelligence awareness sessions had a positive effect on the perception of digital competence among staff nurses. **Recommendations:** healthcare organizations should apply artificial intelligence awareness sessions as a step to improve staff nurses' digital competence.

Keywords: Artificial intelligence, Digital competence, Staff nurses.

Introduction

Artificial intelligence (AI) is the ability of computers to mimic cognitive processes such as learning, problem solving, and decision making. It comprises a variety of technological advances that allow systems to accomplish tasks that need human intelligence. Artificial intelligence (AI) awareness is the understanding of the Artificial intelligence concept, mechanism of working, its capabilities and limitations, and its influence on healthcare system and nursing practice. It includes not only Artificial intelligence technologies understanding, but also the capacity to critically analyze their applications and consequences ***(Abou Hashish, & Alnajjar, 2024).***

Artificial intelligence (AI) had revolutionized healthcare through enhancing nursing processes, therapeutic, and diagnostic procedures. It presented practical solutions to issues like increased costs, irregularities, and consumer demand for higher quality care. The huge and large volumes of data may be analyzed by AI to increase precision, customize individualized care plans, and optimize processes related to resource allocation, which enhanced patient outcomes and increased the effectiveness of healthcare delivery ***(Ahmed, 2024).***

Artificial intelligence (AI) in nursing describes the utilization of computer systems to carry out operations that normally call for human intellect, including data analysis, diagnosis, and treatment decision support. It hunts for simulating human cognitive processes, including learning, reasoning, and problem-solving, to enhance patient care and expedite processes ***(Amin, et al., 2025).***

Nursing can benefit significantly from artificial intelligence (AI) in several ways, such as enhanced decision-making regarding treatments and treatment plans by AI algorithms that can evaluate patient data and offer evidence-based suggestions. It evaluates test findings and patient vital signs to forecast possible issues like infections and sepsis, enabling nurses to take preventative action. AI-powered solutions can also help with medication administration, guaranteeing precise dosing and prompt administration ***(Asal, et al.,2025)***.

Artificial intelligence assists nurses to decrease work stress and cognitive workload; it could be through automating repetitive procedures and sending out timely signals. Finally, it improves nurses' general well-being by reducing stress and burnout and creating a more manageable workload. Additionally, it can assist with administrative and documentation duties, free up nurses to concentrate on patient care. Additionally, AI-powered solutions can optimize resource allocation and staffing, guaranteeing that the appropriate nurses are on hand to attend to patient demands. Virtual assistants, chat-bots and AI capabilities can inform patients about their diseases, possibilities for treatment, and pharmaceutical prescriptions. Additionally, affording answers to queries and worries, these solutions can increase patient happiness and involvement. Additionally, patients can benefit from AI-generated teaching resources that are customized to meet their unique needs and learning preferences ***(Agaoglu,, et al., 2025).***

The artificial intelligence (AI) awareness aim for nurses is to give them the skills and knowledge needed to successfully incorporate AI technology into their work. Through this awareness, nurses use AI to improve patient care, make better decisions, and work more efficiently in healthcare environments. Important topics for nurses' AI awareness include knowledge about the AI fundamentals and basics that involved: machine learning, natural language processing, and how these technologies operate. Also, awareness involved

applications of AI in healthcare, such as patient monitoring, treatment planning, and diagnostics. AI-powered tools and technology are also involved in awareness including virtual assistants, predictive analytics, and robotic process automation. The Ethical Considerations including data privacy, bias, and the proper application of AI in clinical practice are just a few of the ethical issues that are covered in awareness. Additionally, the artificial intelligence effect on nursing practice and patient outcomes helped the healthcare system to be more effective and efficient ***(Abuzaid, et al., 2022).***

The digital competence raising in nursing, it involved the knowledge, skills, and attitudes required for nurses to use digital tools and information systems that enhanced their practice in an efficient and responsible manner. It covers a variety of skills, such as creating digital content, analyzing data, and utilizing digital health systems and communication technologies. Essentially, it gives nurses the ability to use technology to improve workflows, improve patient care, and keep up with medical breakthroughs ***(AlDhaen,2025)***. The importance of digital competence in nursing can be recognized in better patient outcomes which result from the use of digital tools to increase communication between healthcare providers, speed up information access, and improve patient monitoring. Also, improved nursing workflows by streamlining administrative duties and cutting down on paperwork ***(Buchanan, et al.,2021).*** In addition to professional development as it assisted nurses to engage in online learning, accessed resources for professional development, and keep up with the most recent developments in their career. Nurses possessed digital competency, as nurses with strong digital skills equipped to handle the changing healthcare landscape as healthcare continues to digitize ***(Booth, et al., 2021).***

As technology becomes increasingly incorporated into healthcare, ethical issues in digital competency for nurses are essential. These factors include resolving potential problems in artificial intelligence (AI) systems, protecting patient privacy and data security, and upholding professional boundaries in digital communication. To improve patient care, nurses must be prepared to handle these moral issues while utilizing digital technologies ***(Bove & Sauer, 2023).*** So, this study was conducted to examine the effect of artificial intelligence awareness sessions on staff nurses' perception of digital competence.

Research significance:

Egypt vision by 2030 toward responsible artificial intelligence is based on human-centered governance, regional collaboration, and local relevance. It integrates AI into public services, healthcare including nursing while making investments in digital infrastructure including digital competence and talent development, in an ethical framework ***(Amin, et al., 2025).***

Studying the effect of an artificial intelligence awareness sessions on staff nurses' perception of digital competence has been studied in various research, pronouncing its crucial importance to Katch up vast technological advancement related to nursing practice. Studies ensured that high levels of digital competence perception among nurses are associated with high levels of artificial intelligence knowledge and skills which gives advantageous nursing practice. ***(Cardona, et al., 2023).***

This research presents strategies for healthcare organizations that are preparing and planning to use computerized healthcare system to develop nursing knowledge and skills related to artificial intelligence and digital competence obtained by the application of these awareness sessions leading to improving quality and productivity in nursing care ***(Castonguay, et al.,2023).*** Moreover, other research studies insisted that the application of artificial intelligence

awareness sessions was positively correlated to enhancing clinical decision support, improved documentation and administrative efficiency among nurses leading to higher digital competence levels ***(Choi, et al., 2023).***

Research Aim:

This study aimed to investigate the effect of artificial intelligence awareness sessions on digital competence perception among staff nurses.

Research Objectives

1- Assess staff nurses' artificial intelligence knowledge level.
2- Identify staff nurses' perception level of artificial intelligence.
3- Design artificial intelligence awareness sessions for staff nurses.
4- Implement the designed awareness sessions.
5- Examine digital competence perception level among staff nurses pre/post implementation of awareness sessions.
6- Evaluate the effect of artificial intelligence awareness sessions on staff nurses' digital competence perception.

