

Effect of Educational Guidelines on Maternity Nurses' Knowledge and Attitude regarding Artificial Intelligence Application

1Nawal Kamal Abd Elkhalek, 2 ElSayeda Hamdy NasrAbdelhalim, 3Heba Atef Osman, 4Manal Mohamed Ahmed Ayed, 5 Magda Fawzy Hasab Allah Youssef

1 Assistant professor of obstetrics and gynecological nursing, South Valley University

6Assistant Professor of Maternity, Obstetrics, and Gynecology Nursing, Faculty of Nursing, Port Said University

3Lecturer of Women Health and Obstetrics Nursing, Faculty of Nursing, Minia University, Egypt

4Pediatric Nursing Department, Faculty of Nursing, Sohag University, Egypt

5Assistant professor of Women's Health and Obstetrics Nursing, Faculty of Nursing, Minia University, Egypt

Abstract

Background: There is a vast growth of Artificial Intelligence (AI) applications across all aspects of healthcare. Nursing practice is critical and AI technology will enhance practice and patient outcomes. **The study aimed to** investigate the effect of educational guidelines on maternity nurses' knowledge and attitude regarding Artificial Intelligence applications. **Design:** A quasi-experimental research design with a pre/post-test was utilized. **Setting:** This study was conducted at Sohag University Hospital's obstetrics department. **Sample:-** A convenience sampling of all nurses working in the previously mentioned setting, Egypt. **Tools: Tool (1):** A self-administered Nurses' Knowledge Questionnaire regarding Artificial Intelligence and **Tool (2):** Nurses' General Attitudes towards Artificial Intelligence Questionnaire. **Results:** Pre-implementation of the educational guidelines, 90% had unsatisfactory total knowledge scores and 88% had a negative attitude. After implementing the instructional guidelines, 92% had satisfactory total knowledge scores, and 96% had a positive attitude with statistically significant differences. Moreover, highly statistically significant differences between the demographic characteristics and total knowledge level post-implementation of the educational guidelines at ($P < 0.00$). **Conclusion:** The educational guidelines that were conducted in this area had a significant effect on the promotion of maternity nurses' knowledge and attitude regarding Artificial Intelligence applications. **Recommendations:** maternity nurses should be provided with in-service training programs related to Artificial Intelligence applications and well-informed continuous; educational guidelines should be imparted to them. **Keywords:** Artificial Intelligence application, Educational guidelines, Maternity nurses' knowledge and attitude.

Introduction:

According to **Ronquillo et al. (2021)**, artificial intelligence enhances the creativity and strategic thinking of senior managers, hence impacting their responsibilities. Artificial intelligence is a useful tool in the healthcare industry that can help with many clinical problems and the assessment of disease. It can also reduce data loss, improve communication skills among nurses, improve inpatient care management, lessen the workload of nurses, and improve patient safety (**Zhou et al., 2022**). Furthermore, nursing intervention can benefit from AI-based medical information processing, as **Liu et al. (2022)** made clear.

Artificial intelligence (AI) is created by creating computer systems that can mimic intelligent human behavior and commonly complete tasks that humans do (**Ronquillo et**

al., 2021). Artificial Intelligence (AI) describes techniques for teaching machines to mimic human cognitive functions such as learning, thinking, decision-making, and communication. According to the definition of AI, it includes "software (and possibly hardware) systems designed by humans that, given a complex goal, act in the physical or digital dimension by perceiving their environment through data acquisition, interpreting the collected structured or unstructured data, reasoning on the knowledge derived from this data, and deciding the best action(s) to take." (**Von Gerich et al., 2021**).

Artificial Intelligence Technology (AIT) is a subfield of computer science that aims to mimic human brain function by automating a variety of activities, such as learning and decision-making, and by accomplishing jobs or solving issues that are also utilized in patient

care (Abuzaid et al., 2022). Three types of artificial intelligence (AI) are used in hospitals: machine learning, which is a statistical technique set for problem-solving; deep learning, which is a machine learning approach and neural network extension; and natural language processing, which is the most recent and relates to the fusion of linguistics and artificial intelligence and includes intelligent analysis of written language (Azzi et al., 2020; Von Gerich et al., 2021).

A professional identity is created through internalizing professional information, abilities, attitudes, values, and ethical standards; then, in nursing education and practice, incorporating these characteristics into one's own identity and behavior. Maternity health nurses who possess a strong sense of professional identity are aware that their role fully satisfies these requirements in conformity with ethical standards and professional ideals (Buchanan et al., 2021). A wide range of factors, such as the educational environment, critical thinking, clinical practice, cognition, personal traits, societal and environmental traits, and public illustration, might impact the formation of a professional identity (Lee & Yoon, 2021).

Maternity nurses' attitude to assisting patients with their difficulties is influenced by their perspective on their work. The final objective of the nursing process is to give comprehensive care, and the qualities and abilities of certain maternity health nurses can affect the quality of care and assist them in understanding patients, solving difficulties, and doing so (Kim & Sim, 2020). Problem-solving is the capacity to identify appropriate and practical solutions to issues that arise in day-to-day living. An individual or group can gain focus and skill by using problem-solving strategies (Altas, 2020; Gerich et al.; 2021; Lee & Yoon, 2021).

These days, speech acceptance (Ronquillo et al., 2021), data mining, and physical deterioration forecasting are among the major AI applications employed in nursing practice. However, future developments in AI technology will help nurses integrate pertinent data and offer tailored, evidence-based care (Hannaford et al., 2021). Few studies have examined nurses' and nursing students' perspectives, in contrast to the great majority of

AI research, which is centered on creating and evaluating AI algorithms and the prediction models that go along with them (O'Connor, 2021). There's a chance that this knowledge gap affects the entire field and has to be fixed. There is little doubt that the use of AI in healthcare practice and education will continue to grow (Swan & Haas, 2021).

A complete understanding of the attitudes and actions of nurses regarding current and upcoming AI applications is necessary for the successful integration of AI into clinical practice. Furthermore, since nurses use technology and have direct contact with patients, evaluating their current level of AI understanding is essential to determining what future training needs will be (O'Connor, 2021).

The nursing profession is essential to the provision of healthcare because it works closely with patients and guarantees the effectiveness of diagnosis and treatment plans. Maintaining patient charts, documenting, taking vital signs, helping with physical examinations, and facilitating communication between patients, nursing professionals, and the administrative sector are just a few of the many and varied daily responsibilities that nurses perform (Taryudi et al., 2022).

That being said, it is certain that AI will have a revolutionary effect on nursing practice. A few instances of how artificial intelligence is being used in nursing practice are robots for special needs, drug delivery robots, and decision-making apps for nursing diagnosis, planning, and intervention (Booth et al., 2021). Nurses need to be aware of and knowledgeable about artificial intelligence since they play a crucial role in providing nursing care. However the majority of recent research has concentrated on creating AI applications and contrasting pre- and post-integration work; some studies have tried to gauge participants' awareness of and desire to incorporate AI into their regular activities (Ronquillo et al., 2021).

Significance of the study:

Egypt has become a safer place to live and conduct business, and the nation has started implementing technology and artificial intelligence across several industries to realize Egypt's Vision 2030. Through programs meant

to encourage research and development within its borders, the government is getting increasingly involved in spurring the development of artificial intelligence. In the context of an artificial intelligence and robotics-powered Egyptian society, the government has established a broad goal that by 2030, these two fields will account for 7.7% of Egypt's GDP (**Egypt's Artificial Intelligence Future, 2020**). Artificial intelligence technologies can also improve nursing performance by enabling nurses to provide more tailored, evidence-based care for their patients by enhancing their professional and supportive abilities in solving problems (**Abd El-Monem, 2023**).

