

Artificial Intelligence and the Future of Health Care: Is it threatening The Existence of Nursing? Nurses' Perception and Attitude

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Abstract

Background: Enhancing staff nurses' perception toward artificial intelligence is essential and attracts a role in the future nursing generation. **Aim of the study:** to investigate artificial intelligence is threatening the existence of nursing and nurses' perceptions and attitudes. **An exploratory research design** was used. **Sample:** a convenient sample (All available) of staff nurses working in the units with a total number of 455 staff nurses during data collection periods. **Setting:** This study was conducted in Minia University Hospital, a pediatric, obstetric university hospital, and a kidney disease and urology hospital. **Data collection tools:** Perceptions of staff nurses regarding the artificial intelligence questionnaire and general attitudes towards the artificial intelligence questionnaire were used. **Results:** The nurses had a moderately positive perception and attitude toward artificial intelligence, with the highest perception related to artificial intelligence ability to reduce medical errors (3.80 ± 1.202). No statistically significant differences were found between the different hospitals (Pediatric, obstetric, kidney and urology hospitals), ages, gender, and residence of the studied nurses, and mean scores of perception and attitude toward AI in healthcare. **Conclusion:** Artificial intelligence improves nursing, not threatens it. Nursing professionals perceive AI can improve patient care, efficiency, and clinical decision-making. Also, job displacement concerns, comprehensive training, benefits and concerns, improved patient outcomes, collaboration, ethics, and patient-nurse relationships, nursing professionals believe artificial intelligence can improve care. **Recommendation:** Provide comprehensive training, consider both benefits and concerns, improve patient outcomes, foster collaboration, address ethical considerations, and maintain patient-nurse relationships to maximize the benefits of AI in healthcare.

Keywords: *Artificial Intelligence, Attitude, Staff Nurses, Perception.*

Introduction:

In the future, hospitals will transform their appearance. Globally, hospitals are expected to experience disruptions due to rapidly advancing innovations, technologies, and increasing consumerism, as well as changes in demographic and economic hospital settings. Home care and outpatient services are replacing the growing number of inpatient healthcare facilities (Commins, 2019). Egypt's Vision 2030 prioritizes the establishment of a secure environment for both residents and businesses. Consequently, the country has commenced implementing technology and artificial

intelligence in various domains (Egypt's Artificial Intelligence Future, 2020).

In light of significant advancements in artificial intelligence (AI), nursing administrators must assess the potential of AI technologies to improve healthcare quality, increase staff familiarity with AI, and enhance their understanding of AI. The incorporation of artificial intelligence (AI) into everyday life is swiftly growing as it enhances efficiency and effectiveness (Taei, 2020; Ronquillo et al., 2021). Therefore, due to the outdated infrastructure in some countries and the need for more beds in others, hospital management and governments are incorporating digital

technology into conventional treatment (Erguzel & Ozekes, 2019).

Artificial intelligence encompasses technologies that enable computers to analyze, evaluate, forecast, and make decisions while also perceiving and learning like humans (Tang et al., 2021). Furthermore, artificial intelligence in healthcare settings aids in the creation of disease-specific nursing care plans that commence with assessment and diagnosis and culminate in a prognosis. Notable applications of these technologies encompass speech and image recognition, expert systems, intelligent games, intelligent tutoring systems, prediction and decision-making utilizing neural networks, deep learning, symbolic machine learning, and natural language processing (Lu et al., 2021; Tang et al., 2021).

Furthermore, AI Azzi et al. (2020) emphasized the importance of effectively harnessing AI data to improve healthcare decision-making and reduce expenses. Consequently, they turned to robots as a means to deliver the highest standard of healthcare (Seibert et al., 2021). In addition, AI assists in monitoring clients' information, retaining patient data, generating reports, overseeing quality, reducing hospitalization duration, improving care efficiency, executing interventions at the appropriate time, providing cost-effectiveness and time efficiency, and aiding in the documentation of patient information.

Furthermore, there are numerous perceived obstacles to the effective implementation of AI-driven decision-support systems in nursing. These barriers and challenges include technological limitations, high system costs, and the need for ongoing updates. In the future, the work environment and employment will undergo significant changes to support future generations' success in a world where human labor is no longer a central or essential part of producing goods and services (Mehdipour, 2019).

