

Nurse Managers' perception and Attitudes toward Using Artificial Intelligence Technology in Health Settings

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Abstract

Background: Despite the application of artificial intelligence in healthcare continues to generate increasing interest, health sector employees still have mixed attitudes and perception regarding the implementation of artificial intelligence technologies. **Aim:** Investigate nurse managers' perspectives and attitudes toward using artificial intelligence technology in Health_settings. **Methods:** Descriptive research design was used to achieve the study's aim on 130 nurse managers at Mansoura University Hospitals through a convenience sampling by using two questionnaires, Perception toward artificial intelligence questionnaire and General attitudes towards artificial intelligence questionnaire. **Results:** 84.6% of nurse managers had moderate perception towards using artificial intelligence in nursing settings. 65.4% of them had positive attitude toward using artificial intelligence in nursing settings. **Conclusion:** There is a highly significant positive correlation between nurse managers' perception and attitudes toward using artificial intelligence in health settings. **Recommendations:** Provide appropriate information about the benefits, challenges, and issues surrounding the implementation of artificial intelligence in nursing settings and the potentials of these technologies to improve health care processes and efficiencies. Encourage nurse managers to increase their knowledge toward artificial intelligence through workshop and training programs .Participation and support of hospital managers from the beginning of the implementation of the artificial intelligence system.

Keywords: *Attitude, Artificial intelligence technology, Nurse Managers, Nursing Settings & Perception.*

Introduction

Artificial intelligence (AI) technologies are increasingly prevalent in different organizations and society sectors, one of these sectors is healthcare. Where, these technologies have the ability to make transformation on many aspects of patient care, in addition to administrative processes within provider, payer and pharmaceutical organizations. The complexity and rise of data in healthcare operations means that artificial intelligence will increasingly be applied within this field. The main categories of applications include diagnosis and treatment (Davenport & Kalakota, 2019). On the other hand, to achieve a competitive advantage in the labor market, there is a need to radical change to digitalize healthcare sectors. from this point, artificial intelligence has succeeded to grasp the attention of key healthcare top managers and providers who are currently experiencing a dilemma of whether or not to fully or partially integrate it into their work (Erguzel & Ozekes, 2019, Jiang, & Zhi, 2017)

Artificial intelligence refers broadly to computing technologies which resemble processes related to human intelligence, as reasoning, adaptation and learning, sensory understanding and interaction (Hassanzadeh, et al., 2018). The developing use cases of artificial intelligence in the sector of healthcare might be shown as technologies collection

which enable machines to perceive, understand, act and learn in order to carry out healthcare administrative and clinical functions, in addition to be enrolled in research and for clinical learning activities. For the last time, Artificial intelligence has increased productivity and its extensive widespread into daily life is increasing at a rapid pace (Taei, 2020)

Future hospitals will be different than the nowadays hospital. It is expected that rapidly emerging technologies and growing consumerism will disrupt hospitals all over the world, accompanied by changes in demographic and economic characters. The growing number of inpatient health care facilities is being turned into home care and outpatient services. Furthermore, clients who are critically ill will stay at the need of acute care inpatient services (Commings, 2019). Due to the old infrastructure in several countries and the need for extra bed numbers in other countries, hospital managers and governments have to think again carefully for the best way to enhance inpatient environments and outpatient environments to interact with clients, incorporate digital technologies into traditional care like telemedicine and telenursing to actually form a healthcare system without walls (Erguzel & Ozekes, 2019).

In addition to offering an insight into an enhanced and improved digital future, the rapid introduction of (AI) into the healthcare system has also created serious concerns about this evolution social and ethical consequences. Nursing managers play a very important role in advocating for the objective and the most effective use of AI health solutions. To accomplish this role and duty, nurses need to be informed on the extensive spread of AI and the effect of development, deployment and evaluation of these technologies (Risling & Low, 2019)

Throughout the present of COVID-19 (Coronavirus) pandemic, the medical organizations are searching for novel technologies to control and monitor the pandemic spread. Artificial intelligence is one of technology that could simply control coronavirus spread, by identifying patients with high-risk, it also very useful in controlling the spread of this infection in real-time. AI has the capability also to expect the risk of mortality by analyzing patient's previous history effectively. It also very important in fighting the virus by screening of the population, notification, medical help, and infection control suggestions (Haleem, et al., (2020), Bai, et al., (2020) & Hu, et al., (2020)). This new trend also has the possibility to enhance planning, treatment and reported outcomes of the COVID-19 patient.

