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Evaluating Nurses' Knowledge of Artificial Intelligence Applications in Clinical Nursing

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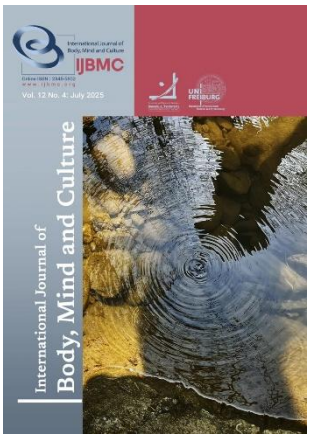

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ABSTRACT

Objective: Healthcare is undergoing a rapid transformation due to artificial intelligence (AI), which has the potential to significantly enhance the nursing profession. Empirical evidence suggests that AI is already influencing nursing practice, encompassing clinical care, nursing responsibilities, and nurse-patient interactions. The goal of the study was to assess nurses' knowledge of artificial intelligence.

Methods and Materials: The research was carried out including (354) nurses selected from different departments of the hospitals in Iraq, which include surgical wards, medical, intensive care units, emergency, dialysis, and maternal and child units, using a self-report questionnaire to assess the nurses' Sociodemographic variables (SDVs), and the nurses' AI knowledge. Using statistical tables like Percent (%) and Frequencies (No.). Calculating the overall mean score (M ±), the standard deviation test ±SD.

Findings: According to the study's findings, 57.6% of the participants were female, and 94.4% of them were not enrolled in artificial intelligence training programs. Among nurses, 85.6% had a moderate level of understanding of AI. Regarding artificial intelligence, a correlation was found between the nurses' knowledge and specific characteristics (age, educational background, department or unit, and training program) at $p \leq 0.05$.

Conclusion: The study concluded that nurses' knowledge of artificial intelligence was moderate, varying according to their age, educational background, training, and department of employment.

Keywords: Nurses; Artificial intelligence; Knowledge; Nursing Practice.

Introduction

Artificial intelligence (AI) and information technology development are growing increasingly prevalent in various businesses and societal sectors these days. The healthcare industry is one area where new technologies can revolutionize numerous facets of patient care. The intricacy and expansion of data in these operations will also lead to an increasing application of AI in healthcare (Abdullah & Fakieh, 2020). A branch of computer science known as artificial intelligence technology (AIT) aims to utilize computer systems to replicate the intelligence of healthcare team members. There are three primary categories of this technology in the healthcare industry: Natural language processing, deep learning, and machine learning. It automates several tasks, including learning and decision-making (Dash et al., 2019; Maddox et al., 2019). AI systems can process data and vast amounts of data, make decisions based on that data, and adapt and enhance their performance over time. The development

and application of AI continue to evolve rapidly, with ongoing advancements in algorithms, computing power, and data availability driving progress in the field (Soori et al., 2023). For nurses who interact closely with patients and perform care and treatment procedures, the use of AI technology is crucial. Both the nursing profession and health services will see several advancements and changes as a result of AI technologies. As a result, nurses must be aware of the fundamental problems with AI concepts, how AI technology is applied in patient care and treatment procedures, and any possible adverse effects on patients (Çobanoğlu & Oğuzhan, 2023). Technologies utilizing artificial intelligence (AI) have the potential to revolutionize nursing practice by allowing the delivery of evidence-based, more individualized care. These tools have the potential to improve nurses' professional identities and greatly aid in problem-solving (Al-Sabawy, 2023).

Methods and Materials

Study Design and Participants

Qualitative cross-sectional descriptive research was conducted to assess nurses' knowledge of artificial intelligence technology using a questionnaire-based assessment approach at Al-Hilla Hospitals in Iraq from September 25, 2024, to April 1, 2025.