Significance of the study

Healthcare organizations have promptly adapted to the rapid changes in technology,

regulation, and client demands in the healthcare industry. Artificial intelligence can facilitate proactive patient care, mitigate potential future risks, and optimize work processes (Shaik, 2020). The increasing automation of jobs raises concerns about the potential for AI to eradicate employment opportunities, including those at Deloitte, within the next 10 to 20 years. It is becoming more evident that AI systems will not extensively replace human clinicians, but instead, they will enhance their efforts in providing patient care. Human clinicians may transition over time (West, 2018; Susskind, 2020; Rawashdeh, 2023).

Nurses should actively guide the development and implementation of AI technologies in hospital care settings. Therefore, it is imperative for the nursing profession to actively engage in and possess a comprehensive understanding of artificial intelligence (AI) (He et al., 2019; European Commission, 2019). According to Alami et al. (2020), awareness plays a crucial role in guiding the development of technology features and purposes and is valuable for designers in terms of application and acceptance.

The future of AI in healthcare is crucial for healthcare institutions, governmental bodies, and regulatory agencies. It entails creating structures to monitor critical issues, respond responsibly, and implement governance mechanisms to mitigate negative consequences. Machine learning is the main driving force behind the advancement of precision medicine. We anticipate that AI will eventually excel in providing diagnosis and treatment recommendations despite initial difficulties (Mehic-Dzanic, 2019; Davenport & Kalakota, 2019).

The primary obstacle for AI in these healthcare fields is not the technology's ability to be effective but rather ensuring their integration into routine clinical practice. In order to achieve broad acceptance, regulators must grant approval to AI systems, incorporate them into electronic health record (HER) systems, establish standardized protocols to ensure consistent functionality among similar products, educate healthcare professionals, secure funding from public or private payer

organizations, and regularly update the systems in the field. Consequently, we anticipate a restricted application of AI in clinical practice within five years, followed by a broader implementation within a decade. (Willcocks, 2020).

Aim of the study

The aim of the study is to investigate artificial intelligence is threatening the existence of nursing and nurses' perceptions and attitudes.

Research questions:

Q1. Is using artificial intelligence technologies threatening the existence of nursing?

Q2. What is the level of nurses' perception and attitude toward using artificial intelligence technologies in Health settings at Minia University Hospitals?

Subject and Methods

Research design:

An exploratory research design was used to achieve the study's aim.

Setting:

The study was conducted at Minia University Hospital, pediatric, obstetric university hospital, and Kidney Disease and Urology Hospital.

Subject:

The current study used a convenient sample that included all available staff nurses from Minia University Hospital (184), pediatric, obstetric, and urology hospitals (141), and kidney disease and urology hospitals (130). There were a total of 455 staff nurses.

Data Collection Tools:

Data were collected by using two tools as follows:

Tool (I): Perception toward artificial intelligence questionnaire was used, which includes three sections.

The first section is the socio-demographic data of the studied staff nurses, including age, gender, residence, experience, and level of education attained.

The second section, The Perception Toward Artificial Intelligence Questionnaire, adapted from **Abdullah and Fakhieh (2020)**, was designed to evaluate nurses' perceptions of artificial intelligence. The questionnaire comprises two items, each with three dimensions. The initial dimension is referred to as perception towards AI (four items). The second dimension pertains to the benefits of utilizing artificial intelligence (five items). The third dimension encompasses the challenges related to the implementation of artificial intelligence in healthcare (five items). The fourth dimension included the nursing perceived barriers scale (seven items), which was designed to assess nurses' perception of the perceived AI barriers using a five-point Likert scale (from 1 = completely disagree to 5 = completely agree).

Scoring System: It utilized a five-point Likert scale, with responses ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), and high mean scores referred to high perception.

Tool (II): General attitudes towards artificial intelligence questionnaire, adapted from **Schepman & Rodway (2020)**. It aims to assess the general attitudes toward AI; it consisted of 20 items with a minimum of 20 and maximum of 100 through a five-point Likert scale ranging from 1-5, 1 (Strongly Disagree), 2 (Agree), 3 (Neutral), 4 (Agree) and 5 (Strongly Agree) and high mean scores referred to positive attitude.

