# Nurse Managers' Perception Regarding Artificial Intelligence and Health Logistic Management

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## Abstract

**Background:** Artificial intelligence has the ability to bring about helpful changes in healthcare especially management of logistics tasks within a hospital. **Aim of the study**: To assess nurse managers' perception regarding artificial intelligence and health logistic management. **Research design**: A descriptive correlational design was used. **Setting**: The study was conducted at Tanta University Hospitals. **Subjects**: All (n=280) nurse managers, who are working in the previously mentioned setting. **Tools:** Two tools were used to collect data; Tool I: Nurse managers' perception about artificial intelligence, Tool II: Nurse managers' perception regarding health logistic management structured questionnaires. **Results**: - More than two-thirds (66.8%) of nurse managers had a low level of perception regarding overall artificial intelligence as well as, more than three-quarters (79.6%) of them had a moderate level of perception regarding health logistic management. **Conclusion:** A positive statistically significant correlation was found among nurse managers overall perception of artificial intelligence and health logistic management. **Recommendations:** Hospital administrator should encourage nurse managers to increase their knowledge and perception toward artificial intelligence and health logistic management through training programs and providing further education to enable them to integrate them into their practices.

*Keywords*: Artificial Intelligence, Health Logistic Management, Nurse Managers

## Introduction

A range of services are provided by healthcare organizations to help people stay healthy and receive care when they are ill or injured. These medical facilities act as centers of healing, with committed staff members from physicians and nurses to medical equipment technicians and support personnel managing patient care and collaborating to promote wellbeing **(Lennon et al.,2023).** Nurse managers are leaders in healthcare organizations who assist in implementing new concepts and procedures for the facility's or organization's improvement in addition providing direction to the nurses in their department. **(Mudd et al., 2023).**

Healthcare operations need drastic changes to digitalize the healthcare organization. Since then, artificial intelligence (AI) has been successful in capturing the interest of important healthcare executives and providers in order to gain a competitive edge in the job market. AI is an attempt to make the computer or the machine that works with programming resemble a human being, whether in thinking, actions, solution to problems, and practice of all aspects of daily life **(Apell & Eriksson, 2023).**

Six domains comprise the features of artificial intelligence technology among nurse managers: perception toward artificial intelligence technology, advantage of using artificial intelligence technology, economics of using artificial intelligence technology in the work, performance expectancy with using artificial intelligence technology in the work, barrier to artificial intelligence technology application in nursing care and general attitude toward using artificial intelligence technology (**Abdullah& Fakiehan ,2020).**

First, nurse managers' perception regarding AI are varied and can be broadly positive or negative views **(De Gelder, & Solanas,2021)**. Second**,** AI technology has many benefits for nurses, including bettering patient care and increasing productivity. It can also automate repetitive administrative duties like scheduling, paperwork, and inventory control, freeing up nurses to concentrate on providing direct patient care **(Khanzode& Sarode, 2020).**

Third**,** predictive analytics powered by AI can identify patients who are at risk for complications, enabling early intervention and reducing costly hospital readmissions **(Cao, 2022)**. Fourth; AI can provide nurses with real-time decision support, offering evidence-based recommendations for patient care, which can lead to more accurate and effective nursing care **(Figueroa-Armijos et al.,2023**) Fifth; The infrastructure required to support AI technology is lacking in many healthcare facilities. Finally, overall, even if there is a lot of excitement around AI's potential advantages, this is tempered by concerns about ethical issues, job displacement, data privacy, and the requirement for legal frameworks to guarantee the equitable and open application of AI technologies **(Renz & Hilbig, 2020).**

Advanced technologies like artificial intelligence (AI), virtual reality, and robotics are already used on a regular basis in various enterprises. A broad range of abilities is required to meet the need for all logistic tasks in the hospital because nurse managers divide up the responsibilities among several departments and units, some of which are quite important **(El Hamdi& Abouabdellah, 2022)** Thus, the application of AI for the best possible administration of hospital logistics operations is essential for cutting expenses, improving treatment quality, and promptly meeting supply availability requirements **(Rajpurkar et al., 2022).**

Logistics is the process of making sure that the appropriate product is available for the right consumer at the right time, location, and quantity in the right condition at the right price **(Khan et al., (2020).** Logistics management is the process of handling the integrated management of all material and related information flow from suppliers

through the conversion of input materials up to the final customer **(Issitt et al., 2022).**

A successful relief effort in hospitals depends on effective logistics, which manages the flow of supplies, information, and services to meet the patients' immediate requirements **(Dembrower et al.2020).** The use of AI is essential to manage logistics tasks in a hospital as efficiently as possible to lower expenses, improve care quality, and meet supply-related demands on time while avoiding shortages that cause stock ruptures. Logistic management involves seven domains: customer service, demand forecasting, communication, store, physical inventory, transport and medical waste product **(Esmaeilzadeh,2020)** First**,** customer service is a critical component of patient care, ensuring that patients and their families feel valued, respected, and supported throughout their healthcare experience **(Adam et al.,2021).**

