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Nursing students' perception and attitudes toward utilization of artificial intelligence in health care

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Abstract: The study aimed to evaluate the nursing students' perception and attitudes toward utilization of Artificial Intelligence in Health care. Descriptive research design. The study was conducted at Vision Medical College, Jeddah. KSA. Two hundred and six students registered in the nursing program were included in the study by using convenience sampling. Three tools were used for data collection, Self-Administered questionnaire, Covered student nurses' demographic characteristics, Perception toward Artificial Intelligence Questionnaire and Students' attitudes towards Artificial Intelligence Questionnaire. The majority of participants responded that they are familiar with Artificial Intelligence 79.6%, there was a significant positive correlation between student nurse' demographic characteristics (Living Location, education, Self-Assessment of Technological Competence and Familiarity with Artificial Intelligence) and their attitudes toward using the artificial intelligence. The mean score of the attitude scale was (M= 3.29, SD = 0.76), while the mean scale score of the perception scale was (M= 3.43, SD = 0.69). Likewise, a significant positive association was observed between perception of students and their attitudes towards artificial intelligence ($\beta = 0.855$, $p < 0.001$). The current study revealed that the students most likely held positive attitudes towards AI utilization and had a favorable perception toward utilization of artificial intelligence in health care. Integration of artificial intelligence technology and their utilization in nursing practice as a partner for improving patient outcomes in the health care field.

Keywords: *Artificial intelligence, Attitude, Perception & nursing students.*

1. Introduction

Artificial Intelligence (AI) is rapidly transforming healthcare and considers immense potential for revolutionizing the field of nursing. Empirical evidence has shown that AI is already influencing nursing practice, including nursing roles, clinical care, and the nurse-patient relationship [1]. As AI technology continues to advance, it becomes increasingly crucial for nurse education programs to prepare student nurses to influence AI technology and be willing to adopt it in their nursing practice. This preparedness is essential for keeping pace with technological advancements and ensuring that nurses can effectively utilize AI for the benefit of patients and the healthcare system. In recent years, there has been a notable increase in research focused on AI in the field of nursing education. Available evidence has demonstrated a significant proportion of student nurses who exhibit a heightened interest in this emerging technology and demonstrate a higher level of confidence in their ability to utilize AI-powered tools [2].

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Many countries comprehend that AI is a foundational technology and are competing to obtain a worldwide innovation gain in AI. Saudi Arabia to achieve its Vision 2030, has begun to adopt artificial intelligence and technology in various sectors. Artificial intelligence (AI) in medicine refers to using computers and advanced technology, such as machine learning algorithms, to assemble and process data input from experts and analyze it, producing critical thinking comparable to that of a human being [3]. AI has an impact on the roles of nursing practice by increasing their creativity and strategic thinking [4]. It has many applications in healthcare, including assisting in disease assessment, diagnosis, and solving various clinical problems, reducing lost data, enhancing good nursing communication skills, improving inpatient care management, diminish nurse workload, and improving patient safety [5]. AI and its probable application in clinical settings; for instance, how it can be helpful in-patient care training, and medical education to revolutionize healthcare [6].

Artificial intelligence technology is growing at a fast pace and permeates many aspects of people's daily lives. Nursing students' inclination towards AI in health care increases the probability of effective AI adoption and its value in the health care services [7]. Nurses must be involved in directing the growth and use of AI technologies in the health care settings. So, there is a necessity for the nursing profession to participate and well understand AI [8]. While many previous publications assessed the perception of AI with respect to a specific health care provider, the attitude and perception on all different aspects of AI stays widely unclear. Thus, it is necessary for the upcoming nurses to work with these technologies to provide holistic care in part with the advancements in health care. It is also necessary for the nursing students to have a positive or favorable attitude towards artificial intelligence in their care.

1.1. Aim of the Study

The aim of this study was to evaluate the nursing students Perception and Attitudes toward utilization of Artificial Intelligence in Health care.

1.2. Study Questions

Q1. What are the nursing students' attitudes and perceptions towards utilization of artificial intelligence in health care?

Q2. What is the effect of students' perception on their attitude towards utilization of artificial intelligence in health care?

2. Materials and Method

2.1. Research Design

A quantitative study design was used. A descriptive correlational study was conducted using adopted questionnaire to evaluate the perception and attitude of the nursing students toward utilization of artificial intelligence at Vision Medical College at Jeddah (VMC) in a period from March to May 2024. An anonymous electronic survey was created using google Forms and used to achieve the study objective.

2.2. Research Sample

A convenient sample of nursing students studying at VMC was used in the study. Bachelor nursing students from all levels, interns and bridging nursing students typically holding a two-year college degree and have been working in clinical settings for years, who have been offered this program to seek and obtain a four-year or graduate degree, were also eligible to participate in this study. The sample size was estimated by using the G*Power software as the following parameters were reported in the literature, statistical power of 0.80, a significance level of 0.05, and a small effect size of 0.05 **[9].** Taking a non-response percentage of 10% into consideration, Finally, a total of 206 nursing students were eligible to participate in the study.