Validity and reliability of the tools

The tools were validated after being tested by a group of five Minia University nursing administration and pediatric nursing specialists. Based on their assessment of the content's appropriateness and the item sequence's accuracy, the panel made

modifications to the tools. Researchers used Cronbach's alpha to find out how reliable the tool was; the perception item for part two of the tool had a reliability of 0.795, and the attitude item for artificial intelligence had a reliability of 0.773.

Pilot study:

Ten percent of the nursing staff (45 nurses) took part in a pilot study after the tools were developed but before the main data collection started. The pilot study ensured that the study could be carried out as planned, that the items were presented in the correct sequence, and that the preliminary tool was consistent and applicable. Along with that, we timed how long the questionnaire took with the main subjects of the study—20 minutes. The procedure for the pilot study lasted for two weeks (from 1 to 15/January 2024).

Ethical considerations:

The ethical committee of Minia University's Faculty of Nursing provided written consent. Minia University's dean of the nursing school and the study's primary investigator both gave their stamp of approval to the research. It was necessary to get the verbal consent of staff nurses who were willing to participate in the study after being informed about its purpose and nature before beginning either the pilot or main study.

The staff nurses who take part in the study are not required to do so and are free to leave at any time without giving a reason. The confidentiality of the staff nurses under investigation was guaranteed throughout data collection. Researchers assured all participants that their information would be kept completely confidential. To further protect their privacy, we assigned each nurse a number instead of their name, which allowed them to remain anonymous.

Data collection procedure:

The dean officially approved the documents of the faculty of nursing at Minia University. To obtain permission and assistance in conducting the study, an official letter was sent to the heads of the units by the hospital directors, the vice dean of postgraduate studies and research at Minia University's Faculty of Nursing, and the ethical committee before data collection began. An inventory of data needed for the study was also attached to the letters. Before taking part in the

study, every single participant also verbally agreed to do so. Prior to their consent, the nurses were informed about the study's purpose, methods, and expected benefits. Researchers emphasized that taking part is totally optional and that people can stop at any point if they do not want to continue. Next, the researchers went to the respondents' units one by one and distributed the data collection instruments. Around twenty minutes were needed to finish the survey. The researchers double-checked the participant's form after they had finished filling it out. Data collection occurred four times per week during morning and afternoon shifts from February 2023 to April 2023.

Statistical design:

Data entry was subjected to quality control tests, and statistical analysis coding was done using the Statistical Package for the Social Science (IBM 28.0). For qualitative variables, we used frequencies and percentages, and for quantitative variables, we used standard deviation (SD) and mean. Independent sample T-test was used to assess differences mean between two variable of the study and One way anova test was used to assess different mean between three or more variable. The P - value of ≤ 0.05 indicates a significant result and P - value of ≤ 0.001 indicates high significant while, P value of > 0.05 indicates a non-significant result. In additional spearman correlation test used between the perception and attitude toward AI

Results:

Table (1) shows that 40.4% of the studied nurses work in Minia University Hospital, 46.8% of nurses ages 32- less than 45 years, 55.8% are female, and 63.1% live in rural areas. 48.1% have 15-20 years of experience, and 32.3.6% have technical institute

Table (2) presents moderate mean scores perception of AI is 20.6 ± 2.263 from 30, perception of the advantages of using AI is 14.58 ± 1.872 , and perception of the application of AI in health care is 28.25 ± 3.050 . The highest mean score among perception 3.80 ± 1.202 to the last item, "I have high hopes about AI applications in the health care sector, and as regards the advantages of AI, the highest mean score in AI can help reduce the number of medical errors 4.04 ± 0.963 .

The highest mean score is 4.03 ± 0.967 in AI, which has a low ability to sympathize and consider the emotional wellbeing of the patient in the application of AI in health care. The highest mean score for the application of AI in health care (28.25 ± 3.050) was followed by the perception of AI (20.60 ± 2.263) and ended with the perception of the advantages of using AI (14.58 ± 1.872), then the risk of AI for nursing existence.

Regarding barriers to applying AI, the highest mean score related to High running cost of AI-related software and hardware and adequate human supervision, followed by Regulatory and social constraints, may limit AI's potential to help medical practitioners then Lack of Information, training, and time (3.6 ± 0.4 ; 3.2 ± 0.8 and 3.1 ± 0.9 respectively).