Second**,** demand forecast in healthcare involves predicting the future demand for healthcare services, medical supplies, and other related products **(Seyedan & Mafakheri, 2020).** Third, communication is the process by which nurse managers exchange information using a common set of signs, symbols, or behaviors **(Liu et al., 2022).** Communicate health logistic involves hospital center monthly report which includes essential information related to the management of medical supplies; a stock card is a manual or electronic record-keeping tool used to track the inventory of medical supplies and requisition for medical supplies contain

the name of health commodity **(Wilson et al., 2022).**

Fourth**;** store is a room or space for the storing of medical supplies that should be clean, dry and ventilated **(Grewal et al., 2020)** Fifth**;** physical inventory refers to the process of manually counting and recording all items in a store to verify the actual inventory levels **(Hashmi et al., 2021)** Sixth**;** Transport is the movement of people or materials from one location to another. Finally, in healthcare logistics management, this includes moving medical supplies, patients, labs, and medical waste products from one department to another **(Liew et al., 2020).**

Nurse managers have an important role in the good management of healthcare organization by overseeing the nursing staff, managing budgets, ensuring compliance with healthcare regulations, implementing policies and procedures, and improving the quality of patient care. **(Warshawsky & Cramer, 2019)**

**Significance of the study**

Artificial intelligence has a transformative impact on healthcare services, especially logistics services, as it has proven its effective role in creating a qualitative shift in supply chain management, warehousing and transportation, demand forecasting, customer service, and inventory management. AI is a valuable technology that can be relied upon in the logistics sector to enhance decision-making, enhance adaptability, reduce costs and increase company competitiveness **(Dossou et al.,2021).**

From the researcher's perspective, many healthcare organizations especially Tanta University Hospitals are slow to adopt AI technologies into

their supply chain, and even those that invest in this technology are not leveraging its full power **(Boute& Udenio, 2022).** Thus, assessing nurse managers' perception toward healthcare logistics and artificial intelligence is crucial for nursing practice because it can encourage them to adopt these technologies and help them prepare for future challenges.

### Aim of the study

Assess nurse managers' perception regarding artificial intelligence and health logistic management.

### Research Questions

1. What are the levels of nurse managers' perception regarding artificial intelligence and health logistic management?
2. What is the relation between nurse managers' perception of artificial intelligence and health logistic management?

### Research design:

A descriptive-correlational research design was used in the present study.

### Study setting:

This study was conducted at Tanta University Hospitals which is affiliated to the Ministry of Higher Education and Scientific research. Tanta University Hospitals is a landmark in the medical world in the middle of the delta including Pediatric Hospital, Medical Hospital, Psychiatric Hospital, The New Surgical Hospital, Tanta International Educational Hospital, Emergency Hospital, Ophthalmology Hospital, Student Hospital and the Tanta University Main Hospital (Gynecology and Obstetrics, Cardiac, Neurology, Tropical, Blood bank, Central Laboratory and Oncology departments).

### Subjects:

The subjects of the study included all (n=280) nurse managers, who are working in the previously mentioned setting and are available at the time of data collection.

### Tools of data collection:

To achieve the aim of study, the following two tools were used.

**Tool I: Nurse Managers' Perception about Artificial Intelligence Structured Questionnaire**

This tool was developed by researcher based on **Oh et al., (2019)** and related literature **(Abdullah & Fakiehan, 2020; Schepman & Rodway, 2023),** it was used to assess nurse manager' perception about artificial intelligence. It consisted of two parts as follows:

**Part 1**: Personal data of nurse managers included age, gender, marital status, hospital name, position, educational level, years of experience, training program about artificial intelligence and logistics management.

**Part 2**: Nurse Managers' Perception of Artificial Intelligence Questionnaire: it consisted of 38 items categorized into six subscale distributed as the following:

- **Perception toward AI technology**: included 9 items (No 1-9).
- **Advantages of using AI technology**: included 8 items (No 10-17).
- **Economic expectation of using AI technology in the work**: included 3 items (No18-20).
- **Performance expectancy with using AI technology in the work:** included 5 items (No 21-25).
- **Barrier to AI technology application in nursing care:** included 6 items (No 26-31).

- **General attitude toward using AI technology:** included 7 items (No 32-38).

**Scoring system:**

Nurse managers' responses were measured on a 5 points Likert Scale ranging from 5 to 1 where; strongly agree (5), agree (4), neutral (3), disagree (2), and strongly disagree (1). The strongly disagree response was added to disagree and strongly agree was added to agree response. The total scores were calculated by summing the scores of all categories, then classified according to statistical cut-off point for:

- High level of artificial intelligence perception >75% (equal 142)
- Moderate level of artificial intelligence perception 60%-75% (equal ٢٣-١٤٣)
- Low level of artificial intelligence perception <60% (equal 22)

**Tool II: Nurse Managers' Perception Regarding Health Logistic Management Structured Questionnaire.**

This tool was developed by **Dobrzańska et al., (2013)** and was modified by the researcher based on related literature (**Kazakov et al., 2023 and Zhu et al., 2021).** It was used to assess nurse managers' perception regarding health logistic management. It consisted of 47 items categorized into seven subscales as follow:

- **Customer service**: included 4 items (No 1-4).
- **Demand forecasting**: included 4 items (No 5-8).
- **Communication** is divided into three categories.
- **Hospital center monthly report LMIS**: included 3 items (No 9-11).
- **Department stock card**: included 4 items (No 12-15).