Artificial intelligence (AI) technology has the potential to improve nursing practice and enable medical-surgical nurses to provide more tailored, evidence-based care for their patients by enhancing their professional demeanor and approving solutions to issues. Healthcare industries need to undergo significant change to become more competitive in the labor market. As of right now, artificial intelligence has drawn the interest of important healthcare executives and providers, who are now debating whether to totally or partially incorporate it into their work care by enhancing nurses' professional and assistance (**Elsayed&Sleem, 2021**). The progress of artificial intelligence technology in the healthcare industry is sustained by factors such as cost, quality, care results, and the ability to analyze vast volumes of data rapidly. That being said, not much research has looked into how nurses may use artificial intelligence technologies to better educate patients (**Shaik, 2020**).

Aim of the study

The current study aimed to investigate the effect of educational guidelines on maternity nurses' knowledge and attitude regarding artificial intelligence application through objectives:

- 1- Assess maternity nurses' knowledge level regarding artificial intelligence applications.
- 2- Assess maternity nurses' attitude level toward artificial intelligence applications.
- 3- Designing and applying educational guidelines regarding artificial intelligence for nurses according to their actual needs.

Evaluating the effect of educational guidelines on maternity nurses' knowledge and attitude regarding artificial intelligence application.

Hypothesis:

H1: Educational guidelines implementation regarding artificial intelligence applications is expected to improve nurses' knowledge levels post-implementation than pre-implementation.
H2: Educational guidelines implementation regarding artificial intelligence applications is expected to have a positive effect on nurses' attitude levels post-implementation than pre-implementation.

Subjects and Methods

Design:

A quasi-experimental research design with a pre/post-test was utilized to achieve the aim of this study. This research used a quasi-experimental research design (a pre-and post-intervention study) to evaluate the effect of specific interventions. "In quasi-experimental research, there is no control group, no select group, no randomization, and/or no energetic manipulation (**Iowa State University of Science and Technology, 2021**).

Setting:

This study was conducted at Sohag University Hospital's obstetrics department.

Subjects:

A convenience sampling of all nurses working in the previously mentioned setting, Egypt.

Tools of data collection:

Data were collected using two study tools:

Tool (1): A self-administered Nurses' Knowledge Questionnaire regarding Artificial Intelligence:

The researchers developed this questionnaire to assess nurses' knowledge of artificial intelligence. It includes two sections as follows:

Part I: Included nurses' demographic characteristics as age, gender, educational level, and years of professional experience, having

previously trained and dealt with artificial intelligence, and the source of knowledge of artificial intelligence.

Part II: Included artificial intelligence knowledge, developed by the research team after reviewing relevant literature and guided by Lennartz et al., (2021); and Shimon et al., (2021), to assess the artificial intelligence knowledge levels of nurses pre and post-sessions. The questions included two different types: both true and false questions) and multiple-choice questions and were divided into 12 categories: Definition of artificial intelligence in the nursing field (2 marks), how artificial intelligence works (2 marks), importance (2 marks), advantages (6 marks), disadvantages (6 marks), types of artificial intelligence (4 marks), Basic Components of AI (5 marks), barriers (5 marks), principles (6 marks), applications (examples of artificial intelligence that can help the medical and surgical nurse, and examples of artificial intelligence in the nursing field (10 marks). Additionally, this part is asking about problems of artificial intelligence in the nursing field (10 marks), and principles (5 marks).

Scoring system: Each true or false response, received "Two marks" if it was complete and correct, "One" if it was correct but incomplete and a "zero" if it was don't know. The nurse was considered to have satisfactory artificial intelligence knowledge if the percent score was 60%, or higher and unsatisfactory artificial intelligence knowledge if the percent score was less than 60%.

Tool (2): Nurses' General Attitudes towards Artificial Intelligence Questionnaire.

It was adapted from Schepman and Rodway (2020), using a five-point Likert scale with 1 representing strongly disagree, 2 representing disagree, 3 representing neutral, 4 representing agreement, and 5 representing strongly agree. It uses 24 questions including statements and aims to assess the general attitudes about AI.

Scoring System:

Based on the cut of value 60%, the nurses' attitude is determined as negative ≤ 60 and positive attitude ≥ 61 (Elsayed and Sleem, 2021).

Administrative and Ethical Considerations:

Approval to conduct this study was obtained from the Research Ethics Committee of the Faculty of Nursing, Sohag University. To obtain official approval to conduct the study, an official letter was issued by the Dean of the Faculty of Nursing at Sohag University to the Director of the previously selected settings. Nurses who agreed to participate in the study provided written consent. The voluntary participation of nurses was confirmed. Nurses were informed that they could withdraw from the study at any time without giving any reasons. Confidentiality was established through the use of tokens to ensure anonymity.

Tools Validity and Reliability:

All of the tools were translated into Arabic and retranslated into English by the researchers. A panel of five experts from in the field of AI and obstetric Nursing department tested the tools to appraise their face and content validity. The experts revised the tools for their content, clarity, simplicity, relevance, completeness, and suitability. No changes were made in response to their feedback. From the standpoint of experts, the tools were valid. As for reliability, the Cronbach's alpha value (Internal consistency) of the nurses' knowledge was 0.974, and of the nurses' attitudes was 0.865, indicating the high reliability of the tools.

Pilot study:

It was conducted on 5 nurses; representing 10% of the study sample. It was done to identify the clarity and feasibility of the tools used in the study. The pilot study's data were analyzed. Nurses who participated in the pilot study were included in the main study sample.

Fieldwork

Between the beginning of July 2023 and the middle of December 2023, data was gathered. The educational intervention for artificial intelligence was implemented according to the following phases:

I. Assessment phase:

Once permission was granted to proceed with the study, the researchers visited the study

settings. The researchers began recruiting a sample of nurses. The researchers introduced themselves to each nurse individually, gave them an overview of the study's objectives and procedures, and invited them to take part. The researchers read and explained each item of study tools to each nurse and recorded her responses to each item. The researchers began filling in the questionnaire which took about 35 to 45 minutes to be completed. Using the research questionnaire, they interviewed each nurse individually to obtain baseline data of demographic characteristics, knowledge questionnaire, and attitude scale.

II. Planning phase:

Based on the literature relevant to artificial intelligence research, researchers gained a comprehensive understanding of all aspects of artificial intelligence. The results obtained from the assessment phase reported to characteristics of the study sample, and the researchers designed the intervention sessions' content. In addition, the researchers designed and illustrated a booklet, and its content was proved and it was distributed to the studied nurses to be used as a guide for self-learning. The researchers worked with the principals of the hospital to find a suitable place for the educational intervention, it was the lecture room, dedicated to providing workshops and training for nurses. This room contains data displays for any lectures. A handout was prepared and distributed to nurses by the end of each session of the educational guidelines. The researchers established the AI educational intervention for the studied subjects according to the following steps:

Setting the educational guidelines objectives

▪ General objective:

The general objective of the intervention program was to increase nurses' knowledge levels and improve their attitudes toward artificial intelligence.

Specific objectives:

After implementing the current educational guidelines, the nurses should be able to:

Define artificial intelligence and its characteristics in the nursing field.

Explain the importance of artificial intelligence.

Discuss how artificial intelligence works

List the advantages of artificial intelligence and its strategy.

Identify the barriers to artificial intelligence

Enumerate the disadvantages of artificial intelligence.

Discuss the four types of artificial intelligence.