A non-probability sampling technique is used to choose a convenient sample of 354 nurses. They were selected based on the inclusion requirement:(1) Nurses who have worked in the designated hospitals, (2) Nurses with varying levels of education, and (3) Nurses who consent to take part in the research. The study sample is distributed across various departments at Hilla Hospital, including the emergency room, critical care units, dialysis units, maternal and child units, and medical-surgical wards.

Instruments

The questionnaire used in this study contains the following: I: The sociodemographic data questionnaire (SDVs) includes information such as "number of training courses, unit/department, years of nursing experience, sex, age, and educational background." II: Nurse's knowledge scale adapted by (Rony et al., 2024; Swed et al., 2022). This section consists of (14) items to assess nurses' knowledge regarding Artificial Intelligence. The elements were rated using two-point knowledge measures. The items were evaluated as either Yes or No. Total mean of scores (Maximum total scores-Minimum total scores)/Levels Knowledge (Poor 14-18.66; Moderate= 18.67-23.33; Good= 23.34-28).

Data Analysis

The researcher used SPSS 23 to conduct a thorough statistical analysis of the data collected from the study sample and produce insightful findings. Through a series of exacting statistical tests, these instruments were used to methodically examine the data, determine correlations between variables, and eventually produce the research's definitive conclusions. Utilizing statistical tables such as Frequencies (No.) and Percent (%), and computing the average scores overall mean score (M ±). Additionally, the standard deviation test ±SD is employed.

Findings and Results

Table 1 presents the distribution of the nurse sample based on their sociodemographic variables (SDVs). The ages of the nurses range from 20 to over 50 years, with the majority (69.2%) being in the 20-29 age group, followed by 21.2% in the 30-39 age group. The mean age is 28.65 years (SD = 6.807). Regarding sex, 57.6% of the nurses are female, and 42.4% are male. Educational qualifications vary, with 48.0% holding a diploma in nursing, 30.8% having a bachelor's degree, and smaller percentages holding secondary school nursing qualifications, a master's, or a doctoral degree. Years of nursing experience show that 57.6% have less than 5 years of experience, with a mean experience of 5.67 years (SD = 5.748). The nurses are distributed across various units, with the highest percentage (26.3%) in the Emergency unit and the least in Dialysis (10.5%). In terms of training courses, a large majority (94.4%) have not attended any additional courses, with only 5.4% attending one course and 0.3% attending two or more. The mean number of training courses attended is 0.05 (SD = 0.248).

The overall assessment of nurses' knowledge regarding artificial intelligence (AI) reveals that the majority of nurses (85.6%) possess a moderate level of knowledge, with a mean score of 20.58 ± 1.796, falling

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within the moderate assessment range (18.67–23.33) (Table 2).

Figure 1 highlights a significant negative correlation between nurses' knowledge of artificial intelligence and their age (r = -0.139, p = 0.009). This suggests that for each one-year increase in age, there is a decrease in probability of approximately 0.5298 (R^2 = 0.0194).

Figure 2 highlights a significant positive correlation between nurses' knowledge of artificial intelligence and their educational qualification (r = 0.147, p = 0.006). This suggests that for higher education, there is a 0.1702 increase in knowledge probability (R^2 = 0.0004).

Table 3 outlines the results of a Kruskal-Wallis test, which examines statistical differences in nurses' knowledge regarding Artificial Intelligence (AI) across various hospital departments. The test reveals a significant difference in AI knowledge between departments (p 0.001), which is below the significance threshold of 0.05. The mean ranks of expertise in different departments vary, with the Dialysis unit showing the highest mean rank (261.47), followed by the Surgical Unit (206.52). Other departments, such as the Medical-Surgical Unit (161.61) and Emergency (164.55), have intermediate ranks. The Maternal-Child Unit has the lowest mean rank (137.23). These findings indicate substantial differences in AI knowledge across the various units.

Figure 3 highlights a significant positive correlation between nurses' knowledge of artificial intelligence and the number of training courses (r = 0.413, p = 0.000). This suggests that increasing the number of training courses is accompanied by a potential increase in nurses' knowledge by 2.9805 (R^2 = 0.171).