- **Requisition for medical supplies:** included 2 items (No 16-17).
- **Store**: included 10 items (No 18-27).
- **Physical inventory**: included 3 items (No 28-30).
- **Transport** divided into three categories;
- **Transport medical supply**: included 5 items (No 31-35).
- **Transport patient from department to another department**: included 4 items (No 36-39).
- **Transport laboratory**: included 2 items (No 40-41).
- **Medical waste product**: included 6 items (No 42-47).

**Scoring system:**

Nurse managers' responses were measured on a 5-points Likert Scale ranging from 5to1 where; strongly agree (5), agree (4), neutral (3), disagree (2), and strongly disagree (1). The strongly disagree response was added to disagree and strongly agree was added to agree response. The total scores were calculated by summing the scores of all categories, then classified according to statistical cut-off point for:

- High level of health logistic management perception >75% (equal 175)
- Moderate level of health logistic management perception 60%-75% (equal 28-176)
- Low level of health logistic management perception <60%. (equal 27)

**Method**

1. An official permission was obtained from the Dean of Faculty of Nursing to the authoritative personnel that submitted to the previously mentioned setting.

2. The purpose of the study was explained and made clear to the directors of hospitals and the managers of each unit to gain their cooperation.

3. **Ethical considerations:**

- Approval was obtained from the Scientific Research Ethics Committee before conducting the study with code number 324-11-2023.

- The nature of the study was not causing harm to the entire sample.

- Informed consent was obtained from the study's participants after explanation of the study's aim.

- Confidentiality and anonymity were maintained regarding data collection and the participants have the right to withdrawal.

4. Tools were translated from English to Arabic to ensure that they are comprehensible and culturally relevant for the participant. This translation process followed a standard translation and the back -translation procedure:

- **Initial Translation**: The tools were translated into Arabic by a qualified translator fluent in both English and Arabic and familiar with the cultural nuances of both languages.

- **Back-Translation**: A different translator, who was not involved in the initial translation and is also fluent in both languages, was independently translating the Arabic version back into English. This step helped to check for consistency and accuracy in the translation.

- **Comparison and revision**: The original English version and the back-translated English version were compared. Any discrepancies were discussed and resolved by a panel of experts including translator and researchers, to finalize the Arabic version of the tools.

5. Tools (I, II) presented to jury of five experts in the area of specialty to check their content validity and the clarity of the questionnaire. The experts were two professors, and three assistant professors of nursing administration from the faculty of nursing, at Tanta University. The experts' responses were represented in four points rating scale ranging from (1-4) when (1) not relevant, (2) little relevant, (3) relevant, and (4) strongly relevant. Necessary modifications were made including clarification, omission of certain items and adding others and simplifying work related words.

- The face validity value of tool (I) nurse managers' perception about artificial intelligence structured questionnaire was 97.3% & tool (II) nurse managers' perception regarding health logistic management structured questionnaire was 98.8%.

6. A pilot study was carried out on a sample (10%) of the subject (n=28), and they were included into the main study sample during the actual collection of data. The pilot study was done to test clarity, sequence of items, applicability, and relevance of the questions, minor modifications were done. The pilot study was done also to determine the needed time to complete the questionnaire.

- The estimated time needed to complete the questionnaire items from nursing manager was 20 – 30 minutes for each sheet.

7. Reliability of tools was tested using Cronbach's Alpha Coefficient test. Reliability of tool (I) nurse managers' perception about artificial intelligence structured questionnaire= 0.892 and reliability of tool (II) nurse managers' perception regarding health logistic

management structured questionnaire = 0.958.

8. **Data collection phase**: the data were collected from nurse managers by the researcher. The researcher met the respondents' nurse manager individually in different areas under study during working hours to distribute the questionnaire. The subjects recorded the answer in the presence of the researcher to ascertain that all questions were answered.

9. The data was collected over a period of six months started from the beginning of March 2024 until the end of August 2024.

**Statistical analysis:**

The statistical analysis of the data was performed using IBM SPSS software version 20.0 (Armonk, NY: IBM Corp, released 2011). Categorical data were summarized as numbers and percentages. For continuous data, normality was assessed using the Kolmogorov-Smirnov test. Quantitative data were described using range (minimum and maximum), mean, standard deviation and median. The significance of the obtained results was judged at the 5% level. The used tests were student t-test for normally distributed quantitative variables to compare between two studied categories, F-test (ANOVA) For normally distributed quantitative variables to compare between more than two categories and Pearson coefficient to correlate between two normally distributed quantitative variables.

**Results**

**Table (1)** shows distribution of nurse managers according their personal data. It was observed that, nurse managers' age ranged between 25 – 50 years with mean age 31.04+4.87, more than half (59.6%) of them fall in the age group from 25 to <30 years and the majority (87.9%) of them were female. The most (95.7%) of nurse managers were married and more than one-quarter (26.1%) of them were worked at Tanta University Main Hospital. As regards position, more than three-quarters (78.6%) of nurse managers were charge nurse. Regarding educational level, the majority (84.6%) of nurse managers had bachelor in nursing science. Also, as noticed, nurse managers' year of experience ranged between 3-25 years with mean 8.25+4.77 and the majority (80.7%) of them fall in the group of years of experience from 5 to <10. As well as, all (100%) of nurse managers did not attend the training program about health logistic management or artificial intelligence.