Some uses of artificial intelligence which could be used in nursing information systems are monitoring client' information, helping to remember patient data, reporting forms, managing quality and minimizing hospitalization time, enhancing care efficacy and performing interventions in its correct time, cost effective and time saving, and helping in documentation of patient information. There are many barriers facing successful AI-based decision support systems for nursing as implementation of any technology is facing barriers, these barriers and challenges are technology limitations, the elevated costs of the system, and the continuous updates (Mehdipour, 2019).

As Egypt has become a safer place to live and do business and realizing Egypt's vision 2030 the country has started to embrace artificial intelligence & technology in different sectors. The government has gotten more aggressive in sparking the AI growth through initiatives aimed at fostering research and development within their borders. Towards an Egyptian society powered by AI & robotics, a public goal was set by the government of 7.7% of Egyptian Gross Domestic Product to be derived from AI & robotics by 2030 (Egypt's Artificial Intelligence Future, 2020).

Significance of the study

Health organizations must respond rapidly to changing technology, regulation, and customer

demands in the rapid transition in healthcare. Artificial intelligence can assist in proactive patient care, decreased future risk, and streamlined work processes. The advancement of artificial intelligence technology to additional adoption and value across healthcare is perpetuated by cost, quality, and care outcomes. Computer systems help also to analyze large amounts of data efficiently and assist instruction (Shaik, 2020). The researchers think no one attempt to study nurses' perception and attitudes toward artificial intelligence technology at Mansoura University Hospitals So, the aim of present study was to investigate the perception and attitudes of nursing managers toward using artificial intelligence technology in health settings at Mansoura University Hospitals.

Aim of the study:

The study aim is to investigate nurse managers' perspectives and attitudes toward using artificial intelligence technology in health settings at Mansoura University Hospitals.

Research questions:

Q1. What is the level of nurse managers' perception toward using artificial intelligence technologies in Health settings at Mansoura University Hospitals?

Q2. What is the level of nurse managers' attitudes toward using artificial intelligence technologies in Health settings at Mansoura University Hospitals.?

Q3. Is there a relation between nurse managers' perception and attitudes toward using artificial intelligence technologies?

Q4. Is there a relation between nurse managers' perception and their demographic characteristics at Mansoura University Hospitals?

Q5. Is there a relation between nurse managers' attitude and their demographic characteristics at Mansoura University Hospitals?

Materials and Methods:

Research Design: Descriptive research design was used to collect data of the study.

Setting: All Mansoura University Hospitals (Main Mansoura University Hospital, Emergency Hospital, Oncology Center, Specialized Medical Hospital, GIT center and Pediatric Hospital).

Participants: All available nurse managers at Mansoura University Hospitals were selected through convenient sample to participate in this study and accepted to participate in the study in the previously mentioned settings.

Tools of data collection: Two questionnaires were used to collect study data:

Tool (I): Perception toward artificial intelligence questionnaire adopted from Abdullah & Fakieh (2020) and aimed to assess nurse manager's perception toward AI through five point Likert scale

as 1 (Strongly Disagree), 2 (Agree), 3 (Neutral), 4 (Agree) and 5 (Strongly Agree). The questionnaire consists of two parts: 1st part is demographic data of studied sample as gender, age, type of job, and the educational level. 2nd part consists of 14 items with three dimensions, the first dimension, perception towards AI contains (4) items. The second dimension, the advantages of using AI includes (5) items. The third dimension, the problems regarding the application of AI in healthcare included (5) items.

Scoring System:

Based on cut of value 40%. The nurse managers' perception is determined as low ≤ 40 , moderate $41 \leq 80$ and high ≥ 81

Tool (II): General attitudes towards artificial intelligence questionnaire, adapted from **Schepman & Rodway (2020)**. And aims to assess the general attitudes toward AI through five point Likert scale ranged from 1-5, 1 (Strongly Disagree), 2 (Agree), 3 (Neutral), 4 (Agree) and 5 (Strongly Agree).