Research Hypothesis

H1 Staff nurses' knowledge and perception regarding artificial intelligence is positively associated with artificial intelligence awareness sessions implementation.

H2 Staff nurses' digital competence perception is positively associated with artificial intelligence awareness sessions implementation.

Methods

Study design: One group pretest- posttest quasi experimental research design was used to implement this research over six months from 1st February, 2025, to the end of July ,2025. The research adhered to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines to ensure transparency and methodological rigor.

Setting

The study was conducted in " Samannoud Central Hospital" affiliated to the Egyptian Ministry of Health and Population in El-Gharbia Governorate: Samannoud Central Hospital serves urban and semi-urban populations and provide comprehensive inpatient and outpatient medical services. It is considered a tertiary referral center and among the largest in the region, employing approximately 600 nurses and offering a wide range of specialized services across several departments. The hospital has (220) beds. Its departments include adult intensive care unit, neonatal intensive care unit, emergency department, and kidney dialysis department, surgical department, medical department, urology department, obstetrics and gynecology department, ear nose and throat department, ophthalmology department, pediatric department, and operative and endoscopic department.

Sample size estimation

A convenience non-probability sampling technique was used to recruit staff nurses who participated in the study. Sample size calculations were done using G Power software (version 3.1.9.4), applying a linear multiple regression model ***(Faul, et al., 2009)***. Based on a statistical power of 0.95, an alpha level of 0.05, and a medium effect size ($f^2 = 0.15$) as recommended by **(Cohen ,2013).**

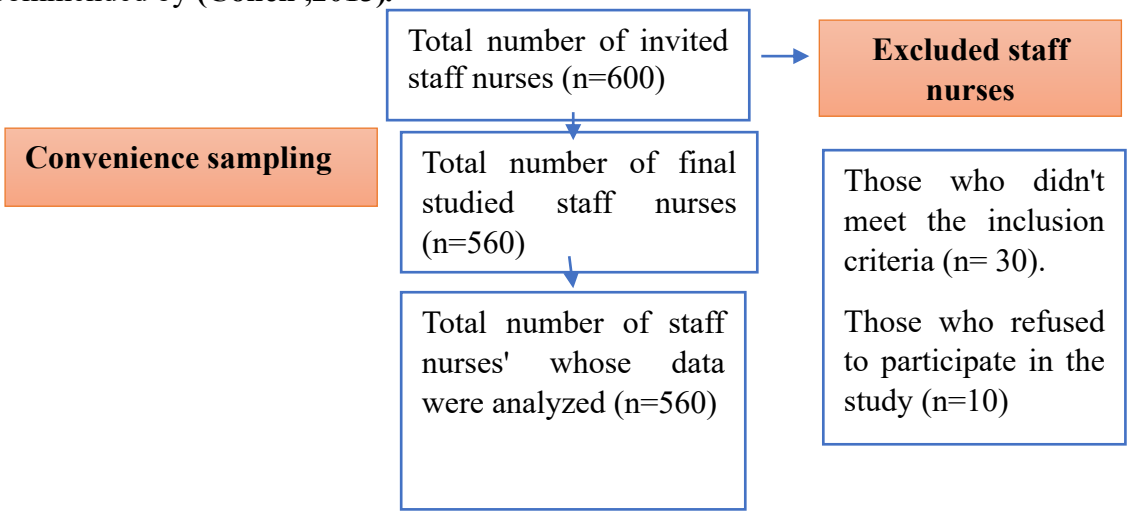


Figure (1) participants' recruitment flowchart.

Inclusion and exclusion criteria

Eligible study participants were staff nurses who held formal nursing qualifications, had at least one year of work experience in nursing field, and voluntarily accepted to participate in the study. Staff nurses who had previous awareness or training in artificial intelligence or digital competence were excluded to ensure the sample reflected nursing professionals with relevant workplace experience.

Research instruments

To collect data from the current study, the following validated tools were used:

Tool (1): Socio-demographic tool:

This tool was designed to collect personal data and job characteristics of studied staff nurses. It consists of items related to age, gender ,years of experience in nursing, and level of education in nursing.

Tool (II): Artificial intelligence knowledge questionnaire (AIKQ): it was developed by ***(Swed et al.,2022)*** and was adapted and translated for staff nurses by the researchers to address the level of staff nurses' knowledge about artificial intelligence. It contained seven items in the form of "Yes or No" questions such as " Do you have basic information about the definition of artificial intelligence (AI)?". Those questions describe different constitutes of AI used in healthcare industry. Confirmatory factor analysis (CFA) conducted on the Arabic version demonstrated a good model fit, with indices including CFI = 0.89, TLI = 0.90, and RMSEA = 0.04. Additionally, the questionnaire portrayed a strong internal consistency, validated by a

Cronbach's alpha of 0.795. These psychometric findings support the reliability and validity of the AIKQ use in Arabic-speaking healthcare organizations. Staff nurses' responses were assessed against a two-point Likert scale as follows: yes, was scored as 2, no scored as 1. The score was summed, and the total score was divided by the number of the items, giving a mean score for the questionnaire. A percent score was created from these scores. The mean score for the items was calculated by adding the scores from the questionnaire items and dividing the result by the number of items. A percent score was created from these scores. Following that, the percent score was classified as satisfactory knowledge (≥ 75%) or unsatisfactory (<75%).

Tool III: Artificial Intelligence perception Scale (AIPS): it was developed by ***(Sommer, Schmidbauer & Wahl ,2024)***. It was adapted and translated by the researchers. It contained 21 items. The scale was classified into four main dimensions: Knowledge and definition of AI (8 items), opportunities and perceived benefits (5 items), Anxiety and disadvantages (4 items), and facilitators and future needs (5 items). Staff nurses' responses were assessed against a five-point Likert scale as follows: Strongly agree was scored as 5, agreed as 4, Neutral scored as 3, disagree scored as 2, and strongly disagree was scored as 1. The score of each subscale was summed, and the total score was divided by the number of the items, giving a mean score for the part. A percent score was created from these scores. The mean score for the items was calculated by adding the scores from the subscales' items and dividing the result by the number of items. A percent score was created from these scores. Following that, the percent score was classified low if it was less than 60%, moderate if it was between 60% and 75%, and high if it was at least 75%.