Table (3): Shows that Artificial Intelligence is exciting and has positive impacts on people's wellbeing gained the high mean score of nurses' attitudes toward using artificial intelligence (4.04 ± 0.963), while both items, as nurses would

like to use Artificial Intelligence in their job and they think Artificial Intelligence is dangerous gained the lowest mean score (3.03 ± 1.048) for each item and total mean score of nurses attitude regarding AI was 66.28 ± 17.581 .

Table (4) presents that nurses who had diplomas, bachelor's, and master's degrees have high mean scores of perception and attitude toward AI in healthcare, with statistically significant differences at 0.018, respectively. Also, nurses who experienced less than 15 years had high mean attitude scores toward AI in healthcare, with statistically significant differences at 0.018. on the other hand, no statistically significant differences were found between the different hospitals, ages, gender, and residence of the studied nurses, and mean scores of perception and attitude toward AI in healthcare.

Table (5): presents positive association between the studied nurses perception and attitude toward AI which $r = 0.715$ and $P - \text{value} < 0.001$.

Table (1): Percentage distribution of the demographic characteristics of the studied staff nurses (n = 455).

Items	No.	%
Hospital		
Pediatric, obstetric university hospital	141	30.9
Minia university hospital	184	40.4
Kidney disease and urology hospital.	130	29.2
Age/year		
18 <32	102	22.4
32 <45	213	46.8
45 – 57	93	20.4
<57	47	10.3
Gender		
Female	254	55.8
Male	201	44.21
Residence		
Urban	168	36.9
Rural	287	63.1
Experience		
One <10	80	17.5
Ten <15	91	20.0
15 – 20	219	48.1
>20	65	14.2
Educational levels		
Diploma	91	20.0
Technical institute	147	32.3
Bachelor degree	85	18.7
Master degree	79	17.4
Others	53	11.6

Table (2): Mean scores of each domain of the perception of the nursing towards AI of the studied staff nurses (n = 455).

ITEMS	Min.	Max.	Mean	SD
Perception to AI	15	20	20.60	2.263
1) I have good knowledge of AI	2	5	3.66	0.619
2) AI abilities are superior to human experience	1	4	3.21	0.924
3) AI could replace me in my job	1	5	3.45	0.789
4) I have high hopes for AI applications in the healthcare sector	1	5	3.80	1.202
Perception of The advantages of using AI	9	18	14.58	1.872
5) AI can speed up the process of healthcare	2	5	3.53	0.698
6) AI can help reduce the number of medical errors	2	5	4.04	0.963
7) AI can deliver clinically relevant, vast amounts of high-quality data in real-time	1	5	3.24	0.936
8) AI has no space-time constraint	1	5	3.77	1.197
9) AI has no emotional exhaustion or physical limitation.				
The application of AI in healthcare	21	30	28.25	2.050
10) AI cannot be used to provide opinions in unexpected situations	2	4	3.45	0.740
11) AI is not flexible enough to be applied to every patient	1	5	3.57	0.685
12) AI is difficult to apply to controversial subjects	1	4	3.03	1.048
13) AI has a low ability to sympathize and consider the emotional wellbeing of the patient	2	5	4.03	0.967
14) AI was developed by a specialist with little clinical experience in medical practice	2	5	3.56	1.033
15) Problems regarding the application of AI in health care.	1	4	3.11	1.009
Nursing staff perceived Barriers to AI	12	35	23.4	7.55
16) Lack of Information, training, and time	1	4	3.1	0.9
17) lack of flexibility in working with AI	1	4	2.85	1.15
18) Difficulty in translating medical terminology into machine language involves collaboration between healthcare practitioners and Artificial Intelligence	1	4	1.75	1.7
19) the AI cannot make the decision and will generate an unreliable report (such as an end-of-life care decision) that must be taken	1	4	1.9	1.2
20) High running cost of AI-related software and hardware and adequate human supervision	1	4	3.6	0.4
21) Fear of litigation	1	4	2.6	1.4
22) Regulatory and social constraints may limit AI's potential to help medical practitioners	1	4	3.2	0.8

Table (3): Mean scores of the studied nurses' attitude toward AI (n = 455).