Scoring System: Based on cut of value 60%. The nurse managers' attitude is determined as negative ≤ 60 and positive attitude ≥ 61 .

Validity and reliability:

Face and content validity of the study tools were tested by five experts in the field of Nursing Administration to evaluate the items as well as the entire instruments as being relevant, comprehensive and appropriate to test what they wanted to measure and modifications were done. The study tools were tested to assess reliability via the pilot subjects and Cronbach's alpha test was 0.879 for first tool and 0.899 for the second tool.

Pilot study:

A pilot study was applied on 10% (13 nurses) from nurses' managers at Mansoura University Hospitals to investigate the clarity and applicability of tools and to determine the time needed to fill in questions. The pilot study was excluded from study sample.

Field work:

The researchers introduced themselves to the study sample, explained the aim of the study, and how to fill in the questionnaire, approval was taken orally and asked them for their cooperation with them. The researchers met the study sample either individually or groups during shifts to distribute the questionnaires during these meetings. The study sample filled in the tools individually at once and some of them read the questionnaires and fixed another time to fill them, filling the questionnaire sheet acquired from 20-30 minutes. The researchers were available during data collection to answer any question from the study sample. The data collection process started from the beginning of September to the end of November, 2020.

Ethical considerations

Ethical approval was obtained from the Research Ethical Committee of Faculty of Nursing, Mansoura University. An official permission to conduct the study was obtained from the responsible administrator of the hospitals included in the study. All participants were informed that the study is voluntary and they have the right to withdraw from the study at any time. All participants were assured about the confidentiality of the collected data and the privacy of the study sample was assured.

Statistical design:

The data collected was organized, tabulated and analyzed statistically by using SPSS software (Statistical Package for the Social Sciences, version 22, SPSS Inc. Chicago, IL, USA). The mean, range, and standard deviation for the quantitative data were calculated. Comparisons were done between two groups using the Chi-square test (χ^2) for qualitative data.

Results

Table (1): Percentage distribution of nurse managers' personal characteristics (no=130).

%	No	Personal data
96.2	125	Gender
3.8	5	Female
		Male
4.6	6	Age
41.5	54	20-25
13.9	18	26-30
28.5	37	31-35
11.5	15	36-40
		More than 40
8.5	11	Experience
40.0	52	Less than 5 years
20.8	27	5-10 years
21.5	28	11-15 years
9.2	12	16-20years
		More than 20 years
42.3	55	Position
53.1	69	Head nurse
4.6	6	Supervisor
		Nurse manger
79.3	103	Education
16.9	22	BSc
1.5	2	Master
2.3	3	Ph.d
		others
26.9	35	Hospital
7.7	10	Emergency Hospital
11.5	15	Gastrointestinal Hospital
15.4	20	Oncology Center
23.1	30	Specialized medical Hospital
15.4	20	Main Mansoura University Hospital
		Pediatric Hospital

Table (2): Mean scores of nurse managers' perception toward using artificial intelligence technology in nursing settings.

Mean \pm SD	Items
11.33 \pm 3.95	Perception towards artificial intelligence
16.17 \pm 4.67	Advantages of using artificial intelligence
15.31 \pm 4.65	The problems regarding the application of artificial intelligence in healthcare

Table (3): Mean Scores of nurse managers' attitude toward Using Artificial Intelligence Technology in Nursing Settings

Mean \pm SD	Items
3.03 \pm 0.95	1. I am interested in using artificially intelligent systems in my daily life
3.38 \pm 0.99	2. There are many beneficial applications of Artificial Intelligence
3.55 \pm 0.91	3. Artificial Intelligence is exciting
3.47 \pm 0.90	4. Artificial Intelligence can provide new economic opportunities for My organization
3.29 \pm 1.07	5. I would like to use Artificial Intelligence in my own job
3.10 \pm 1.12	6. An artificially intelligent agent would be better than an employee in many routine jobs
3.28 \pm 1.05	7. I am impressed by what Artificial Intelligence can do
3.39 \pm 1.05	8. Artificial Intelligence can have positive impacts on Nurses' wellbeing
3.26 \pm 1.00	9. Artificially intelligent systems can help Nurses feel happier
2.85 \pm 1.13	10. Artificially intelligent systems can perform better than humans
3.20 \pm 1.05	11. Much of organizations will benefit from a future full of Artificial Intelligence