Tool IV: Digital Competence Questionnaire (DCQ): it was developed by ***(Golz, et al.,2024)*** and translated by the researchers It contained 26 items divided into three dimensions knowledge (4 items), skills (8 items) and attitude (14 items). It assessed staff nurses' perception toward digital competence. Staff nurses' responses were assessed against a five-point Likert scale as follows: Fully agree was scored as 5, agree scored as 4, neither agree nor disagree scored as 3, disagree scored as 2, and fully disagree was scored as 1. The mean score for the items was calculated by adding the scores from the items and dividing the result by the number of items. A percent score was created from these scores. After that, the percent score was considered low if it was less than 60%, moderate if it was between 60% and 75%, and high if it was at least 75%.

Procedure

Ethical approval:

Faculty of Nursing at Modern University for Technology and Information's Research Ethics Committee (REC) has officially approved the study settings, allowing for necessary data collection. The responsible authorities at Samannoud Central Hospital have also approved of it. The study followed the Helsinki guidelines. Each study participant provided informed written sent after thoroughly explaining the study objectives. The study strictly adhered to voluntary participation, anonymity, and confidentiality. Additionally, participants of staff nurses were informed that they have the right to withdraw from study at any time without any penalty.

Pilot Study:

A pilot study was conducted on 56 staff nurses that presents 10% of study sample to assess the study instruments for appropriateness, comprehensibility, and feasibility. The tools were found to be relevant, lucid, and practical, and no modifications or adjustments were deemed necessary, so pilot study participants were included in the study sample.

Addressing Common Method Bias

Several measures were taken to minimize bias associated with non-probability sampling. Data collection procedures were standardized, with trained researchers following the same protocol. Participation was anonymous and voluntary, reducing response bias. These steps enhanced the study's internal validity and helped mitigate potential sampling bias.

Data Collection

The main data collection for the study took place between February 2025 and Juli ,2025. The research process consisted of various phases including assessment, planning, implementation, and evaluation, to ensure comprehensive data collection and analysis. The study was implemented through the following phases.

Phase I (Assessment Phase): During the assessment phase, the initial step involved administering "tool I" to staff nurses to assess their artificial intelligence knowledge level. Tool II was administered to them to assess their perception level of artificial intelligence. Then Tool III was distributed to staff nurses to identify their digital competence perception level. Data collection occurred during morning and afternoon shifts, according to hospital policy. Researchers were available to offer guidance and clarification as needed and gathered the completed tools immediately after their completion. Completion time for questionnaire sheets ranged from 15 to 20 minutes for tools I and II, and around 20 to 30 minutes for tools III.

Phase II (Planning): The planning phase was prepared based on an analysis of the assessment phase results and relevant literature. Prior to starting the study, the content validity of the awareness sessions was assessed by estimating the content validity index (CVI). A panel of five experts, who were 2 professors, and 3 assistant professors from Faculties of nursing at Tanta, Banha and Ain Shams universities participated in the validation process. The experts evaluated the clarity and relevance of the study tools and offered recommendations to enhance their quality. The resulting CVI for the study awareness sessions was determined to be 0.90, indicating excellent content validity. The awareness sessions' content and teaching methods were carefully selected. Additionally, the researchers designed the time schedule, teaching sessions, and selected appropriate media for instruction. The teaching methods encompassed lectures, discussions, supplemented by visual aids such as data shows and awareness sessions booklet. This phase of awareness sessions development was completed within a span of one month.

***Phase III (The artificial intelligence awareness sessions implementation*)**: the researchers implemented the awareness sessions at the hospital conference room, which was comfortable, air conditioned, not crowded and supported with media display devices. All participants of staff nurses attended two sessions, with each session lasting two hours in morning and afternoon shift. They perceived the awareness sessions contents using teaching strategies and awareness sessions booklet. Various teaching methods were used, including lectures, discussions, and

brainstorming. Instructional materials consisted of awareness sessions booklet prepared by the researchers and distributed to all participants on the first day of the awareness sessions' implementation, in addition to power point presentation for awareness sessions. The awareness sessions addressed several topics related to artificial intelligence, including definition, basics of machine learning and embedded systems, issues of artificial intelligence in nursing, constraints in artificial intelligence – Physical, Power, and Economic, the role of artificial intelligence in nursing practice, advancing nursing practice with artificial intelligence: enhancing preparedness for the future, and nurses' digital competence. The awareness sessions lasted for three months, running from the beginning of March to the end of May 2025.

***Phase IV* (*Evaluation phase*):** In the evaluation phase, Tool I was employed directly after the awareness sessions implementation to assess staff nurses' artificial intelligence knowledge level. Tools II was then distributed post-awareness sessions' conduction to assess staff nurses' staff nurses' perception level of artificial intelligence. Tool III was used to assess staff nurses' digital competence perception level.

Data Analysis

Data was analyzed using IBM SPSS-26 and AMOS-26, involving review, coding, and cleaning process. Normality was tested with Shapiro and Kolmogorov-Smirnov tests, while staff nurse characteristics and variable correlations were analyzed using descriptive statistics and Pearson's coefficient. Cronbach's Alpha assessed tool reliability and factor analysis validated translated instruments, with SPSS-AMOS used to calculate regression weights, standard error (SE), critical ratio (CR), and p-values. Goodness-of-fit measures like chi-square, root mean square error of approximation (RMSEA), comparative fit index (CFI), and Incremental Fit Index (IFI) were used, with significance set at $p < 0.01$ for this study.

Results

Distribution of study subjects according to their Personal Data and Job Characteristics.

Table 1 illustrates that the study sample consisted of 560 staff nurses, the majority (89.3%) were female, less than half of them (46.3%) aged less than 25 years old with a mean ± SD (27.76±2.88).Additionally, fewer than two thirds of them (62.5%&64.4%) respectively, had a bachelor's degree in nursing and had from 5 to less than ten years of work experience with a mean ± SD (9.80±2.91).

Relation between study variables

Staff nurses' artificial intelligence knowledge level pre and post awareness sessions implementation.

Table 2 and figure 2 indicate that prior to awareness sessions' implementation, only a small percentage (4.7%) of staff nurses exhibited satisfactory knowledge regarding artificial intelligence knowledge. However, following awareness, a substantial majority (98%) demonstrated a high level of satisfactory knowledge regarding artificial intelligence. And there was a significant and positive improvement in their knowledge levels related to all categories of artificial intelligence compared to pre-awareness levels (P<0.001).

Staff nurses' artificial intelligence perception level pre and post awareness sessions.

Table 3 and figure 3 identified that prior to awareness sessions' implementation, only a small percentage (3%) of staff nurses exhibited high perception level regarding artificial intelligence. However, following awareness, a substantial majority (**97.3**%) demonstrated a high level of perception regarding artificial intelligence. And there was a significant and positive improvement in their perception levels related to all categories of artificial intelligence compared to pre-awareness levels (P<0.001).

Staff nurses' digital competence perception level pre and post awareness sessions.