Table 1

The Nurses' Sociodemographic Sample Factors (SDVs)Intelligence.

SDVs	Classification	No.% *M ± SD*
Age/ years	20-29	245(69.2)
	30-39	75(21.2)
	40-49	24(6.8)
	≥50	10(2.8)
		28.65±6.807
Sex	Male	150(42.4)
	Female	204(57.6)
Education qualification	Secondary school nursing	49(13.8)
	Diploma in Nursing	170(48.0)
	Bachelor's in nursing	109(30.8)
	Master	20(5.6)
	Doctoral	6(1.7)
Years of nursing experience	<5	204(57.6)
	5-10	103(29.1)
	>10	47(13.3)
		5.67±5.748
Unit/Department	Medical Unit	61(17.2)
	Maternal-Child Unit	49(13.8)
	Emergency	93(26.3)
	Surgical Unit	49(13.8)
	Intensive Care Unit	65(18.4)
	Dialysis	37(10.5)
No. of training courses	Non	334(94.4)
	1	19(5.4)
	2	1(.3)
		0.05±0.248

Table 2

Overall Assessment of Nurses' Knowledge regarding Artificial Intelligence.

Variables	Score	No.	%	M ± SD	Assess.
Nurses Knowledge	Poor	32	9.0	20.58±1.796	Moderate
	Moderate	303	85.6		
	Good	19	5.4		
	Total	354	100.0		

Table 3

Statistical Differences in Nurses' Knowledge between Groups of Unit/Department

Variable	Department	No.	Mean Rank	Sig.
Nurses Knowledge	Medical-Surgical Unit	61	161.61	.001
	Maternal-Child Unit	49	137.23	
	Emergency	93	164.55	
	Surgical Unit	49	206.52	
	Intensive Care Unit	65	171.61	
	Dialysis	37	261.47	

Figure 1

Nurses' Age and Knowledge of Artificial Intelligence.