ITEMS	Min.	Max.	Mean	SD
1. I am interested in using artificially intelligent systems in my daily life	2	5	3.66	0.619
2. There are many beneficial applications of Artificial Intelligence	1	4	3.21	0.924
3. -Artificial Intelligence is exciting	2	5	4.04	0.963
4. -Artificial Intelligence can provide new economic opportunities for this country	1	5	3.80	1.202
5. -I would like to use Artificial Intelligence in my job	1	4	3.03	1.048
6. -An artificially intelligent agent would be better than an employee in many routine jobs	1	5	3.45	0.734
7. -I am impressed by what Artificial Intelligence can do	2	5	3.53	0.698
8. -Artificial Intelligence can have positive impacts on people's wellbeing				
9. --Artificially intelligent systems can help people feel happier	1	5	3.24	0.936
10- Artificially intelligent systems can perform better than humans	1	5	3.77	1.197
11-Much of society will benefit from a future full of Artificial Intelligence	2	4	3.45	0.740
12-For routine transactions, I would rather interact with an artificially intelligent system than with a human	1	5	3.57	0.685
13-I think Artificial Intelligence is dangerous	1	4	3.03	1.048
14- Organizations use Artificial Intelligence unethically	2	4	3.45	0.752
15- I find Artificial Intelligence sinister	2	5	3.56	1.033
16- Artificial Intelligence is used to spy on people	1	4	3.11	1.009
17-I shiver with discomfort when I think about future uses of Artificial Intelligence	2	4	3.45	0.752
18- Artificial Intelligence might take control of people	2	5	4.04	0.963
19- I think artificially intelligent systems make many errors	1	5	3.84	1.173
20- People like me will suffer if Artificial Intelligence is used more and more	1	5	3.05	1.105
Total attitude	1	100	66.28	17.581

Table (4): Relation between demographic characteristics of the studied nurses with perception and attitude toward AI (n = 455).

Items	No.	Perception	Attitude
Hospital			
Pediatric, obstetric university hospital	141	78.6 ± 5.6	74.6 ± 5.2
Minia University Hospital	184	74.6 ± 5.2	78.6 ± 5.6
Kidney disease and urology hospital.	130	78.7 ± 5.2	78.7 ± 5.2
Age/year			
18 <32	102	78.1 ± 6.2	78.1 ± 6.2
32 <45	213	78.8 ± 5.6	78.8 ± 5.6
45 – 57	93	78.6 ± 5.5	78.6 ± 5.5
<57	47	77.0 ± 5.7	77.0 ± 5.7
F (P-value)		1.417 (0.237)	1.417 (0.237)
Gender			
Female	254	78.6 ± 5.9	78.6 ± 5.9
Male	201	78.3 ± 5.5	78.3 ± 5.5
t (P-value)		0.558 (0.289)	0.558 (0.289)
Residence			
Urban	168	78.1 ± 5.5	78.1 ± 5.5
Rural	287	78.7 ± 5.9	78.7 ± 5.9
t (P-value)		1.00 (0.159)	1.00 (0.159)
Experience			
One <10	80	78.5 ± 5.9	78.7 ± 5.2
Ten <15	91	79.0 ± 5.7	78.6 ± 5.6
15 – 20	219	77.9 ± 5.8	75.3 ± 5.3
>20	65	78.7 ± 5.8	74.6 ± 5.2
F (P-value)		0.641 (0.634)	2.445 (0.018)*
Educational Qualification			
Diploma	91	78.6 ± 5.6	78.6 ± 5.6
Technical institute	147	74.6 ± 5.2	74.6 ± 5.2
Bachelor degree	85	78.7 ± 5.2	78.7 ± 5.2
Master degree	79	75.3 ± 5.3	75.3 ± 5.3
Others	53	78.7 ± 6.3	78.7 ± 6.3
F (P-value)		2.445 (0.018)*	2.445 (0.018)*

*Statistically significance differences at 0.05

Table (5): Correlation between perception and attitude toward AI among the studied nurses (n = 455).

Items	Attitude	
	r	P – Value
Perception	0.715	0.001

Discussion

The active and economical world presents technology as having improved the speed of healthcare productiveness. AI is a technology that assists the health care system to produce at a quicker speed and professionally achieving their goals, so they must be aware and knowledgeable about AI; few studies have tried to understand the knowledge, perception, and readiness to integrate AI in their daily practice and many investigators think that "nurses attitude has a main factor in the implementation of innovative technology and may powerfully influence technology approval judgments (Wu et al., 2019 & Lichtenthaler, 2020).