Table 4 illustrated that prior to awareness sessions' implementation, only a small percentage (0.9%) of staff nurses exhibited high perception level regarding digital competence. However, following awareness, a substantial majority (**91.9**%) demonstrated a high level of perception regarding digital competence. And there was a significant and positive improvement in their perception levels related to all categories of digital competence compared to pre-awareness levels (P<0.001).

Simple linear regression for the effect of artificial intelligence knowledge and perception on staff nurses' digital competence perception pre and post awareness sessions.

The simple linear regression pre and post awareness sessions indicate the greater effect of artificial intelligence knowledge on staff nurses' digital competence reaching the 0**.83** post awareness sessions. Additionally, it reaches 0**.89** to indicate the greater effect of artificial intelligence perception on staff nurses' digital competence.

Table 1: Personal data and Job Characteristics of staff nurses (n = 560)

Personal Data	Staff nurses (n=560)	
	N	%
Gender		
Female	500	**89.3**
Male	60	**10.7**
Age (years)		
<25	259	46.3
25- <35	96	17.1
35 - <45	55	9.8
>45	150	26.7
Mean ± SD		**27.76±2.88**
Educational level in nursing		
Technical Nursing Institute	200	35.7
Bachelor degree	350	62.5
Master degree	10	1.8
Years of experience		
1 - <5 years	100	17.8
5- <10 years	360	64.4
> 10 years	100	17.8
Mean ± SD	**9.80±2.91**	

Table (2): staff nurses' artificial intelligence knowledge level pre and post awareness sessions implementation (n= 560).

Artificial intelligence knowledge dimensions	Pre- awareness sessions				Post awareness sessions				Pre -post	
	Unsatisfactory		Satisfactory		Satisfactory		Unsatisfactory		χ^2	P-value
	No.	%	No.	%	No	%	No	%		
1. What do you know about definition of artificial intelligence?	520	92.9	40	7.1	550	98.2	10	1.8	20.68	0.000**
2. Do you have an idea about use of AI in the medical field?	530	94.6	30	5.4	545	97.3	15	2.7	14.49	0.001**
3. Have you studied artificial intelligence in your undergraduate education?	510	91.1	50	8.9	555	99.1	5	0.9	18.99	0.001**
4. Have you been informed about means of AI and used it in the nursing field?	535	95.5	25	4.5	530	94.6	30	5.4	20.22	0.000**
5. Do you have an idea about machine learning?	540	96.4	20	3.6	550	98.2	10	1.8	20.68	0.000**
6. Have you utilized AI in nursing diagnosis through electronic care systems?	550	98.2	10	1.8	555	99.1	5	0.9	14.49	0.001**
7. Have you utilized AI to calculate drug doses?	551	98.4	9	1.6	556	99.3	4	0.7	18.99	0.001**
Total artificial intelligence knowledge level	534	95.3	26	4.7	549	98.0	11	2.0	18.36	0.001**

*Significant at p ‹ 0.05 **highly significant at p ‹ 0.01.