Mean \pm SD	Items
3.12 \pm 1.16	12. For routine transactions, I would rather interact with an artificially intelligent system than with a human
3.14 \pm 1.20	13. I think Artificial Intelligence is dangerous
2.81 \pm 1.04	14. Organizations use Artificial Intelligence unethically
2.76 \pm 1.11	15. I find Artificial Intelligence sinister
2.76 \pm 1.15	16. Artificial Intelligence is used to spy on Nurses
2.81 \pm 1.09	17. I shiver with discomfort when I think about future uses of Artificial Intelligence
2.81 \pm 1.07	18. Artificial Intelligence might take control of Nurses
2.93 \pm 1.07	19. I think artificially intelligent systems make many errors
2.80 \pm 1.07	20. Nurses like me will suffer if Artificial Intelligence is used more and more
61.84 \pm 1.26	Total

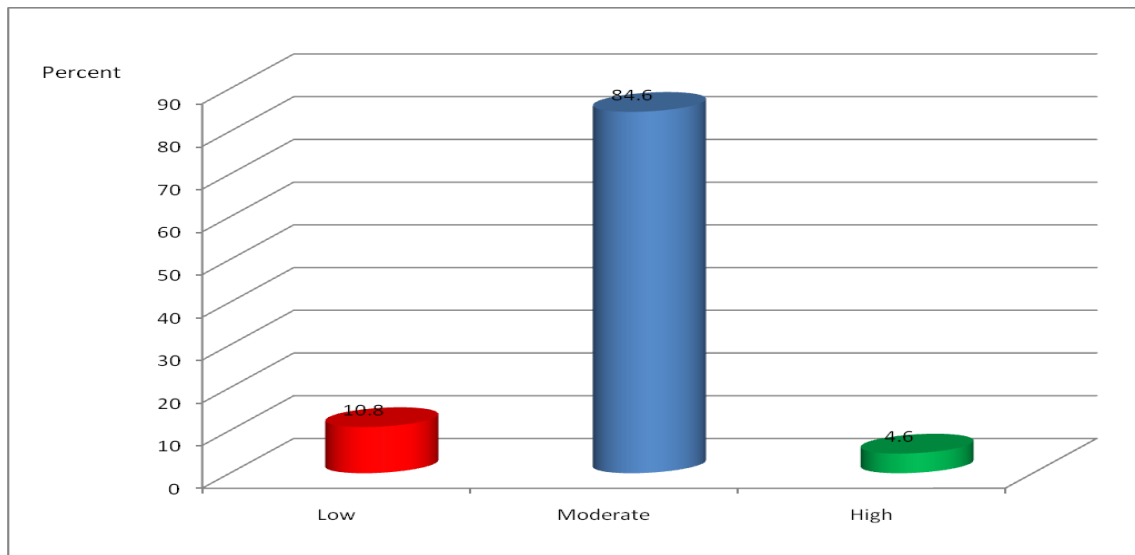


Figure (1): Levels of nurse managers' Perception toward using Artificial Intelligence Technology in Health Settings.