The finding of the current study revealed that more than one-third of studied nurses work

in Minia University Hospital. As regards age, nearly half of nurses aged 32- less than 45 years, mor than half are female, and nearly two-thirds live in rural areas. Nearly half of them their years of experience ranged between 15-20 years, and one-third have technical institute

In addition, the finding of the current study presented that the moderate mean score perception of AI is 20.6 ± 2.263 from 30, the perception of the advantages of using AI is 14.58 ± 1.872 , and the perception of the application of AI in healthcare is 28.25 ± 3.050 . The highest mean score among perceptions was 3.80 ± 1.202 for the last item, "nurses have high hopes about AI applications in the health care sector, and as regards the advantages of AI, the highest mean score in AI

can help reduce the number of medical errors 4.04 ± 0.963 . **Finally, the highest mean score, 4.03 ± 0.967 in AI, has a low ability to sympathize and consider the emotional wellbeing of the patient in the application of AI in health care.** This result may related to the extent to which nurses are aware of the importance and advantages of using AI in nursing settings, especially at present during the COVID-19 outbreak.

The current study finding is in agreement with **Castagno & Khalifa (2020)** in high hopes about AI applications in the healthcare sector and found that more than two-thirds of subjects without any fear reported AI will substitute them at their work. **This answers our research question (Is Using AI Threaten the Nursing Existence?).** This is in the same line with **Frey and Osborne (2017)**, who reported that slightly less than of professions will be substituted by AI over some number of years. Along the same line, **Glauser (2017)** found that AI will improve human competencies by 2030, and fears about AI include human organization, data misuse, job loss, and dependence on lockin and mayhem.

On the other hand, the current study disagreed with **Abdullah & Fakieh (2020)**, who showed that their respondents feared artificial intelligence would replace employees and had a general lack of knowledge regarding artificial intelligence. In addition, most respondents needed to be made aware of the advantages and most common challenges to artificial intelligence applications in the health sector.

Also, the **Royal Society Working Group (2017) & Anderson et al. (2018)** reported that the public perceived AI as a chance but also expressed fears concerning harm, impersonal experiences, choice restriction, and replacement or job losses. Furthermore, the finding of the current study is not accorded to **Sabra et al. (2023)**; most nurses' agreed that AI will cause many job losses, AI can have constructive effects on nurses' welfare, and AI can offer new financial chances for their hospitals.

Regarding the perception of advantages of using AI, this study presented moderate mean scores perception of the advantages of using AI of 14.58 ± 1.872 . These findings were consistent with **Jiang et al. (2017)**, who mentioned that AI transports a change to healthcare powered by the aggregate availability of healthcare data and fast progress of analytics practices. Also, **Shameer et al. (2018)** found that AI can develop a huge amount of data using a correct, quick, and effective technique by using multifaceted statistical and computing algorithms. Additionally, **Trivedi et al. (2018)** asserted that AI can help in the establishing of precise diagnoses and suitable treatment plans, offer assistance on the best treatments for cancer, and conduct genome analyses. Also, **Vaananen et al. (2021)** mentioned that the use of AI may prevent medication errors such as drug overdoses. Moreover, the current study finding has a moderate mean score as related to the perception of the application of AI in health care is 28.25 ± 3.050 . This study is similar to the study of **Sabra et al. (2023)**, who indicated that more than fifty nurses agreed that AI could improve the practice in health care, help to decrease the number of medical mistakes, and offer clinically relevant, high-quality data and agreed that they had high hopes about AI application in the health care settings, while they had good knowledge about AI.

Moreover, this result is congruent with **Möllmann et al. (2021)**, who reported that the majority of subjects consider AI to be beneficial in the medical field. Also, **Krittanawong (2018)** mentioned that physicians were predictable that AI would be useful in diagnoses and in preparation for treatment by providing the latest clinically appropriate data, and the growth of AI in healthcare will be pleasing for everyone in the healthcare team. In addition, **Funk et al. (2020)** stated that 72% of Singapore believed that the growth of AI has mostly been a worthy mechanism for society, and Japan considers that AI has an optimistic effect on society. In the same line, **Ahmed et al. (2022)** found that nearly two-thirds of participants agreed that AI helps healthcare providers make daily to-do lists.