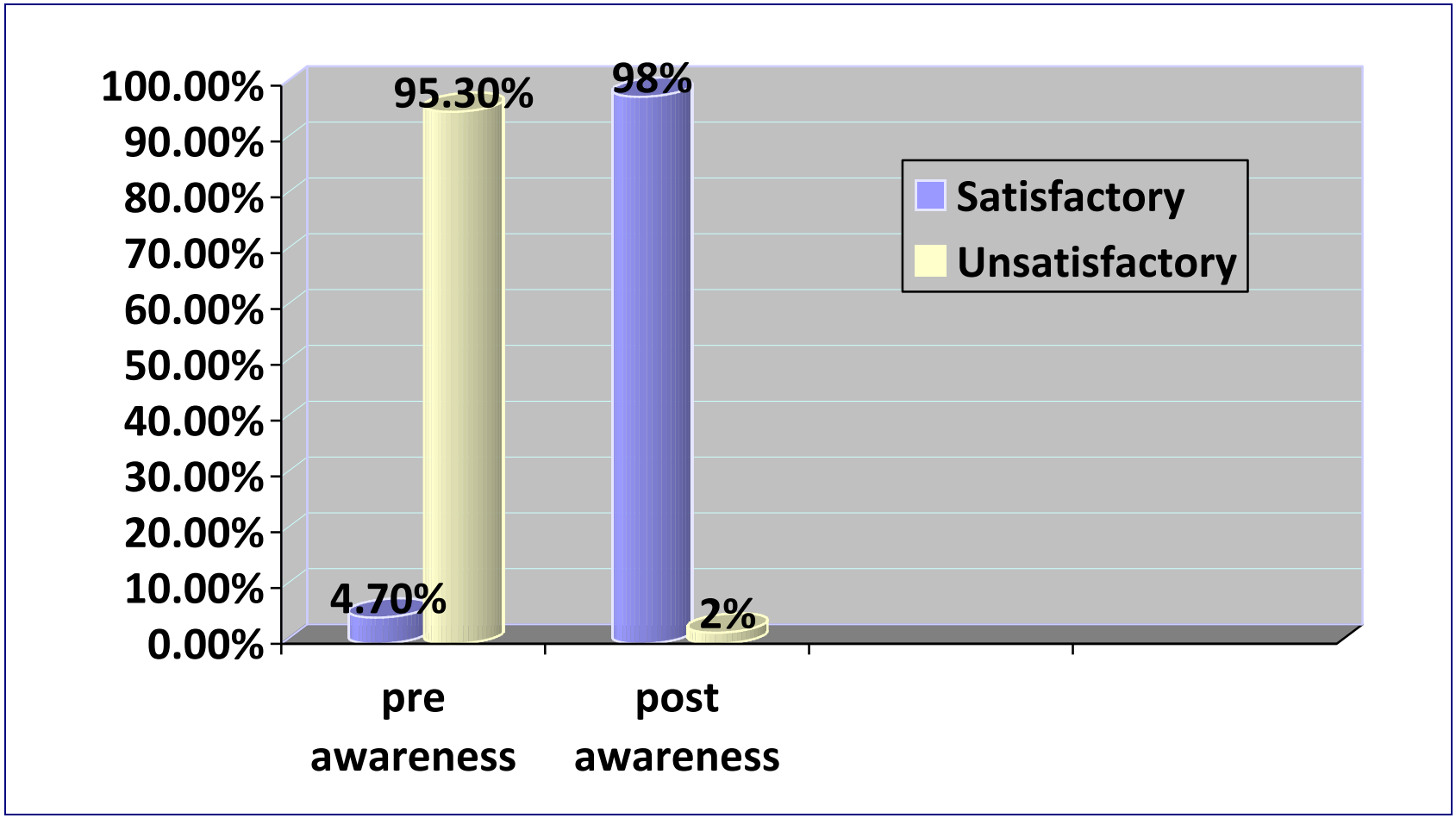
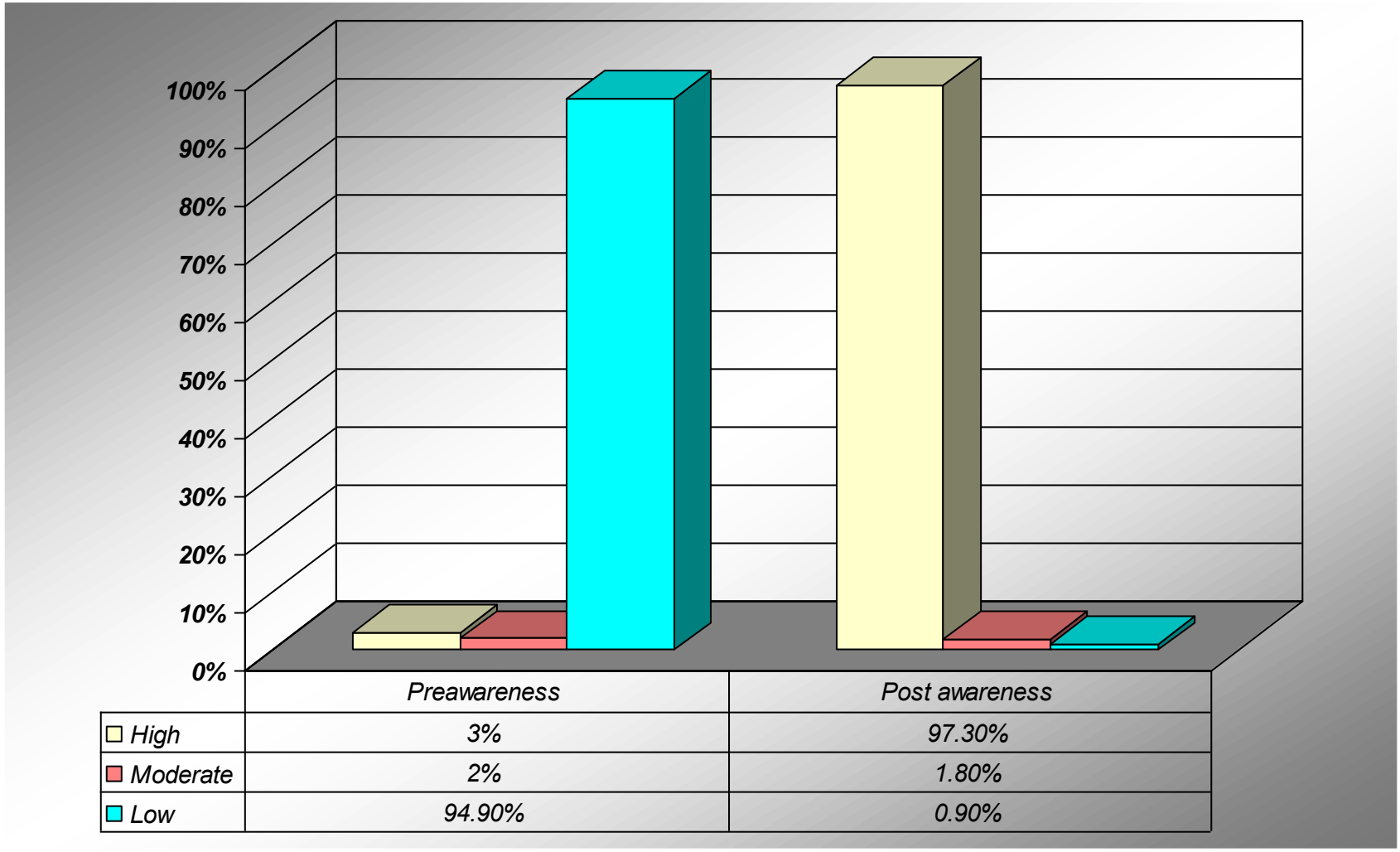


Figure (2) Total staff nurses' artificial intelligence knowledge level pre and post awareness sessions (n = 560)

Table (3): Total staff nurses' artificial intelligence perception level pre and post awareness sessions (n = 560)

Dimensions of artificial intelligence perception	Pre awareness sessions						Post awareness sessions						Pre- post awareness sessions	
	High		Moderate		Low		High		Moderate		Low		χ2	p value
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
1. Knowledge and definition of AI.	10	1.8	11	1.9	539	96.3	549	98	10	1.8	1	0.2	19.50*	0.001
2.Opportunities and perceived benefits.	19	3.4	12	2.1	529	94.5	535	95.5	15	2.7	10	1.8	12.40**	0.001
3. Anxiety and disadvantages.	20	3.6	15	2.7	525	93.7	550	98.2	5	0.9	5	0.9	14.44**	0.001
4. Facilitators and future needs.	21	3.7	10	1.8	529	94.5	545	97.3	10	1.8	5	0.9	12.50**	0.001
Total	**17**	**3.0**	**12**	**2.1**	**531**	**94.9**	**545**	**97.3**	**10**	**1.8**	**5**	**0.9**	**14.71****	**0.001**



	Preawareness	Post awareness
High	3%	97.30%
Moderate	2%	1.80%
Low	94.90%	0.90%

Figure 3: Total staff nurses' artificial intelligence perception level pre and post awareness sessions (n = 560)

Table (4): Total staff nurses' digital competence perception level pre and post awareness sessions (n = 560)

Dimensions of digital competence perception	Pre awareness sessions						Post awareness sessions						Pre- post awareness sessions	
	High		Moderate		Low		High		Moderate		Low		χ2	p value
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
1.Digital competence knowledge	10	1.8	30	5.3	520	92.9	545	97.3	10	1.8	5	0.9	17.50*	0.001
2.Digital competence skills.	1	0.2	20	3.6	539	96.2	505	90.1	45	8.0	10	1.8	19.40**	0.001
3.Digital competence attitude.	5	0.9	15	2.7	540	96.4	495	88.4	60	10.7	5	0.9	15.44**	0.001
Total	**5**	**0.9**	**22**	**3.9**	**533**	**95.2**	**515**	**91.9**	**38**	**6.8**	**7**	**1.3**	**17.44****	**0.001**

Table (5): Simple linear regression for the effect of artificial intelligence knowledge and perception on staff nurses' digital competence perception pre and post awareness sessions (n=560).