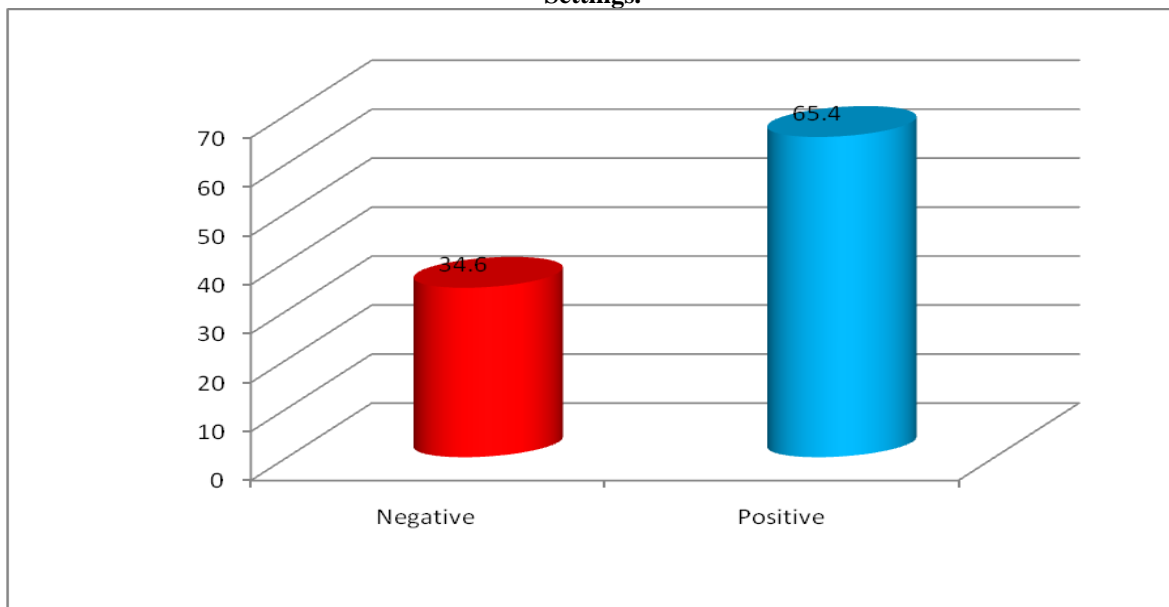


Figure (2): Levels of nurse managers' attitude toward using Artificial Intelligence Technology in Health Settings.

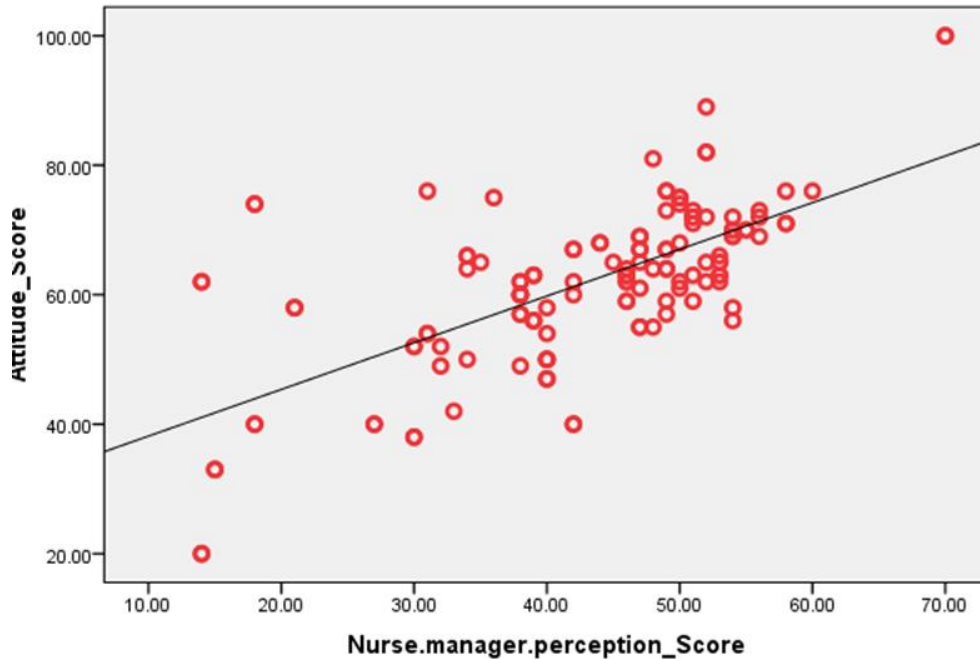


Figure (3): Correlation between nurse managers’ perception and attitudes toward using AI in nursing setting.

Table (4): Relation between Nurse mangers’ attitude toward using AI and their demographic characteristics