Explain the components of artificial intelligence.

Discuss the applications of AI (Examples of AI that can help the studied nurse, and examples of AI in the health field).

List the most important problems of artificial intelligence and their solutions in the health field.

Explain the principles that address AI.

Demonstrate the problems and solutions of artificial intelligence in the nursing field.

Discuss the statements of the general attitudes scale and improve the positive attitudes towards AI.

III. Implementation phase:

All selected nurses were subjected to the educational guidelines. The educational guidelines were implemented by the researchers in the selected settings. The nurses were divided into ten groups, each group included 5 nurses. Each session had specific objectives and titles based on its content, which varied according to the nurse's comprehension and assimilation of the information, as well as the time available and the content of each session. The same contents were presented to all nurses, and sessions were conducted using lectures, role models small group discussions, and the brochures booklet and were employed throughout.

A PowerPoint presentation supported the health education intervention, and four videos were shown to all computer users in the current study on a laptop computer, followed by a group discussion about the contents. In addition, researchers helped nurses gain knowledge of feedback. Also, brochures with attractive images and simple, clear text were distributed to guide them after the intervention. Each session starts with a summary of what

had been given in the previous one and an explanation of the objectives for the current one, using simple language to accommodate the nurses' level of understanding. During the sessions, reinforcement techniques such as praise were used to encourage active participation and increase learning. The sessions were as follows:

- First session: During this session, the researchers gave an overview of the educational guidelines, including the goal, the number of sessions, the duration of each session, the location of the meeting, and the schedule. Then, a pre-testing was performed using data collection tools.

- Second session: The researchers provided nurses with an overview of the definition and importance of artificial intelligence, AI is the basis for mimicking human intelligence processes through the creation and application of algorithms built into a dynamic computing environment. Stated simply, AI is trying to make computers think and act like humans.

Third session: It was initiated by a review of the previous session followed by a discussion about the role of AI in nursing care, as well, as a discussion of how artificial intelligence works. Artificial intelligence is being used in healthcare to analyze complex medical and healthcare data and to approximate conclusions based solely on input data. The AI is applied to practices such as; diagnostics, treatment protocol development, drug development, personalized medicine, and patient monitoring and care. AI technologies can analyze vast data sets in the form of health records and images, population data, claims data, and clinical trial data to uncover patterns and insights that humans could not find on their own (Luca et al., 2023). The AI simplifies the lives of patients, nurses, doctors, and hospital administrators by performing tasks that are typically done by humans, but in less time and at a fraction of the cost. The AI can improve the speed and accuracy in the use of diagnostics, give practitioners faster and easier access to more knowledge, and enable remote monitoring and patient empowerment through self-care. AI has the potential to fundamentally transform the practice of medicine and the delivery of healthcare (Floridi et al., 2023).

- Fourth session: It includes group discussions about the advantages of artificial intelligence, such as reduction in human errors, taking risks instead of humans, helping in repetitive jobs, digital assistance, faster decisions, daily applications, and new inventions. As well as artificial intelligence strategies were also discussed.

- Fifth session: It initiated by a review of the previous session, followed by a discussion about the barriers to artificial intelligence, such as; cultural barriers, fear, shortage of talent, and lack of a strategic approach to AI adoption, and solutions to any problems were discussed as, computing power, trust deficit, limited knowledge, human-level, data privacy and security, the bias problem, and data scarcity.

In the sixth session, the types of artificial intelligence were demonstrated through movies after a review of the previous sessions. Subsequently, the scientists talked about the elements of AI. Robotics, Natural Language Processing, Computer Vision, Machine Learning, and Expert Systems are some of the components of artificial intelligence. Before the development of these components, machines would not have been able to learn from, comprehend, or interact with their environment.

- Seventh session: It started with a review of previous sessions, then great emphasis is made on increasing nurses' awareness about the applications of AI as examples of artificial intelligence that can help the medical-surgical nurse. As well, as examples of artificial intelligence in the nursing field. Additionally, the researchers explained the problems of artificial intelligence in the health field. Also, the principles that address artificial intelligence in the nursing field.

- Eighth session: It includes group discussions about the problems and solutions of artificial intelligence in the nursing field. Moreover, discussed how to improve the attitude toward artificial intelligence.

- Ninth session: It includes group discussions about knowledge of how artificial intelligence

enhances practice and patient outcomes. Each session lasted between 30 and 35 minutes.

Tenth session: The researchers summarized all previous sessions, identifying nurses' comments about the advantages of the educational intervention. It also included communication channels between researchers and nurses to answer any questions from the nurses and thank them for their participation.

IV. Evaluation phase:

This phase was used to reassess the effect of educational guidelines on maternity nurses' knowledge and attitude regarding artificial intelligence applications using the same pre-test tools post one month of application.

Statistical Analysis:

All statistical analyses were performed using SPSS for Windows version 20.0 (SPSS, Chicago, IL). Continuous data were normally distributed and were expressed in mean \pm standard deviation (\pm SD). Categorical data were expressed in numbers and percentages. The chi-square test (or Fisher's exact test when applicable) was used for comparison of variables with categorical data. Statistical significance was set at $p < 0.05$.

Results:

Table (1) describes that 86% of the studied sample were females, 46% of them aged from 30–40 years. Additionally, 60% had 10–20 years of experience, and 46% of them had a B.Sc. degree in nursing education.

Figure (1): Shows that 80% of the studied maternity nurses didn't have previous training and dealt with artificial intelligence.

Figure (2): Illustrates that 40% of the studied maternity nurses reported that their source of knowledge of artificial intelligence was media.

Table (2): reveals that there were statistically significant differences and improvement in all items of artificial intelligence pre and post-one-month

educational guidelines implementation ($P < 0.05$).

Most (94%) of the studied maternity nurses had unsatisfactory total knowledge scores regarding artificial intelligence in the pre-test phase, while 86 % of them had total satisfactory knowledge scores after educational guidelines implementation **as shown in (Figure, 3).**

Table (3) illustrated that there was a highly statistically significant difference between maternity nurses' knowledge pre and post-one-month educational guidelines implementation regarding artificial intelligence ($P < 0.000$). It's clear from the above table that there was a highly statistically significant difference ($p = < 0.000$) in the maternity nurses' knowledge scores pre and post-one-month of educational guidelines implementation.

It's clear from **Table (4)** that there was a highly statistically significant difference ($p = < 0.000$) and improvement in the maternity nurses' attitude mean scores in artificial intelligence pre and post-one month of educational guidelines implementation.