Model	Digital competence perception									
	Pre-awareness sessions					Post awareness sessions				
	Liner regression					Liner regression				
(Constant) Total artificial intelligence knowledge	B	R	R^2	Std. Error	t(sig)	B	r	R^2	Std. Error	t(sig)
	.26	.26	**.07**	.126	2.04 (.03)	.66	.91	**.83**	.043	16.53 (.000)
Total artificial intelligence perception	.19	.17	**.09**	.121	1.09 (.02)	.63	.90	**.89**	.053	19.12 (.000)

Discussion

The integration of artificial intelligence into nursing practice is crucial to be updated with recent world changes. Also, nurses should develop their digital competencies to ensure quality and productivity. As regard to nurses age, the study findings showed that less than half of studied staff nurses were under 25 years old, with a mean age of 27.76 years. This result suggested that the sample primarily contained first to mid-career professionals. Their relative youth might correlated with a greater openness to and familiarity with digital technologies. The study results were in line with the study by ***(Alruwaili et al., 2024)*** entitled " Exploring nurses' awareness and attitudes toward artificial intelligence: Implications for nursing practice" which stated that the young workforce might influence high adaptability to AI technologies.

In relation to level education of studied staff nurses, the study findings indicated that fewer than two-thirds held a bachelor's degree in nursing, it indicated a moderate level of formal education, and they generally considered well educated workforce. The study results are in line with the study by ***(Kaihlanen et al., 2021)*** entitled**"** Nursing informatics competences of Finnish registered nurses after national educational initiatives: A cross-sectional study" which showed that the higher level of education among nursing professionals often correlates with greater digital literacy and a stronger ability to adapt to new technologies

As regard to staff nurses' work experience, the study findings indicated that around two-thirds of the nurses had between 5 and 10 years of work experience, which suggested a sample of individuals who have had some exposure to traditional nursing practices but are likely still adaptable to new technological advancements. The study results were in line with the study by ***(Alruwaili et al., 2024)*** which stated that nurses' level of experience may impact their openness to adopting AI tools.

Regarding artificial intelligence knowledge level pre and post awareness sessions implementation, the study findings indicated that before awareness sessions' implementation, there was only a small percentage of staff nurses displayed satisfactory knowledge regarding artificial intelligence and after the awareness sessions the high majority demonstrated a high level of satisfactory knowledge regarding artificial intelligence. It indicated that targeted awareness sessions significantly improved knowledge levels within healthcare settings, particularly on complex topics like artificial intelligence. The study result is in line with the study by ***(Abdel Gawad, Abd El Rahman, Ayed & Sofar, 2024)*** which demonstrated that the nurses had improved their knowledge regarding artificial intelligence after training intervention.

Also, the study results indicated that there was a significant and positive improvement in nurses' knowledge levels related to all categories of artificial intelligence compared to pre-awareness levels ($P<0.001$). The study results in line with the study by ***(Khalil, Bakheet, Atiya, Jehani, Abdullah & Haddad, 2025)*** which showed that participants had significant improvement in their knowledge, with post-knowledge scores increasing from 115.22 to 131.71. and, the study findings in agreement with ***(Mohamed, Mohamed, Mahmoud, & Heggy, 2023)*** which showed that the educational intervention had a highly statistically significant positive effect on the nurses' knowledge and attitudes regarding artificial intelligence.

Referring to staff nurses' Artificial Intelligence Perception Level pre and post awareness sessions, the study results indicated that there were only a small percentage of staff nurses who displayed high perception level regarding artificial intelligence. However, following awareness, a substantial majority demonstrated a high level of perception regarding artificial intelligence. The

study findings in agreement with ***(Abd El-Monem, Rashed & Hasanin 2023)*** which indicated that a significant majority of staff nurses had a high level of perception toward AI technology, and in agreement with the study by ***(Wang et al., 2024)*** which stated more than half of nurses demonstrated high perception toward artificial intelligence.

Additionally, the study results indicated that there was a significant and positive improvement in staff nurses' perception levels related to all categories of artificial intelligence compared to pre-awareness levels ($P<0.001$). The dramatic positive shift in staff nurses' perceptions of AI indicated the effectiveness of awareness sessions. The significant improvement ($P<0.001$) that observed across all AI-related categories emphasized the need for continuous AI education for the healthcare professionals to bridge gaps in understanding AI in clinical settings. The study findings in line with (***Al-Sabawy***, **2023)** which conducted in Turkey and found that educational intervention increased most nurses believed awareness of AI programs like ChatGPT and it would contribute to professional development. But the study results in contrast with the study by ***(Abdel-Moaty, El-Molla & Abdel-Wahab, 2024)*** which reported that less than half had a low perception level of AI applications, indicating that perception levels can vary significantly based on demographic and professional factors

As regards staff nurses' digital competence perception level pre and post awareness sessions, the study findings illustrated that before implementation of the awareness sessions, there was only a small percentage of staff nurses who showed high perception level regarding digital competence. However, following sessions, the majority demonstrated a high level of perception regarding digital competence. The study results in line with A systematic review by ***(Kulju et al. 2024)*** which identified that the educational interventions improved various aspects of digital competence among healthcare professionals.

Also, the study reported that there was statistically significant improvement ($P < 0.001$) in the nurses' perception levels across all categories of digital competence. The statistical significance supports the inference that the awareness sessions had a real and measurable impact on the nurses' self-perceived digital competence. Statistical validation ensured that the changes observed are not due to random chance and emphasized the importance of such educational initiatives. Correspondingly, the study by ***(Hariyati et al. 2024)*** which demonstrated that digital nursing promotion programs increased ethics digital mastery.

As regards the effect of artificial intelligence knowledge and perception on staff nurses' digital competence perception pre and post awareness sessions. The study results highlighted that Artificial Intelligence knowledge has a substantial effect on nurses' digital competence, with a coefficient of 0.83 post-awareness sessions. It suggested that increasing nurses' understanding of Artificial Intelligence directly increases their ability to use digital tools effectively. Also, the effect of AI perception on digital competence is even greater, reaching 0.89 post-awareness sessions. it emphasized the importance of not only educating nurses about Artificial Intelligence but also fostering positive attitudes and perceptions toward its integration into clinical practice.

The study results in line with study by ***(Hoelscher & Pugh, 2025)*** which emphasized the importance of AI literacy for nurses, stating that integrating AI into academic and bedside learning is crucial for addressing literacy gaps and ensuring safe, effective patient care. Also, another study by ***(Abou Hashish & Alnajjar, 2024)*** which highlighted that the Artificial Intelligence knowledge has a substantial effect on nurses' digital competence and the continuous education improve nurses' digital health literacy and attitudes toward AI.

Also, the study findings in agreement with ***(Makhlouf, Alenezi & Shokr, 2024)*** which assessed the effectiveness of AI-focused training programs concluded that such interventions meaningfully improve nurses' knowledge, skills, and attitudes toward AI, reinforcing the importance of structured awareness sessions. Likewise, the study by ***(Hassan & El-Ashry, 2024)*** which found AI knowledge positively influences digital competence and integration of AI in healthcare enhances nurses' decision-making and workflow efficiency.