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2.3. Research Instruments

An electronic survey was conducted. It involved three parts, the 1st part including the demographic data as age, gender, marital status, educational level, residence, and academic performance and familiarity with AI. The 2nd part was adopted from [10] used to assess the perception toward artificial intelligence. It consisted of 14 items within three domains, presented on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The 1st domain, perception towards AI contains (4) items. The 2nd domain, the advantage of using AI includes (5) items. The 3rd domain, the problems regarding the application of AI in healthcare included (5) items. The 3rd part adapted from [11] aimed to assess the attitudes toward AI, presented on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Scoring System: Based on cut of value 60%. The students' attitude is determined as negative ≤ 60 and positive attitude ≥ 61.

2.4. Content validity & Reliability of the Tools

The content was reviewed by three jury in nursing field to test its validity; Based on his comments, modifications were considered. The study tools were tested to assess reliability via the pilot subjects and Cronbach's alpha test was 0.879 for 2nd part and 0.899 for 3rd part.

2.5. Procedure

The research team distributed the survey to nursing students at Vision Medical College after the IRB approval (24-03/1) in March 2024. The survey included research information and confidentiality was reassured as the survey was anonymous. Also, an informed consent has been obtained from each student before the intervention. They are informed of the right to withdraw at any time. A reminder was sent to the potential participants to enhance their responses. The data collected was analyzed using the Statistical Packages for the Social Sciences (SPSS) program, (SPSS) V26.0. Descriptive statistics will be used to examine the demographic characteristics of the sample. Bivariate analyses, including Pearson's correlation coefficient, and linear regression analysis, will be performed to explore relationships between variables. The significance level will be set at $p < .05$, representing the accepted threshold for statistical significance.

3. Results

The study sample consisted of 206 undergraduate nursing students. As shown in (Table 1) below, 58.3% were female and 41.7% were male. The participants were sampled from communities, representing urban areas 73.3% and rural areas 26.7%. Out of the participants, 26.7% were first-year students, 13.1% were second-year students, 36.9% were third-year students, 13.6% were fourth-year students, and 9.7% were interns. Regarding their academic performance which depends on their GPA, 42.7% (n = 88) have excellent academic performance, 21.4% (n = 44) have very good academic performance, 25.2% (n = 52) have good academic performance, and 10.7% (n = 22) have acceptable academic performance. In addressing the self-assessment of technological competence, 50.5% (n = 104) rated themselves as having excellent proficiency, while 44.7% (n = 92) rated themselves as average, and 4.9% (n = 10) rated themselves as poor. The majority of participants responded that they are familiar with Artificial Intelligence 79.6% (n = 164).

The results assessed the influence of demographic variables on the students' attitude towards artificial intelligence (AI) utilization in health care. As shown in (Table 1), the results showed that the relationship between the living location and attitude toward AI utilization was negatively significant. Moreover, the results showed that the relationship between the self-assessment of technological competence and attitude toward AI utilization was also negatively significant. Similarly, the correlations between the participants' familiarity with AI and attitude toward AI utilization was negatively significant. The correlations between educational level and attitude scores showed that there was a significant positive correlation. These findings signify those students in higher educational levels had more positive attitude scores toward AI utilization. On the other hand, the results showed that gender

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and academic performance had no statistically significant correlations with attitude toward AI utilization in health care.

Table 1.
Characteristics/Demographics of the study sample (N=206).

Variable	Frequency (%)	Correlations with attitudes toward artificial intelligence utilization
Gender		-0.17
Female	120(58.3%)	
Male	86(41.7%)	
Living Location		-0.21*
Urban	151(73.3%)	
Rural	55(26.7%)	
Educational Level		+0.21*
First Year	28(13.6%)	
Second Year	27(13.1%)	
Third Year	20(9.7%)	
Fourth Year	55(26.7%)	
Internship	76(36.9%)	
Academic Performance		+0.02
Excellent	88(42.7%)	
Very Good	44(21.4%)	
Good	52(25.2%)	
Acceptable	22(10.7%)	
Self-Assessment of technological competence		-0.34*
Excellent	104(50.5%)	
Average	92(44.7%)	
Poor	10(4.9%)	
Familiarity with artificial intelligence		-0.33*
Yes	164(79.6%)	
No	42(20.4%)	

Note: *Significant at $\alpha = 0.05$.

The graph below shows the levels of the students' attitude toward AI utilization. It's clear that the 64% of the participants had positive attitude toward using AI in health care, while nearly a third of participants (36%) had negative attitude.