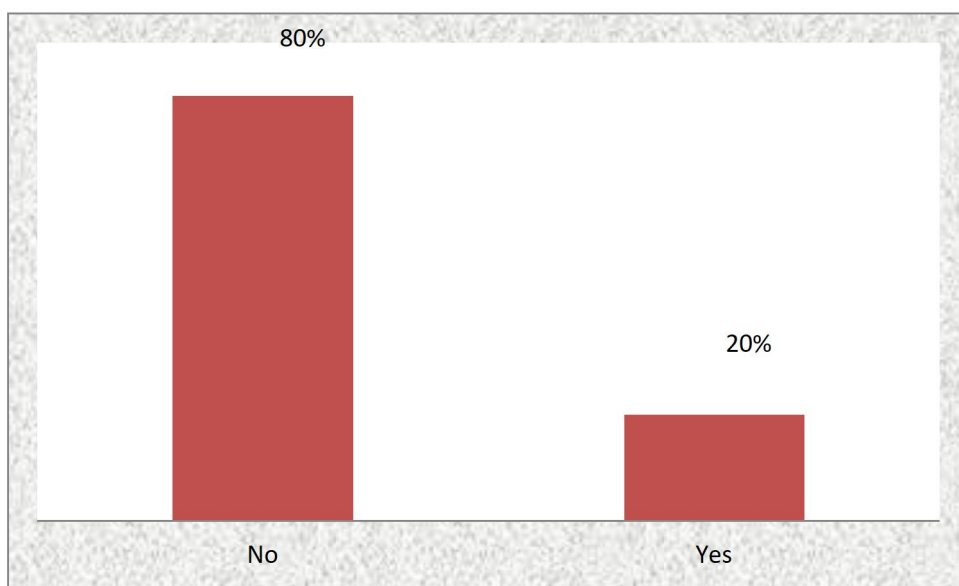
It's clear from **Figure (4)** that there was an improvement in the **maternity nurses'** total scores pre and post-one-month of **educational** guidelines implementation. The majority (86 %) of the study group had a **Positive** total **attitude** level **toward** artificial intelligence in the pre-test phase, compared to 8 % after **educational** guidelines implementation (**Figure, 4**).

Table (5): illustrated that there was a statistically significant correlation between the educational level of the studied maternity nurses' total knowledge and attitude regarding artificial intelligence application throughout the phases of the educational guidelines at $p < 0.01$.

Table (6): Illustrates the correlation between the total knowledge and attitude among maternity nurses. It clarifies that there is a highly statistically positive correlation between total knowledge and attitude regarding artificial intelligence applications (at $p = 0.001^{**}$).

Table (1): Demographic Characteristics among the studied Maternity Nurses (n=50)

Items	N	%
Age (years)		
< 30	11	22.0
30 – 40	23	46.0
> 40	16	32.0
Mean \pm SD	37.7 \pm 9.1	
Gender		
Male	7	14.0
Female	43	86.0
Residence		
Rural	36	72.0
Urban	14	28.0
Educational qualifications		
Secondary nursing	14	28.0
Nursing institute	23	46.0
B.Sc.N,	13	26.0
Experience (Years)		
Less than 10	15	30.0
10 – 20	30	60.0
More than 20	5	10.0

**Figure (1): Maternity nurses' knowledge distribution regarding having previously trained and dealt with artificial intelligence (n=50).**

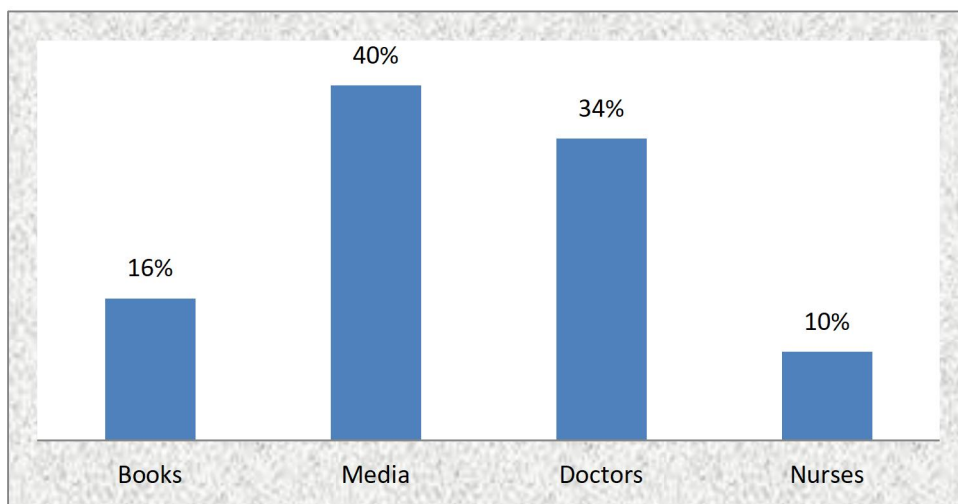


Figure (2): Maternity nurses' knowledge distribution regarding the source of knowledge of artificial intelligence (n=50).

Table (2): Maternity nurses' knowledge distribution regarding artificial intelligence application pre and post-educational guidelines implementation (n=50).

Correct knowledge of artificial intelligence:	Pre		Post		X2 test	p-value
	No.	%	No.	%		
Definition of artificial intelligence	7	14.	46	92.0	88.87	<0.001*
How artificial intelligence works	8	16.0	42	84.0	51.93	<0.001*
Importance of artificial intelligence	15	30.0	47	94.0	65.83	<0.001*
Advantages of artificial intelligence	11	22.0	42	84.0	30.46	<0.001*
Disadvantages of artificial intelligence	14	28.0	43	86.0	75.37	<0.001*
Types of artificial intelligence	5	10.0	45	90.0	60.64	<0.001*
Components of artificial intelligence	12	24.0	48	96.0	66.70	<0.001*
barriers	6	12.0	44	88.0	59.05	<0.001*
principles	9	18.0	47	94.0	57.95	<0.001*
applications	10	20.0	46	92.0	50.72	<0.001*
examples of artificial intelligence in the nursing field	8	16.0	43	86.0	55.05	<0.001*
problems of artificial intelligence in the nursing field	12	24.0	42	84.0	89.89	<0.001*

(*) Statistically significant at $p < 0.05$

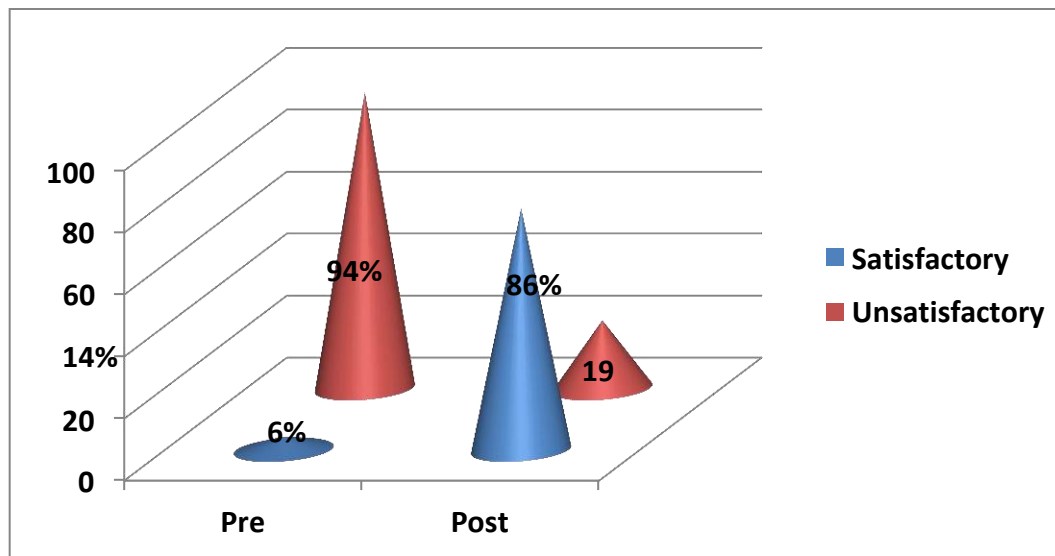


Figure (3): Total knowledge scores of the studied maternity nurses through pre/post educational guidelines phases (n=50).

Table (3): Comparison between the studied maternity nurses' knowledge level related to artificial intelligence application as pre and post-one-month educational guidelines implementation

Items	n=50 100%				P-value
	Pre-educational guidelines		Posteducational guidelines		
	No.	%	No.	%	
Satisfactory $\geq 60\%$	14	6	249	86	<0.000
Unsatisfactory less than 60%	266	94	31	14	<0.000

Table (4): Comparison between mean scores of the studied maternity nurses' attitude related to artificial intelligence pre and post-one month of educational guidelines implementation.