Conclusion

- There was an affected improvement in Artificial Intelligence knowledge, with only 4.7% demonstrating satisfactory knowledge before the sessions, compared to 98% afterward highlighted the effectiveness of structured educational interventions in enhancing Artificial Intelligence literacy among nurses.
- Nurses' perception of Artificial Intelligence improved significantly, from 3% to 97.3% post-awareness. This referred to awareness sessions played a pivotal role in shaping Artificial Intelligence positive attitudes
- Digital Competence Perception had a substantial increased, from 0.9% to 91.9%, demonstrating that Artificial Intelligence education directly enhanced nurses' confidence in using digital tools.
- Artificial Intelligence knowledge and perception both had a strong positive effect on digital competence, with coefficients of 0.83 and 0.89, respectively. It highlighted that both knowledge and attitude are essential drivers of digital competence among nurses.

Recommendations

- Strengthen Artificial Intelligence Education in Nursing by integration into nursing curricula and continuing education programs to confirm that all nurses, regardless of their experience and education level, are equipped with important AI knowledge and skills.
- Foster the Culture of Continuous Learning by encouraging healthcare institutions to invest in AI education and provide resources for learning, such as online courses, and certifications. Establishment of mentorship programs where experienced nurses and AI specialists can guide their peers in adopting AI tools and technologies.
- Promote Interdisciplinary Collaboration through Encouraging the collaboration between nurses, IT specialists, and AI developers to co-design AI tools that are user-friendly and aligned with clinical needs.

Furthers studies:

- Supportive leadership as a mediator between artificial intelligence and digital competence among nurses.

Acknowledgements

The authors thank all staff nurses who agreed to participate in this study.

References

1. Abdel Hady Abdel Gawad, D., Ibrahim Ahmed Abdou Abd El Rahman, B., Mohamed Ahmed Ayed, M., & Mahmoud Sofar, S. (2024). Impact of Instructional Guidelines on Surgical Nurses' Knowledge and Attitude regarding Artificial Intelligence Application. *Egyptian Journal of Health Care*, *15*(3), 555–569. https://doi.org/10.21608/ejhc.2024.378025
2. Abdel-Moaty, M. A., El-Molla, M. A., & Abdel-Wahab, E. A. (2024). Nursing interns' perception about artificial intelligence applications in nursing. *Egyptian Nursing Journal*, *21*(2), 121-128.

3. Abou Hashish, E. A., & Alnajjar, H. (2024). Digital proficiency: assessing knowledge, attitudes, and skills in digital transformation, health literacy, and artificial intelligence among university nursing students. *BMC Medical Education*, *24*(1), 508.
4. Abou Hashish, E. A., and H. Alnajjar. 2024. "Digital Proficiency: Assessing Knowledge, Attitudes, and Skills in Digital Transformation, Health Literacy, and Artificial Intelligence Among University Nursing Students." *BMC Medical Education* **24**, no. 1: 1–11. **https://doi.org/10.1186/s12909-024-054**
5. Abuzaid, M. M., Elshami, W., & McFadden, S. (2022). Integration of artificial intelligence into nursing practice. Health and Technology, 12, 1109–1115. https://doi.org/10.1007/s12553-022-00697-0
6. Agaoglu, F.O., Bas, M., Tarsuslu, S. *et al.* The mediating digital literacy and the moderating role of academic support in the relationship between artificial intelligence usage and creative thinking in nursing students. *BMC Nurs* **24**, 484 (2025). https://doi.org/10.1186/s12912-025-03128-3
7. Ahmed, S. K. 2024. "Artificial Intelligence in Nursing: Current Trends, Possibilities and Pitfalls." *Journal of Medicine, Surgery, and Public Health* **3**: 100072. **https://doi.org/10.1016/j.glmedi.2024.100072**.
8. AlDhaen, F.S. AI-Powered Transformation of Healthcare: Enhancing Patient Safety Through AI Interventions with the Mediating Role of Operational Efficiency and Moderating Role of Digital Competence—Insights from the Gulf Cooperation Council Region. *Healthcare* 2025, *13*, 614. https://doi.org/10.3390/healthcare13060614
9. Alruwaili, M. M., Abuadas, F. H., Alsadi, M., Alruwaili, A. N., Elsayed Ramadan, O. M., Shaban, M., Al Thobaity, A., Alkahtani, S. M., & El Arab, R. A. (2024). Exploring nurses' awareness and attitudes toward artificial intelligence: Implications for nursing practice. *DIGITAL HEALTH*, *10*. https://doi.org/10.1177/20552076241271803
10. Al-Sabawy, M. R. (2023). Artificial intelligence in nursing: a study on nurses' perceptions and readiness. In *1st international and 6th scientific conference of kirkuk health directorate*.
11. Amin, S.M., El-fattah Mahgoub, S.A., Tawfik, A.F. *et al.* Nursing education in the digital era: the role of digital competence in enhancing academic motivation and lifelong learning among nursing students. *BMC Nurs* 24, 571 (2025). https://doi.org/10.1186/s12912-025-03199-2
12. Asal M., Alsenany S., Elzohairy N., El-Sayed A.,"The impact of digital competence on pedagogical innovation among nurse educators: The moderating role of artificial intelligence readiness", Nurse Education in Practice, Volume 85,2025,104367,ISSN 1471-5953, https://doi.org/10.1016/j.nepr.2025.104367.
13. Booth, R. G., Strudwick, G., McBride, S., O'Connor, S., & Solano López, A. L. (2021). How the nursing profession should adapt for a digital future.BMJ,373, n1190. https://doi.org/10.1136/bmj.n1190
14. Bove, L.A., & Sauer, P. (2023). Nursing faculty informatics competencies. CIN: Computers,Informatics,Nursing,41(1), 18–23. https://doi.org/10.1097/cin.0000000000000894
15. Buchanan, C., M. L. Howitt, R. Wilson, R. G. Booth, T. Risling, and M. Bamford. 2021. "Predicted Influences of Artificial Intelligence on Nursing Education: Scoping Review." *JMIR Nursing* **4**, no. 1: 1–11. **https://doi.org/10.2196/23933**.
16. Cardona, M. A., R. J. Rodríguez, and K. Ishmael. 2023. "Artificial Intelligence and the Future of Teaching and Learning." *Miguel A. Cardona Roberto J. Rodríguez Kristina Ishmael* **1**: 1–71. **https://www2.ed.gov/documents/ai-report/ai-report.pdf**.
17. Castonguay, A., P. Farthing, S. Davies, et al. 2023. "Revolutionizing Nursing Education Through AI Integration: A Reflection on the Disruptive Impact of ChatGPT." *Nurse Education Today* **129**: 105916. **https://doi.org/10.1016/j.nedt.2023.105916**.
18. Choi, J., S. Woo, and A. Ferrell. 2023. "Artificial Intelligence Assisted Telehealth for Nursing: A Scoping Review." *Journal of Telemedicine and Telecare* **31**, no. 1: 1357633X231167613. **https://doi.org/10.1177/1357633X231167613**.
19. Cohen J. (2013). Statistical power analysis for the behavioral sciences. 2nd ed. New York: Routledge.
20. Encarnação, R., T. Manuel, H. Palheira, J. Neves-Amado, and P. Alves. 2024. "Artificial Intelligence in Wound Care Education: Protocol for a Scoping Review." *Nursing Reports* **14**, no. 1: 627–640. **https://doi.org/10.3390/nursrep14010048**.
21. Faul F, Erdfelder E, Buchner A, Lang AG.(2009). Statistical power analyses using G*Power 3.1: tests for correlation and regression analyses. Behavior Research Methods. 41(4):1149–60.
22. Fernandes, F., P. Santos, L. Sá, and J. Neves. 2023. "Contributions of Artificial Intelligence to Decision Making in Nursing: A Scoping Review Protocol." *Nursing Reports* **13**, no. 1: 67–72. **https://doi.org/10.3390/nursrep13010007**.
23. Hariyati, R. T. S., Handiyani, H., Zaharany, T. A., Merduaty, R. C., Wildani, A. A., Rachmi, S. F., Gayatri, D., Rahman, L. A., & Kobayashi, N. (2024). Digital nursing promotion has increased ethics