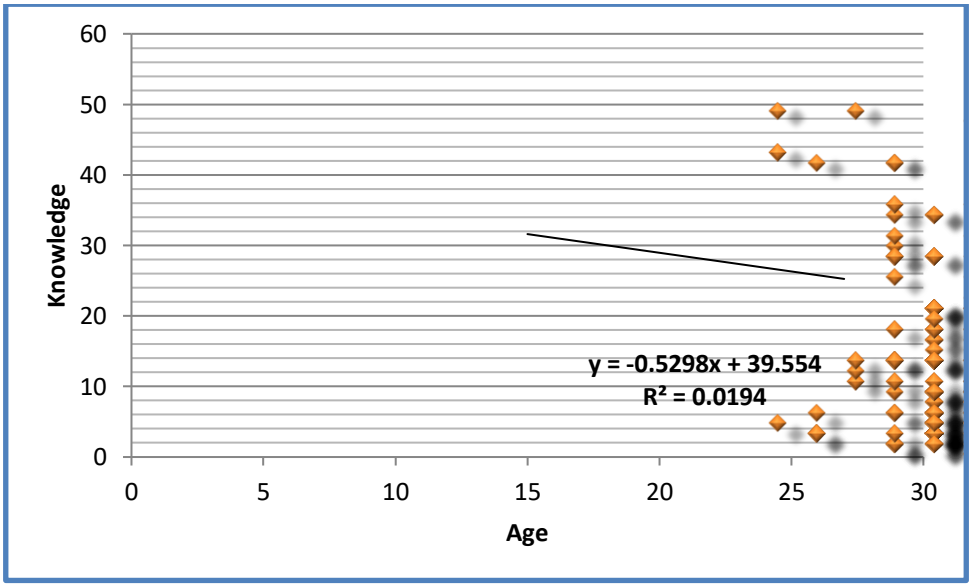


Figure 2

Nurses' Education Qualification and Knowledge Regarding Artificial Intelligence

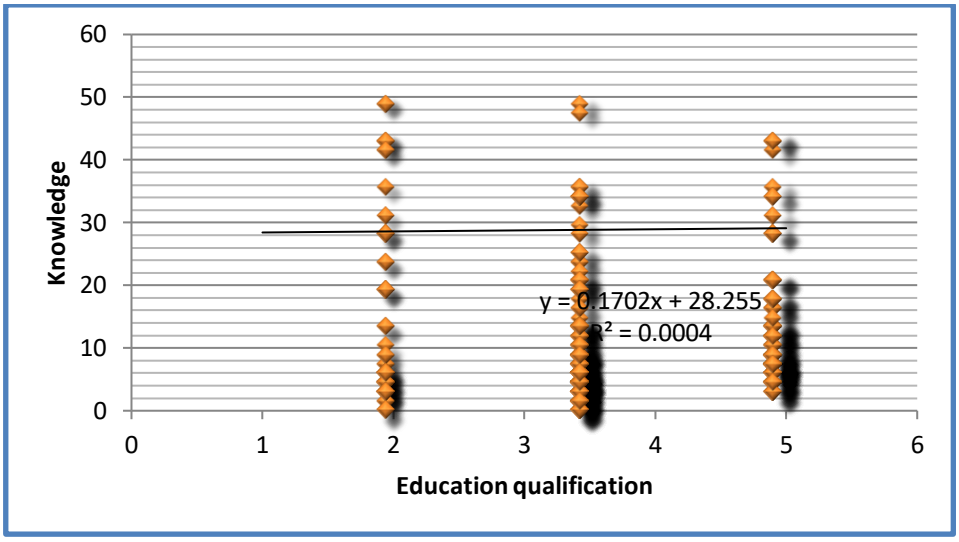
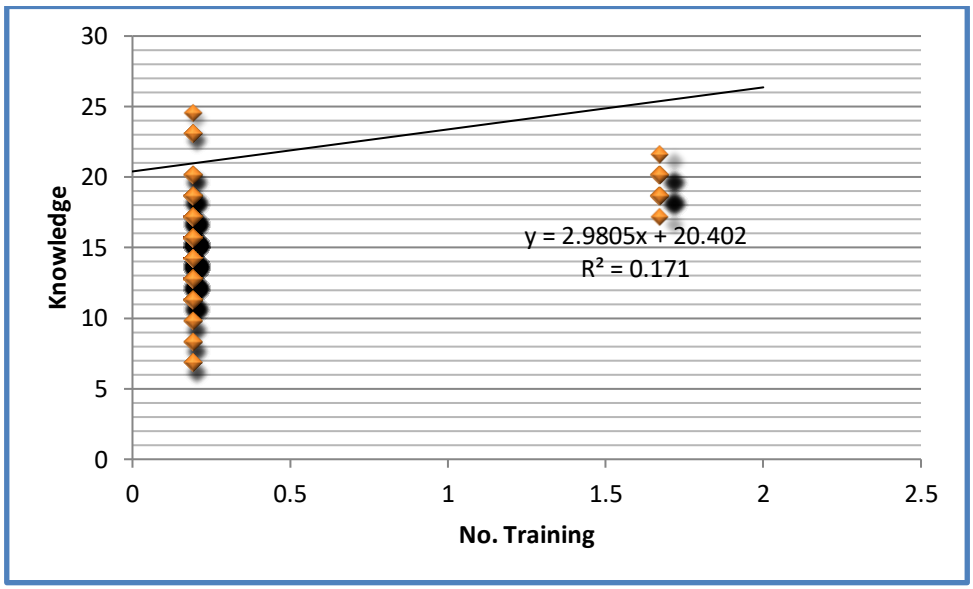


Figure 3

Nurses' Training and Knowledge of Artificial Intelligence.