**Table (2)** displays mean scores, standard deviation, and ranking of nurse managers' perception about artificial intelligence dimensions. As noticed, general attitude toward using artificial intelligence technology was ranked as the highest dimension of nurse managers' perception about artificial intelligence. While, perception toward artificial intelligence technology was ranked as the lowest dimension.

**Table (3):** Displays mean scores, standard deviation, and ranking of nurse managers' perception regarding health logistic management dimensions. As noticed, customer service was ranked as the highest dimension of nurse managers' perception regarding health logistic management.While, physical inventory was ranked as the lowest dimension.

**Figure (1)** denotes that, more than two-thirds (66.8%) of nurse managers had a low perception level regarding to overall perception about artificial intelligence. While, none of them had a high perception level regarding perception about artificial intelligence.

**Figure (2)** denotes that more than three-quarters (79.6%) of nurse managers had a moderate perception level regarding to perception about health logistic management. While, none of nurse managers had a high perception level regarding to perception about health logistic management.

**Figure (3):** Illustrates a positive statistically significant correlation was found among nurse managers' overall perception of artificial intelligence and health logistic management (r =0.133) at (p=0.026*).

**Table (4)** presents relations between nurse managers' perception about artificial intelligence and their personal data. There was no significant difference between nurse managers' perception about artificial intelligence and their personal data except educational level where $p \leq 0.05$.

**Table (5)** portrays the relation between nurse managers' perception about health logistic management and their personal data. It indicated that there was no significant difference between nurse managers' perception about health logistic management and their personal data except hospital name where $p \leq 0.05$.

**Table (1): Distribution of nurse managers according to their personal data (n = 280)**

| Personal data | No. | % |
|---|---|---|
| **Age (years)** | | |
| 25 – 30 | 167 | 59.6 |
| 31 – 40 | 90 | 32.1 |
| 41 – 50 | 23 | 8.2 |
| Min. – Max. | 25.0 – 48.0 | |
| Mean ± SD. | 31.04 ± 4.87 | |
| **Gender** | | |
| Male | 34 | 12.1 |
| Female | 246 | 87.9 |
| **Marital status** | | |
| Married | 268 | 95.7 |
| Not married | 12 | 4.3 |
| **Hospital name** | | |
| Emergency | 42 | 15.0 |
| Medical | 20 | 7.1 |
| Pediatric | 21 | 7.5 |
| Psychiatric | 30 | 10.7 |
| Student | 17 | 6.1 |
| Surgical | 37 | 13.2 |
| Tanta international educational | 40 | 14.3 |
| Tanta university main | 73 | 26.1 |
| **Position** | | |
| Nurse manager | 6 | 2.1 |
| Supervisor | 36 | 12.9 |
| Head nurse | 18 | 6.4 |
| Charge nurse | 220 | 78.6 |
| **Educational level** | | |
| Technical nursing institute diploma | 23 | 8.2 |
| Bachelor in nursing science | 237 | 84.6 |
| Other post graduate studies | 20 | 7.1 |
| **Years of experience in nursing** | | |
| 5 – <10 | 226 | 80.7 |
| 10 – <15 | 25 | 8.9 |
| 15 – <20 | 12 | 4.3 |
| $\geq$20 | 17 | 6.1 |
| Min. – Max. | 3.0 – 25.0 | |
| Mean ± SD. | 8.25 ± 4.77 | |
| **Attendance training program about health logistic management or artificial intelligence** | | |
| No | 280 | 100.0 |

**Table (2): Mean scores, standard deviation, and ranking of nurse managers' perception about artificial intelligence dimensions (n = 280)**

| Nurse managers' perception about artificial Intelligence | No of item | Score range | Total score | | | Average score (1 – 5) | Ranking |
|---|---|---|---|---|---|---|---|
| | | | Min. – Max. | Mean ± SD. | Median | Mean ± SD. | |
| -Perception toward artificial intelligence technology | 9 | (9 – 45) | 18.0 – 39.0 | 26.94 ± 4.25 | 27.0 | 2.99 ± 0.47 | 6 |
| -Advantages of using artificial intelligence technology | 8 | (8 – 40) | 21.0 – 32.0 | 28.30 ± 3.09 | 29.0 | 3.54 ± 0.39 | 2 |
| -Economic expectation of using artificial-intelligence technology in the work | 3 | (3 – 15) | 6.0 – 12.0 | 9.54 ± 1.82 | 9.0 | 3.18 ± 0.61 | 4 |
| -Performance expectancy with using artificial intelligence technology in the work | 5 | (5 – 25) | 6.0 – 20.0 | 13.67 ± 4.21 | 13.0 | 3.33 ± 0.54 | 3 |
| -Barrier to artificial intelligence technology application in nursing care | 6 | (6 – 30) | 12.0 – 24.0 | 19.04 ± 3.23 | 19.0 | 3.17 ± 0.54 | 5 |
| -General attitude toward using artificial intelligence technology | 7 | (7 – 35) | 15.0 – 31.0 | 25.03 ± 2.89 | 25.0 | 3.58 ± 0.41 | 1 |
| **Overall** | 38 | (38 – 190) | 101.0 – 148.0 | 125.6 ± 8.18 | 126.0 | 3.30 ± 0.22 | - |