Items	Pre-educational guidelines	After one month educational guidelines	X ²	P-value
Positive $\geq 60\%$	14.68 \pm 0.49	30.04 \pm 1.64	17.48	<0.000
Negative less than 60%	26.68 \pm 1.49	7.04 \pm 1.64		

(*) Statistically significant at $p < 0.05$

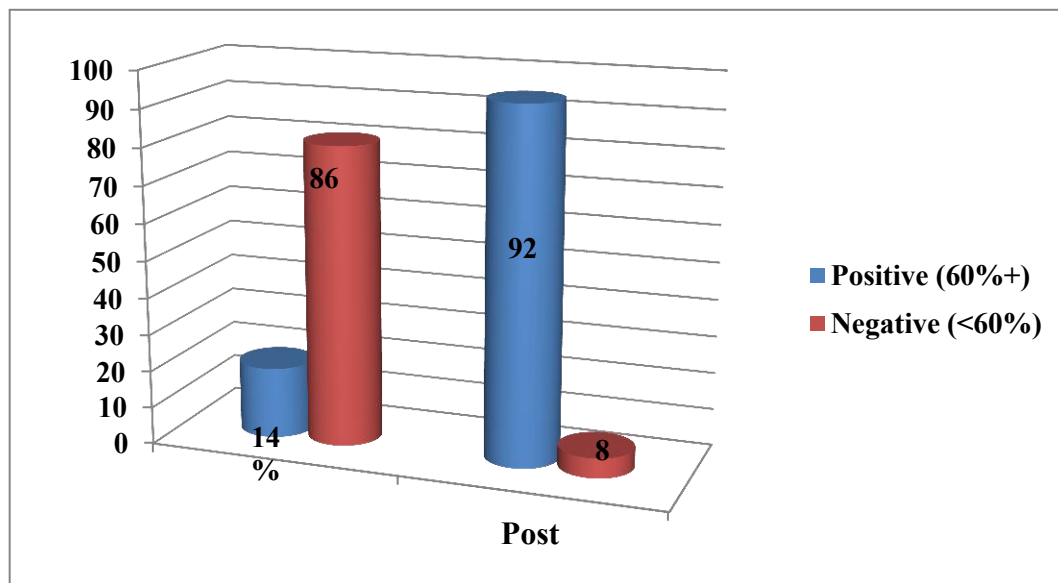


Figure (4): Total attitude levels towards artificial intelligence of the studied maternity nurses through pre and post-educational guidelines phases (n=50).

Table (5): Correlations between farmers' knowledge, attitude, towards artificial intelligence, and demographic characteristics (n=50).

Scores	Spearman's rank correlation coefficient (r)	
	Knowledge	Attitude
Pre-intervention		
Age	-.122	.075
Education	.144	.183
Years of experiences	-.103	-.174
Crowding index	.072	-.089
Post-intervention		
Age	-.208	-.261*
Education	.307**	.363**
Years of experiences	-.129	-.047
Crowding index	.087	-.005
Overall		
Age	-.088	-.091
Education	.176*	.178*
Years of experiences	-.075	-.078
Crowding index	.028	-.049

(*). Statistically significant at $p < 0.05$ (**) statistically significant at $p < 0.01$

Table (6): Correlation between maternity nurses' total knowledge and attitude regarding artificial intelligence application (n= 50)

Items	Pre-test		Post-test	
	r	p	R	p
Total Knowledge	0.374**	<0.001*	0.307**	<0.001*
Total Practice	.442**	<0.001*	604**	<0.001*

**Highly significant $p \leq 0.01$ r- Pearson correlation coefficient

Discussion:

Due to its capacity to evaluate patient information and clinical data with increased research evidence for decision-making and the advancement of new knowledge, artificial intelligence (AI) is currently gaining popularity and emerging as an innovation (**Compassion in a Technological World, 2018**). In the ensuing decades, AI will be able to modernize various facets of healthcare systems due to these capabilities. To change the practice and teaching of nursing, new AI advancements in the field require training. The ability to use AI information in clinical practice is a talent that nurses must possess (**Pepito & Locatsin, 2019**).

The use of artificial intelligence in healthcare is transforming patient care and the role of nurses. It facilitates the synthesis of information, task fulfillment, therapeutic problem-solving, decision-making, and patient outcomes. These technologies alone can improve healthcare. Learning how to use technology will change nurses' identity as professionals and open doors for future advancements in healthcare, productivity, capacity, and quality (**Ronquillo, 2021**). The lack of research on quantifiable attitudes and views among healthcare workers underscores the need to comprehend these elements. Technology perceptions can impede the success of adoption.

AI can help healthcare firms treat patients proactively, lower future risks, and streamline business processes. Healthcare organizations need to integrate AI due to the rapid advancements in technology, law, and patient expectations. Because of these difficulties, healthcare organizations now play a crucial role in the system's success and profitability by cutting expenses and offering top-notch services (**Ahlstedt et al., 2020**). Therefore, the goal of the current study was to find out how educational guidelines affected the knowledge and attitudes of maternity nurses about the use of artificial intelligence.

According to the current study, less than half of nurses were between the ages of 30 and 40, and the majority of nurses were female. Furthermore, just half of them held a bachelor's degree in nursing, and the majority—roughly three-fifths—had between ten and twenty years

of experience. These results may be explained by the fact that nurses value involvement. In the past, only women were allowed to pursue careers in nursing. These findings are in line with an Egyptian study conducted by **Mohamed et al. (2023)**, which discovered that 51.1% of head nurses were between the ages of 40 and less than 50 and that all head nurses were female. The majority of them held nursing bachelor's degrees and most of them. The findings of the study "The Relationship Between Artificial Intelligence Technology and Staff Nurses' Professional Identity and Problem-Solving Skills," conducted by **Abd El-Monem et al. in 2023**, contradict the findings of this one. That study found that over two-fifths of staff nurses were between the ages of 25 and under 30. Along with years of experience, 5 to less than 10 years of experience was held by somewhat less than 25% of staff nurses.

The findings of the study "The Relationship Between Artificial Intelligence Technology and Staff Nurses' Professional Identity and Problem-Solving Skills," conducted by **Abd El-Monem et al. in 2023**, contradict the findings of this one. That study found that over two-fifths of staff nurses were between the ages of 25 and under 30. Along with years of experience, 5 to less than 10 years of experience was held by somewhat less than 25% of staff nurses.

In the current study, the media served as the main information source for nurses' AI expertise. This could be because the internet is a priceless tool for learning and knowledge acquisition. It is an invaluable resource for anyone looking to increase their knowledge and comprehension of the world around them because of its breadth, accessibility, timeliness, diversity of viewpoints, and interpersonal connectivity. These results are in line with those of **Robinson (2020)**, who reported that the Internet accounted for 893.26 percent of the sources in Nigeria. The results of **Abuzaid et al. (2022)** in Sharjah, Sharjah, USA, disagree with these. They discovered that 51% of respondents said the majority of participants learned about AI through self-taught methods, while 20% of them. Only 8% stated they learned through postgraduate courses.

According to the study's findings, there were improvements and statistically significant

changes in all artificial intelligence-related knowledge items between the pre-and post-one-month implementation of instructional recommendations. From the perspective of the researchers, it validated the beneficial impact of educational guidelines that satisfied the researched maternity nurses' desire to increase their knowledge of artificial intelligence.