Discussion and Conclusion

Analysis showed that over half of the study sample's participants were between the ages of 20 and 29. They made up 69.2% of the sample's total of 354 nurses. The main reasons for this are work age and productivity, as nurses with nursing school degrees made up the bulk of the samples. The research bears similarities to a study by Yaseen et al. (2025). In terms of sex, the majority of the study sample consisted of females (57.6%), while males made up 42.4%. The larger proportion of female nurses may have resulted from the perception of nursing as a female-dominated profession. This conclusion was consistent with a study (Ahmed & Elderiny, 2024) that indicated the majority of participants were female (51.3%), with the remaining participants being male (48.5%). The percentage of individuals with 1–5 years of nursing experience is 57.6%. Because nurses move from one hospital unit to another, they may have a few years of expertise in specific nursing specialties. The findings of the study are comparable to those of Abdelkareem et al. (2024). According to the study sample's educational background, the majority of the following criteria contributed to the sample's graduation from the nursing institute. Although there are several medical schools in Iraq, few universities or nursing programs have been

founded recently. These findings are in contrast with the results obtained by Geneedy et al. (2024).

The results indicated that nurses are dispersed throughout different units, with the emergency unit having the highest percentage (26.3%) and dialysis having the lowest (10.5%). According to a study by Alruwaili et al.(2024), the most common wards were the medical/surgical ward (28.3%), the intensive care unit (ICU) (22.7%), and the critical care unit (CCU). These findings were in contrast to those of the study. Psychiatric units accounted for 10.0% of the replies, all other units for 30.9%, and obstetric/pediatric units for 8.1%. Lastly, the survey results revealed that the majority of participating nurses (94.4%) had not received any artificial intelligence training, with only 5.4% having taken one course and 0.3% having taken two or more courses. Training course attendance is 0.05 on average (SD = 0.248). This indicates that the nurses were not enrolled in artificial intelligence education or training programs. These results are consistent with the study's conclusions (Al-Sabawy, 2023), which suggest that the participants lacked training in artificial intelligence.

The overall assessment of nurses' knowledge regarding artificial intelligence (AI) reveals that the majority of nurses (85.6%) have a moderate degree of understanding. These findings contradict a study by Sommer et al. (2024), which found that most nurses (73.0%) have a limited understanding of AI, while only 25.2% possess substantial knowledge of it. Furthermore, this analysis disagrees with a study conducted in Egypt (Ali, 2024), which found that more than half of the studied nursing personnel (58%) had an unsatisfactory level of knowledge about AI. At the same time, more than two-fifths of them (42%) had satisfactory levels of knowledge about AI.

A substantial negative association between nurses' understanding of artificial intelligence and age. Opposite to this, Sommer et al. (2024) stated that age does not function as a crucial factor. A substantial correlation was also found between gender and AI understanding (Cramer's V correlation of 0.335) ($\chi 2$ value = 12.363, p = 0.015). The educational background of nurses reveals a substantial positive association between their understanding of artificial intelligence and their academic qualifications. The results of the current study are similar to those of Rony et al. (2024). The test reveals a significant difference in AI knowledge between departments. These results were also identical to those obtained by Yaseen et al. (2025). A strong favorable association between nurses' artificial intelligence knowledge and the number of training courses (r = 0.413, p = 0.000). Related to the reality that training and education play a vital part in increasing nurses' knowledge, this aids in fostering acceptance and integration of AI technologies. This result contradicted an investigation by Hamedani et al. (2023), which observed that there is no statistically significant relationship between knowledge and ($p > 0.05$) in AI session participation.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Declaration of Helsinki, which provides guidelines for ethical research involving human participants. Ethical considerations in this study were that participation was entirely optional. Participants received comprehensive information about the study's objectives, their freedom to discontinue participation at any moment, and the confidentiality of their answers. All participants gave their informed consent before any data was collected. Participants' safety and privacy were given extra attention, especially considering the delicate nature of the study. The ethical approval was obtained from the Research Ethics Committee of the College of Nursing, University of Babylon (47 on 27/11/2024).

Transparency of Data

Following the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors equally contribute to this study.

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