**Table (3): Mean scores, standard deviation, and ranking of nurse managers' perception regarding health logistic management dimensions (n = 280)**

| Nurse managers' perception regarding health logistic management | No of item | Score Range | Total score | | | Average Score (1 – 5) | Ranking |
|---|---|---|---|---|---|---|---|
| | | | Min. – Max. | Mean ± SD. | Median | Mean ± SD. | |
| -Customer service | 4 | (4 –20) | 8.0 – 20.0 | 15.74 ± 2.36 | 16.0 | 3 ± 0.59 | 1 |
| -Demand forecasting | 4 | (4 –20) | 10.0 – 19.0 | 14.10 ± 2.39 | 14.0 | 3 ± 0.60 | 3 |
| -Communication | 9 | (9 – 45) | 20.0 – 39.0 | 31.15 ± 3.85 | 32.0 | 3.46 ± 0.43 | 4 |
| Hospital center monthly report regarding LMIS | 3 | (3 – 15) | 6.0 – 12.0 | 9.34 ± 1.87 | 9.0 | 3.11 ± 0.62 | - |
| Department stock card | 4 | (4 – 20) | 8.0 – 19.0 | 14.31 ± 2.04 | 15.0 | 3.58 ± 0.51 | - |
| Requisition for medical supplies | 2 | (2 – 10) | 4.0 – 10.0 | 7.50 ± 1.37 | 8.0 | 5 ± 0.68 | - |
| -Store | 10 | (10 – 50) | 20.0 – 40.0 | 33.70 ± 4.34 | 34.0 | 7 ± 0.43 | 5 |
| -Physical inventory | 3 | (3 – 15) | 6.0 – 11.0 | 10.01 ± 1.29 | 10.0 | 4 ± 0.43 | 7 |
| -Transport | 11 | (11 – 55) | 30.0 – 52.0 | 40.71 ± 3.19 | 40.50 | 3.70 ± 0.29 | 2 |
| Medical supply | 5 | (5 – 25) | 11.0 – 22.0 | 16.98 ± 2.34 | 17.0 | 3.40 ± 0.47 | - |
| Patient from department to another department | 4 | (4 – 20) | 10.0 – 20.0 | 15.52 ± 1.67 | 16.0 | 3.88 ± 0.42 | - |
| Laboratory | 2 | (2 – 10) | 6.0 – 10.0 | 8.21 ± 1.12 | 8.0 | 1 ± 0.56 | - |
| -Medical waste product | 6 | (6 – 30) | 14.0 – 25.0 | 20.19 ± 2.16 | 20.0 | 3.36 ± 0.36 | 6 |
| **Overall** | 47 | (47- 235) | 141.0– 182.0 | 165.6 ± 7.84 | 166.0 | 3.52 ± 0.17 | - |
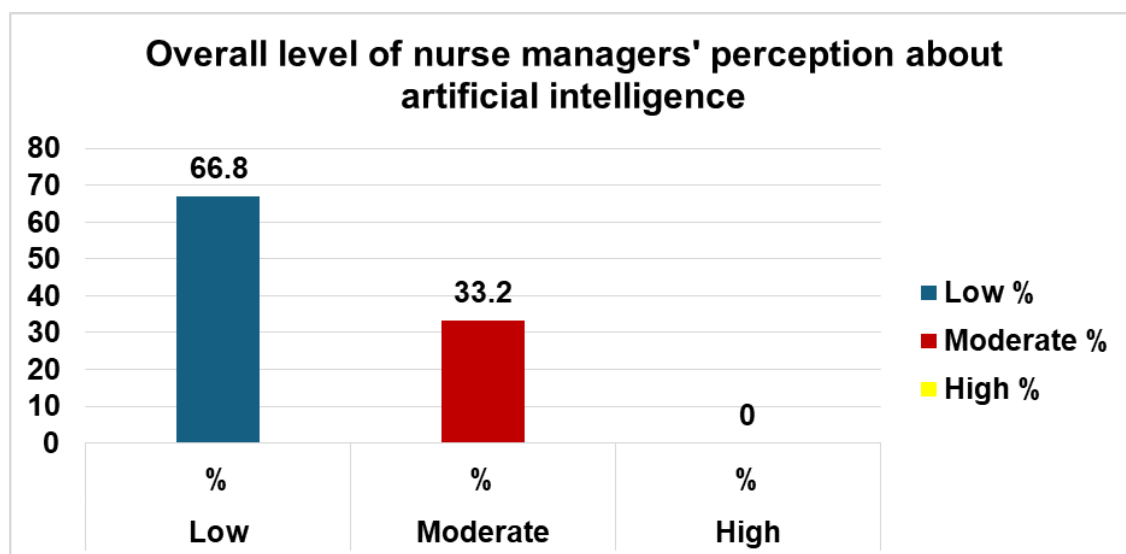
**Figure (1) Levels of nurse managers' overall perception about artificial intelligence dimension (N = 280)**
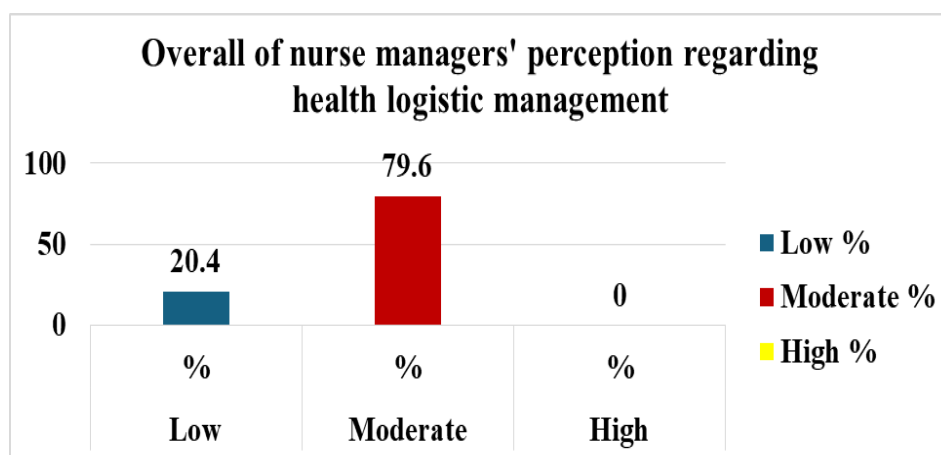