This outcome is consistent with the research conducted by **Abuzaid et al. (2022)**, which examined the lack of knowledge and comprehension of AI principles and their technical potential in the nursing field. The researchers concluded that healthcare organizations and higher education establishments need to develop and execute suitable AI educational and training initiatives for nursing staff to enhance their ability to facilitate the safe integration and utilization of AI in nursing practice. Additionally, most nursing staff members agreed that nursing education and training programs have to cover fundamental AI expertise. Additionally, **Zhang (2022)** studies how Chinese nursing staff uses AI in clinical nursing in the information era and finds that the study produced outstanding results and contributed to the use of artificial intelligence technology in clinical nursing, as well as recommending the development of effective application measures in tandem with the actual work content.

The majority of the maternity nurses in the study had unsatisfactory total knowledge scores for artificial intelligence during the pre-test phase, but when the educational guidelines were implemented, the majority of them had satisfactory total knowledge scores. The findings of **Mohamed et al. (2023)**, who showed that very few head nurses had sufficient expertise in artificial intelligence before program implementation, did not align with this outcome. **Swan (2021)** also looked at the understanding and attitudes of nursing personnel regarding artificial intelligence in US healthcare settings. She found that most nurses were either ignorant of or misunderstood the concept of AI in clinical practice.

The results of this study supported the first research hypothesis, which claimed that nurses' levels of knowledge about artificial intelligence technologies are influenced by applied artificial intelligence instructional guidelines. According to the results of the current study, a minority of

nurses had unsatisfactory knowledge about artificial intelligence before intervention. Following the educational intervention, statistically significant variations were observed in all domains of nurses' artificial intelligence knowledge scores when comparing the pre-intervention and post-intervention scores. This suggests that nurses' general level of knowledge increased right away following the implementation of the educational program. The rise in nurses' satisfaction with AI may be attributed to their increased awareness of the benefits and applications of AI in nursing as a result of the AI educational intervention. AI is capable of observing their surroundings, identifying objects, supporting decision-making, resolving conflicts, organizing tasks, learning new things, and solving complicated problems. Furthermore, it could be the result of the program's effectiveness in advancing knowledge across all AI domains. These earlier findings aligned with those of **Abdullah & Fakieh (2020)**, who sought to ascertain staff attitudes and perspectives regarding AI application in the healthcare industry.

According to a survey done in four hospitals, 3.11 out of 4 respondents said they feared AI would replace workers and that they didn't know much about AI in the past. The majority of responders were also ignorant about the typical advantages and difficulties associated with AI applications in the medical field. Because their occupations don't involve a lot of face-to-face connection with people, technicians are the ones most impacted by AI applications, according to the research. These findings also corroborated those of **Abuzaid et al. (2022)**, who discovered a deficiency in understanding regarding artificial intelligence. 75% of respondents thought that a basic understanding of AI should be taught in nursing programs.

.. These outcomes were consistent with a fairly recent study by **Mohamed et al. (2023)**, which reported that head nurses' mean difference scores varied significantly before and after intervention as well as between pre-intervention and follow-up.

Similar findings were obtained by **Zhou et al., (2022)** in a study looking into the application of AI in clinical nursing among Chinese nursing staff. Zhou concluded that the study produced excellent results and advanced the

use of AI in clinical nursing, and he also suggested developing efficient application measures in line with the actual content of the work.

The study discovered that after implementing instructional guidelines for one month, there was an improvement in the overall scores of maternity nurses. In the pre-test phase, the majority of the study group had a positive overall attitude toward artificial intelligence, however following the implementation of educational guidelines, less than 10% of the group had this view. **Kwak et al. (2022)** provided support for this viewpoint, stating that initial positive sentiments toward AI anticipated its use and implementation.

These earlier results were in line with those of **Liu, et al., (2022)**, who found that nurses and AI robots might collaborate in clinical settings shortly. Liu's study evaluated AI technology-based medical information processing and emergency nursing management. The development of AI care robots is essential to creating nurse-assistance technologies that are successful in light of the growing workload and lack of nurses. These findings were reported by **Oh et al. (2019)** in the United States, who discovered that just 40 (5.9%) out of the 669 individuals who completed the survey indicated that they were well-versed in AI. However, the majority of participants said AI may be helpful in the medical industry. One perceived benefit of utilizing AI was its capacity to evaluate enormous volumes of excellent, clinically significant data.

Robinson's (2020) research from Nigeria, which revealed that most survey participants knew that artificial intelligence (AI) was used in radiology (96.50%) and surgery (94.05%), corroborated these findings. Additionally, 91.81% of respondents said that artificial intelligence (AI) was not used in any way in their facilities, and they were willing to receive training. Of those surveyed, 55.83% agreed that AI would improve healthcare services, while 43.66% believed that AI would lessen the need for human intervention.

This outcome might be connected to the recent Egyptian hospital trend of implementing artificial intelligence in a variety of settings in response to Egypt's 2030 vision. In line with this vision, Egypt began integrating technology and artificial intelligence into every aspect of society.

The health industry is one of these vital ones. Conversely, nurse managers are tasked with setting new workplace trends and making appropriate decisions because they are seen as the decision-makers in their organization. Furthermore, **Mehdipour (2019)** noted that the majority of nursing managers had a good attitude toward the implementation of AI technologies in nursing.

The present study's findings showed a highly significant improvement in the attitude mean scores of artificial intelligence among maternity nurses before and after a month of implementing instructional recommendations. These results could be explained by the fact that artificial intelligence (AI) can provide enormous amounts of clinically relevant, high-quality data in real time, speed up the healthcare process, and assist in lowering the rate of medical errors. Additionally, artificial intelligence helps patients receive answers promptly, regardless of location or time, assists in completing time-consuming administrative duties, and lowers the possibility of human error. AI also can operate physically stress-free around the clock, forecast surgery results for patients, and support epidemiology and public health. Additionally, AI can improve treatment compliance and patient engagement. It can also be used in conjunction with predictive modeling to manage patient flow, hospital capacity, and resource availability, as well as artificial intelligence software to help predict, diagnose, and treat diseases—all of which can improve care and lessen workload.

The results of **El-Sayed and El-Salim's (2021)** study in Egypt, which assessed nurses' views and attitudes toward the use of artificial intelligence in healthcare, corroborated these earlier findings. The study found that nurses' attitudes toward the use of AI were high on average (3.55 ± 0.91), followed by AI's potential to create new economic opportunities for regulation (3.47 ± 0.90), and AI's third place (3.39 ± 1.05). However, out of the two items, the average score for AI that was determined to be wicked and used to spy on nurses was the lowest (2.76 ± 1.11), and 65.4% of them had a generally good attitude regarding employing AI in nursing. These outcomes are consistent with the findings of **Dicuonzo et al. (2023)**, whose related study sought to evaluate how AI is changing healthcare and the effects it will have on the workforce and the organization. The authors of that study

concluded that AI can change the way that healthcare is delivered.

Furthermore, these outcomes might be the consequence of their opinions being directly impacted by the enhanced post-intervention knowledge of artificial intelligence. Furthermore, the health sector's propensity to employ it in a variety of contexts and to attempt to supply the required information on how to utilize it by Egypt's Vision 2030—which intends to digitize all sectors of society—made it extremely important in the modern era. It also showed that nurses' opinions regarding artificial intelligence technology were significantly impacted by the educational intervention.