digital literacy: Program improvement. *F1000Research*, *13*, 366. https://doi.org/10.12688/f1000research.139211.1

24. Hassan, E. A., & El-Ashry, A. M. (2024). Leading with AI in critical care nursing: challenges, opportunities, and the human factor. *BMC nursing*, *23*(1), 752.
25. Hoelscher, S. H., & Pugh, A. (2025). NURSES embracing artificial intelligence: A guide to artificial intelligence literacy for the nursing profession. *Nursing Outlook*, *73*(4), 102466.
26. https://doi.org /10.3758/BRM.41.4.1149.
27. Hussein Mohamed, S., Abed El-Rahman Mohamed, M., Farouk Mahmoud, S., & HessienYousef Heggy, E. (2023). The Effect of Educational Program on Nurses' Knowledge and Attitude Regarding Artificial Intelligence. *Egyptian Journal of Health Care*, *14*(2), 1110–1128. https://doi.org/10.21608/ejhc.2023.312617
28. Kaihlanen, A.-M., Gluschkoff, K., Kinnunen, U.-M., Saranto, K., Ahonen, O., & Heponiemi, T. (2021). Nursing informatics competences of Finnish registered nurses after national educational initiatives: A cross-sectional study. *Nurse Education Today*, *106*, 105060. https://doi.org/10.1016/j.nedt.2021.105060
29. Khalil, A. I., Bakheet, J., Atiya, D., Jehani, R. A., Abdullah, R., & Haddad, M. (2025). Cultivating artificial intelligence (AI) competence and shaping attitudes among psychiatric hospital nurses: A quasi-experimental study. *DIGITAL HEALTH*, *11*. https://doi.org/10.1177/20552076251336515
30. Kulju, E., Jarva, E., Oikarinen, A., Hammarén, M., Kanste, O., & Mikkonen, K. (2024). Educational interventions and their effects on healthcare professionals' digital competence development: A systematic review. *International Journal of Medical Informatics*, *185*, 105396. https://doi.org/10.1016/j.ijmedinf.2024.105396
31. Mohamed Abd El-Monem, A., Elsayed Rashed, S., & Ghoneimy Hasanin, A. (2023). Artificial Intelligence Technology and its Relation to Staff Nurses' Professional Identity and Problem Solving Abilities. *International Egyptian Journal of Nursing Sciences and Research*, *3*(2), 144–164. https://doi.org/10.21608/ejnsr.2023.277890
32. Wang, X., Fei, F., Wei, J., Huang, M., Xiang, F., Tu, J., Wang, Y., & Gan, J. (2024). Knowledge and attitudes toward artificial intelligence in nursing among various categories of professionals in China: a cross-sectional study. *Frontiers in public health*, *12*, 1433252. https://doi.org/10.3389/fpubh.2024.1433252

الملخص العربي

تأثير الوعي بالذكاء الاصطناعي على إدراك الممرضين للكفاءة الرقمية.

مقدمه: في السنوات الأخيرة، غيّر دمج الذكاء الاصطناعي في إجراءات أنظمة الرعاية الصحية ، بما في ذلك ممارسات الرعاية التمريضية. حيث تقع مسؤولية مواكبة أحدث التطورات العلمية على عاتق الممرضين في ممارساتهم وتطوير قدراتهم على استخدام المعرفة والمهارات والحكم والمواقف والقيم والمعتقدات للأداء في بيئة تكنولوجية متقدمة.

الهدف: أجري هذا البحث لاستكشاف تقييم تأثير الوعي بالذكاء الاصطناعي على إدراك الممرضين للكفاءة الرقمية.

التصميم: تم استخدام تصميم بحث شبه تجريبي لتحقيق هدف الدراسة.

المشاركون: شارك في الدراسة 560 ممرضًا وممرضة. مكان الدراسة: أجريت الدراسة في "مستشفى سمنود المركزي"، أحد "مستشفيات وزارة الصحة المصرية".

أدوات جمع البيانات: استُخدمت ثلاث أدوات لجمع البيانات: استبيان معرفة الذكاء الاصطناعي، ومقياس إدراك الذكاء الاصطناعي، واستبيان الكفاءة الرقمية.

النتائج: بعد تطبيق جلسات التوعية، كان هناك تحسن ذو دلالة إحصائية عالية في مستويات معرفة الذكاء الاصطناعي وإدراكه ($p=0.001$) بين الممرضين. علاوة على ذلك، ارتبطت جلسات التوعية بالذكاء الاصطناعي ارتباطًا إيجابيًا بإدراك الممرضين للكفاءة الرقمية.

الاستنتاج: كان لجلسات التوعية بالذكاء الاصطناعي تأثير إيجابي على إدراك الكفاءة الرقمية بين الممرضين.

التوصيات: ينبغي على مؤسسات الرعاية الصحية تطبيق جلسات التوعية بالذكاء الاصطناعي كخطوة لتحسين الكفاءة الرقمية للممرضين.

الكلمات المفتاحية: الذكاء الاصطناعي، الكفاءة الرقمية، الممرضين.