**Figure (2) Levels of nurse managers' overall perception about health logistic management.**
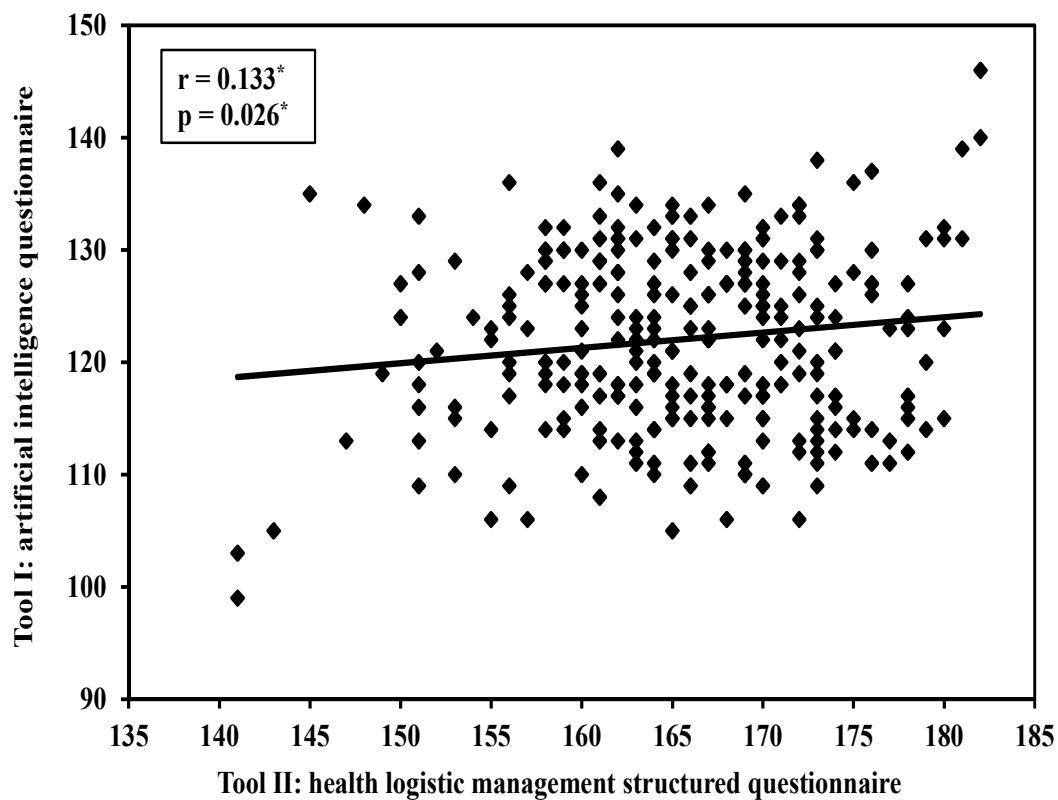
**Figure (3): Correlation between nurse managers' overall perception of artificial intelligence and overall health logistic management (n=280)**