The outcomes of **Mohamed et al.'s (2023)** Egyptian study, which assessed the impact of the artificial intelligence program on nurses, were comparable to these. The pre-, post-, and follow-up phases' mean attitude scores (50.01 ± 3.92 , 83.58 ± 2.12 , and 79.58 ± 2.21 at $p = .000$, respectively) revealed statistically significant differences, they said. Additionally, there were notable variations in head nurses' perspectives on AI technologies between pre- and post-intervention, pre- and follow-up, and post- and follow-up ($p = 0.00$).

The aforementioned outcomes aligned with the findings of **Lee & Yoon's (2021)** investigation evaluating the application of AI-driven technologies in the US healthcare sector, which demonstrated that AI integration enhanced nursing and hospital operations. In the same perspective, **Swan (2021)** found that through improving health promotion and sickness prevention, artificial intelligence will revolutionize nursing and healthcare. **Topol (2019)** emphasized in a prior study that artificial intelligence (AI) has already been applied to nursing for scheduling, nursing robots, clinical decision support via the analysis of pressure ulcers and safety issues, and the analysis of electronic nursing records. Additionally, **Kwak et al. (2022)** findings corroborated this one, stating that

The study's findings showed that the entire knowledge and attitude of the maternity nurses under investigation about the application of artificial intelligence across the stages of the educational guidelines was correlated statistically significantly with their educational level. These findings may be the outcome of attempts to use AI in various nursing contexts across all health

sectors. These results aligned with those of a **Jsebaert, (2019)** study that examined attitudes toward robots and AI at work in 22 European nations. The study found that education significantly improves attitudes about robots and AI at work. However elderly individuals come up with new ways to avoid using robots and technology.

Furthermore, the results of this study concurred with those of **Elsayed & Sleem (2021)** in Egypt, who indicated that a strong positive relationship was found between the demographic features of nurses (job, education, years of experience, and work position) and their opinions regarding the use of artificial intelligence. Furthermore, according to **Elias & Fakieh, (2022)**, age is seen as a crucial factor to take into account when addressing workplace technology. Older workers are less willing to adapt, less able to learn new skills, and less able to comprehend new concepts, all of which have a detrimental impact on managers' and employees' behavior.

The results of this study demonstrated a strong favorable correlation between nurse managers' perceptions of employing artificial intelligence and their occupation, level of education, and workplace. This finding might have to do with employment, education, or the workplace, which are the three main environmental factors that influence an individual's thoughts and perceptions, which in turn influence how they perceive things. This finding is consistent with **Cherry's (2020)** assertion that perception is the world as experienced via the senses. Recognizing environmental cues and acting in response to them are both parts of perception. Environmental stimulation refers to all that is possible to perceive in the surrounding environment.

Similarly, **Abdullah et al., (2020)** study, "Healthcare Employees' Perception of the Use of Artificial Intelligence Application: Survey Study," supports this outcome by stating that there are no notable disparities in employees' perceptions based on their educational attainment. These results were in line with a 2019 study by **Jsebaert** titled *Attitudes Towards Robots and Artificial Intelligence at Work in 22 European Countries*, which found that education significantly improves attitudes toward robots and AI at work. It also demonstrated that age has little bearing on how different robots and AI attitudes are at work. Because they develop novel ways to avoid utilizing technology and robotics,

older folks are less likely to have a good attitude toward them.

The current study's findings showed a relationship between the maternity nurses' attitudes and overall knowledge. Attitudes about the deployment of artificial intelligence and overall knowledge are substantially statistically positively correlated. According to the researchers, this outcome might be the result of nurses being exposed to information and environmental cues that affect their perceptions of artificial intelligence. This outcome responds to the second query concerning the attitudes of nurses toward applications of artificial intelligence.

Conclusion:

Based on the study results, it was concluded that the educational guidelines that were conducted in this area had a significant effect on the promotion of maternity nurses' knowledge and attitude regarding Artificial Intelligence applications.

Recommendations:

Based on the findings of the current study, the researchers suggested the following recommendations

- Maternity nurses should be provided with in-service training programs related to Artificial Intelligence applications and well-informed continuous; educational guidelines should be imparted to them.
- It is recommended to encourage maternity nurses to enhance their knowledge of artificial intelligence through workshops and training programs.
- Adequate knowledge is required of the advantages, difficulties, and concerns related to the application of artificial intelligence in nursing environments, as well as the possibilities for these technologies to improve medical procedures and efficiency.
- The current study has to be repeated with a larger sample of nurses in different settings to generalize the results.

References:

- Identity and Problem Solving Abilities. *International Egyptian Journal of Nursing Sciences and Research (IEJNSR)*. 3 (2), 144-164.
- **Abdullah, R., &Fakieh, B. (2020)**.Health care employees' perceptions of the use of artificial intelligence applications: Survey study. *Journal of Medical Internet Research*, 22(5), e17620.
- **Abuzaid, M. M., Elshami, W., & Fadden, S. M. (2022)**. Integration of artificial intelligence into nursing practice. *Health and Technology*, 12(6), 1109-1115.
- **Abuzaid, M.M., Elshami, W., & Fadden, S.M.(2022)**. Integration of artificial intelligence into nursing practice. *Health Technol (Berl)*; 12(6):1109-1115. doi: 10.1007/s12553-022-00697-0. Epub 2022 Sep 14. PMID: 36117522; PMCID:PMC9470236.
- **Ahlstedt, C., Eriksson L.C., Holmström, I.K., &Muntlin, Å. (2020)**. Flourishing at Work: Nurses' Motivation through Daily Communication—anEthnographic Approach. *Nursing & Health Sciences*, 22(4), 1169-1176.
- **Altas, G. (2020)**. The Relationship between Critical Thinking Disposition and Problem-Solving Skills in Nurses. *International Journal of Caring Sciences*; 13(3), 1890-
- **Azzi, S., Gagnon, S., Ramirez, A., & Richards, G. (2020)**. Healthcare applications of artificial intelligence and analytics: a review and proposed framework. *Applied Sciences*, 10(18),6553.
- **Booth, RG., Strudwick, G., McBride, S., O'Connor, S., Solano, A.,&López AL. (2021)**.How the nursing profession should adapt for a digital future. *BMJ*;373:1–5.
- **Buchanan, C., Howitt, M. L., Wilson, R.,Booth, R. G., Risling, T., & Bamford, M. (2021)**. Predicted influences of artificial intelligence on nursing education: A scoping review. *JMIR nursing*, 4(1), e23933.
- Cherry, K. (2020): what is perception available at <https://www.verywellmind.com/perception-and-theperceptual-process-2795839>
- **Dicuonzo, G., Donofrio, F., Fusco, A., &Shini, M. (2023)**.Documentation by nurses: A systematic review. *Journal of medical Internet research*, 23(11), e26522.<https://doi.org/10.2196/26522>
- **Egypt's Artificial Intelligence Future. (2020)**. Cited online (May 6, 2023). Retrieved from <https://www.rebellionresearch.com/blog/Egypt-s-artificial-intelligence-Future>.
- **Elias, S. Smith, W. & Barney, C. (2022)**: Age as a moderator of attitude towards technology in the