Demographic characteristics	Attitude	
	Median(Mini-Maxi)	Test of Sig.
Gender		
Male	70.00 (62.00-73.00)	Z=1.218 P=0.223
Female	63.00 (20.00-100.00)	
Age		$\chi^2 = 3.052$ P= .549
20-25	64.5000(60.00-89.00)	
26-30	63.0000(47.00-81.00)	
31-35	62.0000(33.00-76.00)	
36-40	64.0000(20.00-82.00)	
>41	60.0000(40.00-100.00)	
Job		$\chi^2 = 5.685$ P= 0.058
Head nurse	64.0000(33.00-89.00)	
Supervisor	62.0000(20.00-82.00)	
Nurse manger	84.5000(56.00-100.00)	
Experience		$\chi^2 = 8.569$ P=0 .073
Less than 5 years	65.0000(60.00-89.00)	
5 – 10 years	62.5000(33.00-76.00)	
11- 15 years	65.0000(38.00-82.00)	
16 -20 years	57.5000(20.00-76.00)	
More than 20	58.0000(40.00-100.00)	
Education		$\chi^2 = 8.564$ P= 0.036
BSC	63.0000(20.00-100.00)	
Master	62.5000(42.00-82.00)	
PHD	33.0000(33.00-33.00)	
Other	72.0000(69.00-72.00)	
Workplace		$\chi^2 = 9.718$ P= 0.084
Emergency Hospital	62.0000(20.00-100.00)	
Gastrointestinal Hospital	61.0000(42.00-74.00)	
Oncology Center	65.0000(50.00-75.00)	
Specialized medical Hospital	64.0000((38.00-89.00)	
Main University Hospital	61.0000(20.00-100.00)	
Pediatric Hospital	69.0000(55.00-76.00)	

Table (5): Relation between Nurse managers’ perception toward using Artificial intelligence and their demographic characteristics

Nurse managers’ perception		Demographic characteristics
Test of Sig.	Median(Mini-Maxi)	
Z=1.697 P=.090	51.00 (46.00-55.00) 46.00 (14.00-70.00)	Gender Male Female
$\chi^2 = 4.151$ P= 0.386	48.50 (42.00-52.00) 46.00 (14.00-58.00) 43.00 (15.00-60.00) 46.00 (14.00-58.00) 42.00 (30.00-70.00)	Age 20-25 26-30 31-35 36-40 >41
$\chi^2 = 4.781$ P= 0.092	46.00 (15.00-58.00) 46.00 (14.00-60.00) 63.00 (39.00-70.00)	Job Head nurse Supervisor Nurse manger
$\chi^2 = 2.802$ P= 0.592	47.00 (42.00- 58.00) 45.00 (14.00-56.00) 47.00 (18.00-60.00) 42.00 (14.00-58.00) 40.50 (30.00-70.00)	Experience Less than 5 years 5 – 10 years 11- 15 years 16 -20 years More than 20
$\chi^2 = 13.114$ P= 0.004	46.00 (14.00-70.00) 38.50 (14.00-53.00) 15.00 (15.00-15.00) 54.00 (52.00-56.00)	Education BSC Master PHD Other
$\chi^2 = 22.320$ P= ≤ 0.001	40.00 (14.00-70.00) 48.00(32.00-54.00) 46.00 (32.00-53.00) 47.00 (30.00-54.00) 39.50(14.00-70.00) 52.00 (40.00-60.00)	Workplace Emergency Hospital Gastrointestinal Hospital Oncology Center Specialized medical Hospital Main University Hospital Pediatric Hospital

Table (1): Shows that 96.2% of studied sample were females, 41.5% of them aged from 26-30 years old, 40% had 5-10 years of experience, 53.1% were supervisors, 79.2% had BSc degree of nursing education and 26.9% were from Emergency Hospital.

Table (2): Shows that nurse managers reported their high mean score (16.17 ± 4.67) for perception of advantage toward using artificial intelligence, followed by the problems regarding the application of artificial intelligence in healthcare (15.31 ± 4.65).

Table (3): Shows that Artificial Intelligence is exciting gained the high mean score of nurse managers’ attitudes toward using artificial intelligence ($3.55 + 0.91$) followed by Artificial Intelligence can provide new economic opportunities for my organization ($3.47 + 0.90$) while, Artificial Intelligence can have positive impacts on Nurses’ wellbeing came on the third rank ($3.39 + 1.05$). on the other hand, both items, find Artificial Intelligence sinister and Artificial Intelligence is used to spy on Nurses gained the lowest mean score ($2.76 + 1.11$) for each item.

Figure (1): Illustrates that the 84.6% of nurse managers had moderate perception towards using AI in nursing setting. While 4.6% of them had high perception.

Figure (2): Illustrates that 65.4% of nurse managers had positive attitude toward using AI in health setting

Figure (3): Illustrates that there is a highly significant positive correlation between nurse managers’ perception and attitude toward using AI in nursing settings.