**Table (4) Relation between nurse managers' perception about artificial intelligence and their personal data (n=280)**

| Personal data | N | Total score for nurse managers' perception regarding artificial intelligence Mean ± SD. | Test of Sig. | p |
|---|---|---|---|---|
| **Gender** | | | | |
| Male | 34 | 124.3 ± 8.52 | t=0.991 | 0.323 |
| Female | 246 | 125.7 ± 8.14 | | |
| **Age (years)** | | | | |
| 25 – 30 | 167 | 125.8 ± 7.54 | F= 0.187 | 0.830 |
| 31 – 40 | 90 | 125.2 ± 8.85 | | |
| 41 – 50 | 23 | 125.2 ± 10.12 | | |
| **Marital status** | | | | |
| Married | 268 | 125.6 ± 8.20 | t= 0.281 | 0.779 |
| Not married | 12 | 124.9 ± 8.11 | | |
| **Hospital name** | | | | |
| Emergency | 42 | 126.6 ± 8.38 | F= 1.985 | 0.057 |
| Medical | 20 | 127.6 ± 8.36 | | |
| Pediatric | 21 | 126.7 ± 10.37 | | |
| Psychiatric | 30 | 125.4 ± 7.80 | | |
| Student | 17 | 127.8 ± 8.21 | | |
| Surgical | 37 | 126.4 ± 7.85 | | |
| Tanta international educational | 40 | 121.5 ± 8.50 | | |
| Tanta main university | 73 | 125.5 ± 7.01 | | |
| **Position** | | | | |
| Nurse manager | 6 | 125.7 ± 7.03 | F= 2.221 | 0.086 |
| Supervisor | 36 | 122.3 ± 8.87 | | |
| Head nurse | 18 | 125.4 ± 9.65 | | |
| Charge nurse | 220 | 126.1 ± 7.90 | | |
| **Educational level** | | | | |
| Technical nursing institute diploma | 23 | 122.0 ± 10.29 | F= 3.749* | 0.025* |
| Bachelor in nursing science | 237 | 125.6 ± 7.98 | | |
| Other post graduate studies | 20 | 128.8 ± 7.26 | | |
| **Years of experience in nursing** | | | | |
| 5 – <10 | 226 | 125.8 ± 7.79 | F= 0.871 | 0.457 |
| 10 – <15 | 25 | 123.7 ± 9.95 | | |
| 15 – <20 | 12 | 127.7 ± 8.38 | | |
| ≥20 | 17 | 124.4 ± 10.29 | | |
| Attendance training program about health logistic management or artificial intelligence | | | | |
| No | 280 | 125.6 ±8.18 | – | – |

**Table (5): Relation between nurse managers' perception about health logistic management and their personal data (n=280)**

| Personal data | N | Total score for nurse managers' perception regarding health logistic management | Test of Sig. | P |
|---|---|---|---|---|
| | | Mean ± SD. | | |
| **Gender** | | | | |
| Male | 34 | 166.24 ±6.14 | t= 0.504 | 0.615 |
| Female | 246 | 165.51 ±8.05 | | |
| **Age (years)** | | | | |
| 25 – 30 | 167 | 166.08 ±8.01 | | |
| 31 – 40 | 90 | 164.78 ±7.73 | F= 0.829 | 0.437 |
| 41 – 50 | 23 | 165.30 ±6.98 | | |
| **Marital status** | | | | |
| Married | 268 | 165.54 ±7.84 | t= 0.594 | 0.553 |
| Not married | 12 | 166.92 ±8.01 | | |
| **Position** | | | | |
| Nurse manager | 6 | 161.0 ±6.78 | | |
| Supervisor | 36 | 165.17 ±9.54 | F= 1.564 | 0.198 |
| Head nurse | 18 | 163.06 ±5.56 | | |
| Charge nurse | 220 | 166.0 ±7.68 | | |
| **Hospital name** | | | | |
| Emergency | 42 | 163.93 ± 7.80 | | |
| Medical | 20 | 165.55 ± 7.27 | | |
| Pediatric | 21 | 161.81 ± 10.84 | | |
| Psychiatric | 30 | 168.97 ± 5.76 | F= 2.258[*] | 0.030[*] |
| Student | 17 | 163.35 ± 5.79 | | |
| Surgical | 37 | 165.86 ± 7.16 | | |
| Tanta international educational | 40 | 165.50 ± 9.25 | | |
| Tanta main university | 73 | 166.73 ± 7.12 | | |
| **Educational level** | | | | |
| Technical nursing institute diploma | 23 | 166.52 ±8.01 | | |
| Bachelor in nursing science | 237 | 165.70 ±7.73 | F= 1.003 | 0.368 |
| Other post graduate studies | 20 | 163.35 ±8.89 | | |
| **Years of experience in nursing** | | | | |
| 5 – <10 | 226 | 165.87 ±7.83 | | |
| 10 – <15 | 25 | 162.72 ±8.41 | F= 1.537 | 0.205 |
| 15 – <20 | 12 | 167.58 ±7.13 | | |
| ≥20 | 17 | 164.82 ±7.12 | | |
| **Attendance training program about health logistic management or artificial intelligence** | | | | |
| No | 280 | 165.6 ±7.84 | – | – |

**Discussion**

Artificial intelligence encompasses a wide range of healthcare technologies that enhance patient care and change nurses' jobs. Nursing and AI technology are starting to collaborate to efficiently synthesize information, complete tasks, support decision making, and improve patient outcomes. On their own, each of these emerging technologies has enormous potential to improve healthcare. The integration of these methods and teaching nurses how to use technology effectively will impact health logistics management and create countless prospects for future advancements in healthcare, productivity, capacity, and quality. **Ronquillo et al., (2021).**

According to the current study, more than two-thirds of nurse managers had a low perception level regarding to overall perception about artificial intelligence with the lowest ranking among all dimensions. From the viewpoint of the researcher, this result might be explained by that all nurse managers not previously attend training program about artificial intelligence as evidenced in table (1) and specified that the nursing curriculum were not include the fundamentals of AI. Along with the present study findings is **Lai, et al. (2020)**, who confirmed a general deficit of perception in the participants of AI and **Swan, (2021),** found that most nurses were either ignorant of or did not understand the use of AI in clinical practice.