The current study showed a high mean score for the application of AI in health care (28.25 ± 3.050) among nurses, followed by the perception of AI (20.60 ± 2.263), and ended with the perception of the advantages of using AI (14.58 ± 1.872) then the risk of AI for nursing existence. Artificial intelligence applications in healthcare gained the high score, followed by an advantage in using artificial intelligence. This was contradicted by the study done by **Carrol (2019)**, which mentioned that the applications and benefits of artificial intelligence to nurses in care delivery environments are still vague.

Regarding barriers to applying AI, the highest mean score related to High running cost of AI-related software and hardware and adequate human supervision, followed by Regulatory and social constraints, may limit AI's potential to help medical practitioners then Lack of Information, training, and time (3.6 ± 0.4 ; 3.2 ± 0.8 and 3.1 ± 0.9 respectively).

The current study is in the same line with **Sabra et al. (2023)**, who indicated that most of the nurses agreed on the following items of attitude toward AI: AI will benefit people, destroy people, AI systems can aid nurses to feel happier and feel human creativity. Similarly, they agreed that **AI will cause many job losses**, that AI has optimistic effects on nurses' welfare, and that AI will provide new economic opportunities for hospitals. This may be clarified by the fact that AI rapidly pervaded society, and nurses became aware of its use and importance.

In addition, **Tiwari et al. (2021)** asserted that organizations that are using AI have perceived a rise in their performance of activity, innovation, and profitability. In the same line, **Ismail. (2021)** concluded that most of the participants agreed that AI could enhance developments in healthcare and deliver amounts of clinically pertinent high-quality information.

However, **Elsayed and Sleem (2021)** found that more than half of the participants had a positive attitude toward using AI in healthcare settings. In addition, **Fast & Horvitz (2017)** found more positive attitudes about AI hopes

for healthcare and focus on its enclosure in education. This result is in agreement with **Vasiljeva et al. (2021)**, who found that nearly half of respondents have had positive attitudes towards AI.

In contrast, **Lichtenthaler (2020)** stated that employees had negative attitude towards information and communication technology trends. **These researches answers the first research question**

As regards the total perception, this finding illustrates that the mean scores of total nurses' perception of AI were 86.83 ± 13.735 , which referred to high positive perception. This is congruent with **Abuzaid, Elshamin, and Fadden (2022)**; the study was similar to this study, which reported that 85% of respondents were knowledgeable and had a good perception of AI, while 15% stated they lacked knowledge of AI, negative perception. However, **Swan (2021)** study reported that among 675 nurses and students in the United States clarified that 72% of their participants were well-oriented, knew, and had high perception. In addition, **Farghaly, Dator & Sankarapandian (2022)** reported that 83.6% (583) of their participants have high levels of perception of artificial intelligence, and the rest.

Regarding attitude towards Artificial Intelligence is exciting and has positive impacts on people's wellbeing gained the high mean score of nurses' attitudes toward using artificial intelligence ($4.04 + 0.963$), while both items, as nurses would like to use Artificial Intelligence in their job and they think Artificial Intelligence is dangerous gained the lowest mean score ($3.03 + 1.048$) for each item. This result may be related to nurses' fear of being infected during the recurrent waves of COVID-19 and providing the opportunity for nurses to recognize the benefit of applying AI in nursing settings in helping nurses to be safe and prevent their infection as they think AI improves the level of health care, increase productivity, decrease medical errors, decrease workload.

The current is accorded to **Elsayed and Sleem (2021)**, who revealed that artificial intelligence is exciting and gained the high

mean score distribution of nurse attitude followed by artificial intelligence can offer new economic opportunities for my organization. Also, this finding was in line with **Sarwar et al. (2019)**, who mentioned that respondents had positive attitudes toward Artificial Intelligence, with almost three-quarters being excited or interested in using AI. In addition, **Mehdipour (2019)** study mentioned that the majority of nursing managers and staff nurses' attitude toward the application of AI systems in nursing were positive.