Table (4): Shows that there is a significant positive relation between studied sample Personal characteristics and Nurse managers’ attitude toward using artificial intelligence except gender and age.

Table (5): Shows that there is a significant positive relation between job, education and workplace of studied sample demographic characteristics and their perception toward using artificial intelligence.

Discussion

Artificial intelligence is already present in healthcare. It could be used in the support of clinical decision making, management of diseases, patient engagement, and organizational enhancements. Many organizations will use it by 2020, as this technology continues to be made readily accessible for every person. That said, healthcare organizations may face several challenges as they begin to deploy AI (Kathleen, McGrow, 2019). Technology perceptions and attitudes are significant factors that may hinder the uptake and success of its implementation. However, there is a lack of studies whether there is a measurable difference in perceptions and attitudes toward the technology among health care staff. So, this study aims to assess the level of the nurse managers' attitudes and perception toward using artificial intelligence technology in health settings at Mansoura University Hospitals.

The results of the present study revealed that there is a significant positive relation between nurse managers' demographic characteristics (years of experience, job, education and work position) and their attitudes toward using AI except gender and age. This result may be related to the global trend regarding the existence of the Corona pandemic showed the need to use AI to reduce the rate of infection spread. Also, all health settings are trying to use AI in different nursing settings. which makes a link between the attitudes of nursing managers (Decision maker) towards the use of AI in different workplaces, especially at the present time. In addition to the correlation of the level of education, years of experience, and the awareness of those with high level of education and experience of the need for AI and technology in health settings to be in line with the global trend.

These findings were consistent with the study by IJsebaert, (2019) entitled attitudes towards robots and Artificial Intelligence at work in 22 European countries and revealed that education has a significant positive effect on robots and AI attitudes at work. Also, it showed that age is a weak factor to make variation in robots and AI attitudes at work. Older adults make new strategies to avoid using of technologies and robots and consequently are less likely to be positive towards them. Also, Elias, et al ., (2012) mentioned that age is seen as a significant element to consider when addressing workplace technology and older workers are less eager to adapt, less able to training and less able to understand new concepts that have a negative effect on managers and employees' behavior.

The finding of the present study revealed that there is a significant positive relation between job, education and workplace of nurse managers' demographic

characteristics and their perception toward using artificial intelligence. This result may be related to job, education and workplace are the most important environmental stimuli that affect the way the person think and his impression about anything. Which in turns affect the person' perception. This result is in line with Cherry, (2020) who mentioned that perception is considered the sensory experience of the world. Perception includes both recognizing environmental stimuli and actions as a result of these stimuli. The whole thing in the environment that has the possibility to be perceived is called environmental stimulus.

In the same line this result is supported by the study of Abdullah, (2020) entitled "Health care employees' perception of the use of artificial intelligence application: survey study" and mentioned that no significant differences in employees' perception and educational level.

The result of the present study mentioned that there is a highly significant positive correlation between nurse managers' perception and attitudes toward using artificial intelligence in nursing settings. This result may be related to the new trend of Egyptian hospital for application of Artificial intelligence in various workplaces as response to Egypt' vision 2030. According to this vision Egypt started to embrace artificial intelligence & technology in all society sectors. One of this critical sector is health. On the other hand, nurse managers are considered the decision maker inside their workplace which gives them the responsibility to achieve the new trend of their workplace and take decisions that go in line.

The result of the current study showed that nurse managers reported their high mean score for perception of advantage toward using artificial intelligence, followed by the problems concerning artificial intelligence application in healthcare. This result may be related to the extent to which nursing managers are aware of the importance and advantages of using AI in nursing settings, especially at the present time, as the existence of the Corona virus. Which is considered a global epidemic threatening the whole world, especially health personnel, and one of the most important advantages of AI is that it helps accelerate health care process, decrease medical errors and deliver real time, clinically relevant, massive amounts of high-quality data. On the other hand, the more critical problem for application of artificial intelligence is that the ability of artificial intelligence to sympathize and understand the patient's emotional well-being is low, which consider the base for dealing with patient and has a significant role for quality of patient care.