According to the study's findings, more than three-quarters of nurse managers had a moderate perception level regarding overall perception about health logistic management. Additionally, customer service was ranked as the highest dimension of nurse managers' perception regarding health logistic management. While physical inventory was ranked as the lowest dimension. These findings may be explained by nurse managers' unawareness of the importance of health logistics, which is a key component of a successful relief effort that focuses on efficiently managing the flow of supplies, information, and services to meet the vital needs of the impacted patient in an emergency. The current study's finding conflicted with **Ebrahim& Shokier, (2020)** who indicated that the majority of nursing leaders at Health Insurance Hospital had higher level of perception regarding health logistics management.

**Correlation between nurse manager' perception of artificial intelligence and health logistic management**

The current study's results displayed a positive statistically significant correlation was found among nurse managers' overall perception of artificial intelligence and health logistic management. This study result may be interpreted by association between AI and healthcare logistics is strong and multifaceted, with AI technologies significantly improving several aspects of healthcare logistics management as the AI contributes to the efficacy, accuracy, and efficiency of healthcare logistics. On agreement

with this finding is **Aydan, (2019)** who evident that there was a significant correlation between the use of AI technology and everyday tasks of logistics, supply chain and transportation.

Also, **Reuter-Oppermann& Kühl, (2021)** demonstrated that addressing healthcare logistics issues with artificial intelligence, and particularly machine learning techniques, is a promising strategy. While, **Islam, (2024)** concluded his study but does not mention a significant correlation between AI and logistics. Instead, it emphasized AI impact on operational efficiency and highlighting its importance in logistics.

**Relation between nurse managers' perception about artificial intelligence and personal data**

The data analysis of the present study clarifies that there was no significant difference between nurse manager' perception about artificial intelligence and their personal data except educational level. These mean that nurse manager with high educational level had the highest mean scores of AI perception. This result may be related to education was the most important environmental stimuli that affect the way the person think and his impression about anything. The study's result of **Elsayed and Sleem, (2021)**, who asserted that there is a significant positive relation between education of nurse managers' demographic characteristics and their perception toward using AI.

Also**, Ahmed AbdelhakamAhmed et al., (2024)** reported that there

were statistically significant differences between nurses' levels of perception toward artificial intelligence in health care setting and educational level. On the other side**, Abdullah, (2020**) reported that no significant differences in employees' perception of AI and educational level. Moreover, **Sabra et al. (2023)**, demonstrate that no significant difference is found between nurses' perception toward AI and their qualifications.

**Relation between nurse managers' perception about impact of health logistic management and personal data**

The present study's findings showed that there was no significant difference between nurse managers' perception about health logistic management and their personal data except hospital name, this finding is evidenced by nurse manager from psychiatric hospital had the highest mean scores of health logistic management perception. This result may be due to Psychiatric hospital logistics encompass a variety of tasks that are essential to the delivery of patient services. This finding matches with **Ebrahim & Shokier, (2020)** who indicated that there was an extremely statistically significant differences between total health logistic management perception and three study settings.

**Conclusion**

Based on the findings of the present study it was concluded that more than two-thirds (66.8%) of nurse managers had a low perception level about artificial intelligence. Moreover, general attitude toward

using artificial intelligence technology was ranked as the highest dimension of nurse managers' perception about artificial intelligence. While, perception toward artificial intelligence technology was ranked as the lowest dimension.

Also, more than three-quarters (79.6%) of nurse managers had a moderate perception level about health logistic management. Additionally, customer service was ranked as the highest dimension of nurse managers' perception regarding health logistic management. While, physical inventory was ranked as the lowest dimension. In addition to, there was a positive statistically significant correlation found among nurse managers' overall perception of artificial intelligence and health logistic management.

**Recommendations**

**For hospital administrator**

- Enhance the readiness of the hospital for AI through good technological infrastructure and budget.
- Develop a strong strategy for hospitals to use AI technology.
- Encourage nurse managers to increase their knowledge and perception toward AI and health logistic management through training programs and providing further education to enable them to integrate them into their practices.
- Develop policy for secure data storage and uses.
- Develop climate that supports innovation regarding AI applications.

**For nurse managers**

- Address concerns or discomfort associated with AI to encourage its broader adoption across various fields in nursing.
- Provide needed resources to apply AI technology in the health field.
- Provide proper training to nurse managers, transparent communication about AI's capabilities and limitations, and stringent ethical guidelines will be crucial in optimizing the integration of AI into nursing practice.
- Regular guidance on the importance of good customer service and hospital policy regarding store and transportation of patient and medical supply.
- Developing cooperation between staff for transporting medical supplies.

**Nursing faculties:**

- Introduce fundamentals of AI and health logistic management into nursing curricula.
- Ensure collaboration between educators and nursing professionals to integrate AI competencies into nursing curricula and professional development programs.

**For further research:**

- Assess the AI impact on the patient-nurse relationship.
- Examine ethical and legal guidelines used by nurses for implementation of AI in nursing practice that affect patients care.
- Identify barriers affecting utilization of artificial intelligence and health logistic management in health care settings.

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