- workplace: work motivation and overall job satisfaction. *Behavior & Information Technology*, 31(5), 453-467. doi:10.1080/0144929X.2010.513419
- **Elsayed, W. A., & Sleem, W. F. (2021).** Nurse Managers' Perception and Attitudes toward Using Artificial Intelligence Technology in Health Settings. *Assiut Scientific Nursing Journal*; 9(24.0), 182-192.
 - **Floridi, L., Luetge, C., Pagallo, U., Schafer, B., Valcke, P., & Vayena E. (2023).** "Key Ethical Challenges in the European Medical Information of Framework". *Minds and Machines*; 29 (3):355–371. doi:10.1007/s11023-018-9467-4. ISSN 1572-8641. S2CID 49668711.
 - **Hannaford, L., Cheng, X., & Kunes-Connell, M. (2021).** Predicting nursing baccalaureate program graduates using machine learning models: A quantitative research study. *Nurse Educ Today*. Cited online (May 6, 2023). Retrieved from 10.1016/j.nedt.2021.104784.
 - **Jsebaert, K. (2019).** Attitudes towards robots and Artificial Intelligence at work in 22 European countries, MSc Thesis– Sociology. ANR:368614. SNR: 2008965. 21.01.2019. Healthcare system: Moving forward with artificial intelligence, <https://www.sciencedirect.com/science/article/pii/S01664972220005>.
 - **Kim, A., & Sim, I. (2020).** Communication Skills, Problem-Solving Ability, Understanding of Patients' Conditions, and Nurse's Perception Of Professionalism Among Clinical Nurses: A Structural Equation Model Analysis. *International Journal of Environmental Research and Public Health*, 17(13), 4896.
 - **Kwak, Y., Ahn, J. W., & Seo, Y. H. (2022).** Influence of AI Ethics Awareness, attitude, anxiety, and self-efficacy on nursing students' behavioral intentions. *BMC Nursing*, 21(1), 1-8. <https://doi.org/10.1186/s12912-022-01048-0>
 - **Lai, M., Brian, M., & Mamzer, M. (2020).** Perceptions of AI in Healthcare: Findings from a Qualitative Survey Study among Actors in France. *Transl. Med.* 18, 14. doi:10.1186/s12967-019-02204-y
 - **Lee, D., & Yoon, S. N. (2021).** Application of artificial intelligence-based technologies in the healthcare industry: Opportunities and challenges. *International Journal of Environmental Research and Public Health*, 18(1), 271.
 - **Lee, D., & Yoon, S. N. (2021).** Application of artificial intelligence-based technologies in the healthcare industry: Opportunities and challenges. *International Journal of Environmental Research and Public Health*; 18(1), 271.
 - **Lennartz, S., Dratsch, T., Zopfs, D., Persigehl, T., Maintz, D., Hokamp, N. G., & Dos Santos, D. P. (2021).** Use and Control of Artificial Intelligence in Patients Across the Medical Workflow: Single-Center Questionnaire Study of Patient Perspectives. *Journal of Medical Internet Research*; 23(2), e24221.
 - **Liu, Q., Yang, L., & Peng, Q. (2022).** Artificial Intelligence Technology Based Medical Information Processing and Emergency First Aid Nursing Management. *Computational and Mathematical Methods in Medicine*. Cited online (May 15, 2023). Retrieved from <https://doi.org/10.1155/2022/867711> 8.
 - **Luca, M., Kleinberg, J., & Mullainathan, S. (2023).** Algorithms Need Managers, Too. *Harvard Business Review*. *Clinical Nursing Sciences*, 29(13-14), 2125-2137.
 - **Mehdipour, Y. (2019).** Nursing Managers' Attitudes towards Using Artificial Intelligence Systems in Nursing Decisions. *IOSR Journal of Nursing and Health Science (IOSR-JNHS)*; 8(1), 87-90.
 - **Mohamed, H.R., Awad, S.G., Eldiasty, E.M.M. & ElSabahy, H.E. (2023).** Effect of the Artificial Intelligence Enhancement Program on Head Nurses' Managerial Competencies and Flourishing at Work. *Egyptian Journal of Health Care*; 14(1), 624-645. doi: 10.21608/ejhc.2023.287188
 - **O'Connor, S. (2021).** Artificial Intelligence and Predictive Analytics in Nursing Education. *Nurse Educ Pract*. Cited online (May 15, 2023). From: 10.1016/J.Nepr.2021.103224.
 - **Oh, S., Kim, J.H., Choi, S.W., Lee, H.J., Hong, J., & Kwon, S.H. (2019).** Physician Confidence in Artificial Intelligence: An Online Mobile Survey. *J Med Internet Res*. Mar 25;21(3):e12422. doi: 10.2196/12422. PMID: 30907742; PMCID: PMC6452288.
 - **Robinson, E. D. (2020).** Artificial intelligence in healthcare: its knowledge, practice, and perception among medical personnel in the developing economy. *J Radiat Med Trop [serial online]* Cited 2023 Jun 12] 1:13-9. Retrieved from <http://www.jrmt.org/text.asp?2020/1/1/13/296106>
 - **Ronquillo, C. E., Peltonen, L. M., Pruinelli, L., Chu, C. H., Bakken, S., Beduschi, A., & Topaz, M. (2021).** Artificial intelligence in nursing: Priorities

and opportunities from an international invitational think-tank of the Nursing and Artificial Intelligence Leadership Collaborative. *Journal of Advanced Nursing*, 77(9), 3707-3717.

- **Ronquillo, C. E., Peltonen, L. M., Pruinelli, L., Chu, C. H., Bakken, S., Beduschi, A., & Topaz, M. (2021).** Artificial intelligence in nursing: Priorities and Opportunities from an International Invitational Think-Tank of the Nursing and Artificial Intelligence Leadership Collaborative. *Journal of Advanced Nursing*; 77(9), 3707-3717.
- Schepman, A., & Rodway, P. (2020). Initial validation of the general attitudes towards the Artificial Intelligence Scale. *Computers in human behavior reports*, 1, 100014.
- **Schepman, A., & Rodway, P. (2020).** Initial validation of the general attitudes towards the Artificial Intelligence Scale. *Computers In Human Behavior Reports*, 1, 100014.
- **Shaik, R. (2020).** Artificial intelligence in Health care, Cited online (May 20, 2023). Retrieved from <https://www.gavstech.com/artificial-intelligence-inhealthcare/>.
- **Shimon, C., Shafat, G., Dangoor, I., & BenShitrit, A. (2021).** Artificial intelligence-enabled preliminary diagnosis of COVID-19 from voice cues and questionnaires. *The Journal of the Acoustical Society of America*, 149(2), 1120-1124.
- **Swan, B. A. (2021).** Assessing the Knowledge and Attitudes of Registered Nurses about Artificial Intelligence in Nursing and Health Care. *Nursing Economic*, 39(3).
- **Swan, B. A., & Haas, S. (2021).** Assessing the Knowledge and Attitudes of Registered Nurses about Artificial Intelligence in Nursing and Health Care. *Nurs Econ*; 39(3):139-43. [[Google Scholar](#)].
- **Taryudi, T., Lindayani, L., Purnama, H., & Mutiar, A. (2022).** Nurses' View Towards the Use of Robotic during Pandemic COVID-19 in Indonesia: A Qualitative Study. *Open Access Maced J Med Sci*. 10:14-8. doi:10.3889/oamjms.2022.7645.
- **Topol, E.J. (2019).** High-performance medicine: the convergence of human and artificial intelligence. *Nature Medicine*, 25(1), 44-56.
- **Von Gerich, H., Moen, H., Block, L. J., Chu, C. H., DeForest, H., Hobensack, M., ... & Peltonen, L. M. (2022).** Artificial Intelligence-based technologies in nursing: A scoping literature review of the evidence. *International journal of nursing studies*, 127, 104153.
- **Zhou, J., Zhang, F., Wang, H., Yin, Y., Wang, Q., Yang, L., & Luo, W. (2022).** Quality and Efficiency of Standardized E-Handover System for Pediatric Nursing: A Prospective Interventional Study. *Journal of Nursing Management*.