This finding disagreed with the study held by Abdullah, (2020) mentioned that problems

concerning artificial intelligence application in healthcare gained the high score followed by advantage toward using artificial intelligence. In the same point of view with the study done by **Carrol, (2019)** entitled “artificial intelligence, critical thinking and the nursing process” mentioned that applications and benefits of artificial intelligence to nurses in care delivery environments are still vague.

Regarding the attitude of nurse managers toward using artificial intelligence, the present findings revealed that artificial Intelligence is exciting gained the high mean score distribution of nurse managers’ attitude followed by artificial intelligence can offer new economic opportunities for my organization. This finding may be related to the ability of artificial intelligence in transforming the level of health care. Artificial intelligence has a various roles in health care delivery process as, using AI approaches to analyses un-structured data as images, videos, doctors notes to help in decision making in clinical settings; using AI can improve patient engagement and treatment compliance; and predictive modeling to deal with patient flow and hospital capacity and resource availability, AI programs that help in predicting, diagnosing and diseases treatment or management of which in turn help improvement of care and reducing workload.

This result was supported by (**Spatharou, 2020**), who mentioned that AI has the ability to change the delivery of healthcare. A new study with the European Union’s EIT Health discussed how it can improve care outcomes, the experience of clients and accessibility of healthcare services. Artificial intelligence may improve care delivery productivity and efficacy also it can help healthcare systems to offer more and better care to additional categories of people. AI will help enhance healthcare practitioners’ experience, helping them to focus extra time on direct patient care and decreasing burnout.

Regarding the level of nurse managers’ perception toward using artificial intelligence the present study revealed that more than three-quarters of studied sample had a moderate level of perception. This result may be due to artificial intelligence has become of great importance nowadays due to the tendency of the health sector to use it in its various fields and seeks to provide the necessary information on how to apply it in line with Egypt’ Vision 2030 that aims to digitization all society sectors.

This result goes in line with **Abdullah, (2020)** who mentioned in his study that the overall perception of health care employees toward AI was moderate.

On the other hand, this result disagreed with **Mehdipour, (2019)** in study entitled “Nursing Managers’ Attitudes towards Using Artificial Intelligence Systems in Nursing Decisions”,

mentioned that the level of application of Artificial Intelligence awareness for the majority of nursing managers in nursing was very high.

In the same line **Alamanova, (2018)** in study entitled “The Perception of Artificial Intelligence and Other Technological Innovations among Human Resources Specialists”. He mentioned that HR professionals were enthusiastic about minimizing manual workloads while being skeptical about adding unnecessary functionality to computing machines also they possess different feelings about AI than they do about other new emerging technologies. HR professionals have concerns about technology pricing and interfaces in addition to electronic HR management applications.

The current study showed that more than half of nurse managers had positive attitude toward using AI in nursing setting. This result may be related to implementation of AI in nursing settings leads to improve the level of health care, increase productivity, decrease medical errors, give more chances for nurse to spend more time with direct patient care and decrease workload.

This finding was in line with **Sarwar, et al., (2019)** who mentioned that pathologist respondents had positive attitudes toward Artificial Intelligence, with almost three- quarters were excited or interested in using AI as a diagnostic tool for enhancing efficiency and quality efficiency in pathology workflows and also, expected AI technology introduction into the pathology laboratory in the future. In addition to **Mehdipour, (2019)** who mentioned that the majority of nursing managers attitude towards application of AI systems in nursing was positive.

Conclusion

In the light of our study findings, it was concluded that the highest percent mean score was related to perception of advantage toward using artificial intelligence, followed by the problems concerning artificial intelligence application in healthcare. The majority of studied sample had a moderate level of perception with positive attitude toward artificial intelligence. There is a highly significant positive correlation between nurse managers’ perception and attitude toward using AI in nursing settings.

Conflict of interest

The authors declare that they have no conflict of interest

Recommendations

- Provide appropriate information about the benefits, challenges, and issues concerning AI implementation in nursing settings and these technologies potentials to enhance processes and efficiencies of health care.

- Encourage nurse managers to increase their knowledge toward artificial intelligence through workshop and training programs.
- Conduct workshop and training programs about AI.
- Participation and support of hospital managers from the beginning of AI system implementation.
- Enhance the readiness of organizations for artificial intelligence through good infrastructure and budget.

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