Moreover, **Booth et al. (2021)** and **Taryudi et al. (2022)** reported that the attitude, perceptions, and implications of both studies showed the excitement of the nurses towards integrating AI applications into daily work practice. In both studies, more than 70% agreed that AI applications would help nurses in work practice with a great understanding of the importance of AI in nurse work. In contrast, **Oh et al. (2019)** reported that nurses perceived that AI could not be implemented on debatable subjects and that it would not be applied to each patient.

The current study finding presented that nurses who had diplomas, bachelor's, and master's degrees have high mean scores of perception and attitude toward AI in healthcare, with statistically significant differences at 0.018, respectively. Also, nurses who experienced less than 15 years had high mean attitude scores toward AI in healthcare, with statistically significant differences at 0.018. on the other hand, no statistically significant differences were found between the different hospitals, ages gender, and residence of the studied nurses and mean scores of perception and attitude toward AI in healthcare

This result may be due to the fact that senior and junior nurses are exposed to the same information and environmental incentives that influence the way they think and their impression of AI. These findings agreed with **Sabra et al. (2023)**; in contrast, **Elsayed and Sleem (2021)** asserted that there is a significant positive relation between job, education, and workplace nurse managers' demographic characteristics and their perception toward using AI.

Also, **Sabra et al. (2023)**, **Araujo et al. (2020)**, and **Zhang and Dafoe (2020)**, who found that attitudes toward AI are influenced by variables such as nation, age, income, and qualification. Also, **Cubric (2020)** stated that the attitude towards digitalization depended on previous experience with automatized systems and asserted that employees who have previous experience with automated solutions were more expected to accept AI applications in their routine jobs.

Additionally, **Shinners et al. (2020)** found that the application of computers in healthcare settings was affected by the experience, knowledge, and skill set of the users. **Elsayed and Sleem (2021)** reported that there is a significant positive relation between nurse demographic characteristics (years of experience, job, education) and their attitudes toward using AI, except educational qualification and years of experience.

These findings were consistent with the study by **IJsebaert (2019)** entitled attitudes towards robots and Artificial Intelligence at Work in 22 European countries, which revealed that education has a significant positive effect on robots and AI attitudes at work. Also, it showed that age is a weak factor in making variations in robots and AI attitudes at work. Education and the workplace are the most important environmental stimuli that affect the way a person thinks and his impression of anything, which in turn affects the person's perception. At the same time, this contradicted the study of **Abdullah (2020)**, who mentioned that there were no significant differences in employees' perceptions and educational level.

The result of the current study showed that there is a positive association between nurses' perception and attitudes toward artificial intelligence. This outcome could be connected to the recent trend in Egyptian hospitals using digital transformation and artificial intelligence in a variety of workplace settings in response to Egypt's 2030 vision.

In the same line this result is supported by the study of **Elsayed & Sleem, (2021)** entitled "Nurse Managers' perception and Attitudes toward Using Artificial Intelligence

Technology in Health Settings” and mentioned that there is a highly significant positive correlation between nurse managers’ perception and attitude toward using AI in nursing settings.

This finding was in line with **Kwak et al. (2019)** who showed a positive correlation between AI ethics perception and positive attitudes toward AI, self-efficacy, and behavioral intention.

Conclusion:

In light of our study findings, it was concluded that artificial intelligence improves nursing, not threatens it. Nursing professionals perceive AI can improve patient care, efficiency, and clinical decision-making. Also, job displacement concerns, comprehensive training, benefits and concerns, improved patient outcomes, collaboration, ethics, and patient-nurse relationships, nursing professionals believe AI can improve care.

As regards the total perception and attitude, this finding illustrates that the mean scores of total nurses' perception of AI were 86.83 ± 13.735 , which referred to high positive perception and total mean score of nurses attitude regarding AI was 66.28 ± 17.581 which referred to positive attitude.

on the other hand, no statistically significant differences were found between the different hospitals (Pediatric, obstetric, kidney and urology hospitals), ages, gender, and residence of the studied nurses, and mean scores of perception and attitude toward AI in healthcare.

Recommendations

- Further research is needed to develop strategies to increase the readiness of the institutions to apply AI,
- Facilitate a deeper understanding and anticipate to complement the growing awareness of AI's role in nursing practice.
- Enhance the readiness of organizations for artificial intelligence through good infrastructure and budget.

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