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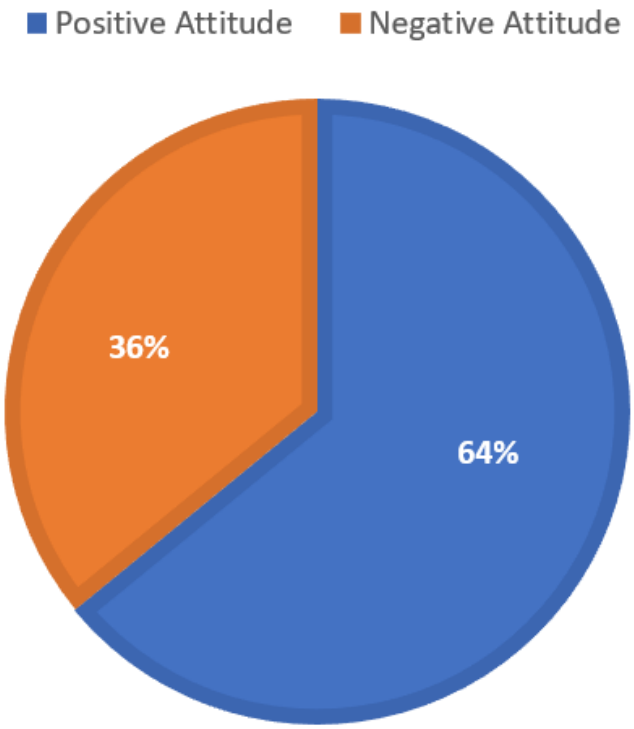

Figure 1.
Levels of students attitude toward artificial intelligence utilization.

Table 2 shows that the student attitudes and perceived utilization of AI in health care receive high mean scores. The mean score on the attitude towards AI scale was (M= 3.29, SD = 0.76), while the mean scale score of the perceived utilization of AI scale was (M= 3.43, SD = 0.69). The high mean scores for these two variables indicate that the students most likely held positive attitudes towards AI utilization and had a favorable perception of AI.

Table 2.
Students attitudes and perception toward utilization of artificial intelligence in health care (N=206).

Variable	Mean (M)	Standard deviation (SD)
Attitude towards AI	3.29	0.76
Perceived Utilization of AI	3.43	0.69
Knowledge of AI	3.25	0.94
The advantages of using AI	3.74	0.93
The application of AI in health care	3.27	0.88

By Using linear regression analysis, the results in Table 3 revealed that there was a significant positive relationship between perceived utilization of AI and attitudes towards AI ($\beta = 0.855$, $p < 0.001$). This result indicates that students' perceptions of AI utilization in health care influence their attitudes towards AI utilization.

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Table 3.
Effect of perception toward artificial intelligence on students attitudes.

Variable	B	SE	*t*	*p*	95.0% confidence interval for B	
					Lower bound	Upper bound
Perceived utilization of AI	0.855	0.047	18.062	0.000	0.762	0.949

4. Discussion

The development of artificial intelligence (AI) technologies has emerged as a promising solution to enhance healthcare efficiency and improve patient outcomes. AI technologies were progressed to provide practical assistance in diverse regions including health care settings. Although the number of newly constructed AI-based applications for healthcare steadily increases and efforts to implement these models into clinical routine go on, unexpectedly, the scientific interest on how health care giver perceive these developments came into the scientific focus just recently. Hence, it was the main objective to assess student nurses' attitudes and perceived utilization of artificial intelligence in health care.

The study findings showed that there is a significant positive correlation between student nurse' demographic characteristics (Living Location, education, Self-Assessment of Technological Competence and Familiarity with Artificial Intelligence) and their attitudes toward using AI except gender and age. On the other hand, the results showed that gender and academic performance had no statistically significant correlations with attitude toward AI utilization in health care. However, the students attitude seems to differ relevantly between certain groups of respondents. Urban residence and intern students have high positive attitude view toward utilization of AI in healthcare. The location of the participating students is in an urban region with a strong technological and research focus environment is correlated with a certain probability that the positive aspects of AI are perceived more strongly in this environment than in a less technological environment. This result may be due to the fact that the study specialty, education and workplace are the most important environmental stimuli that affect the way the person thinks and his impression about anything. Which in turn affects the person' perception. it is conceivable that newly students or rural students may not aware enough about the utilization of AI usage due to concerns primarily resulting from a lack of information. Therefore, these underrepresented groups need to be given special consideration when designing programmes that aim to provide knowledge about new digital technologies in healthcare.

These findings were consistent with the study by [12] 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. Similarly, [13] reported in the study that was conducted to assess nurses' perception and Attitudes toward Using AI that there is a significant positive relation between job, education and workplace of nurse managers' demographic characteristics and their perception toward using artificial intelligence.

Such agreement was reported by [14] with the study findings conducted at a tertiary referral hospital in Germany about the attitude and perception regarding AI, reported that more than 90% of their study sample were previously heard about AI, but only 24% reported good or expert knowledge. Otherwise, stated that 53.18% of the respondents rated the use of artificial intelligence in medicine as positive or very positive, but only 4.77% negative or very negative.

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The findings revealed that the student attitudes and perceived utilization of AI in health care receive high mean scores. The high mean scores for these two variables indicate that the students most likely held positive attitudes towards AI utilization and had a favorable perception of AI. This result was consistent with [15]; [16] who reported in their study that the student nurses have a favorable perception of the use of AI in nursing practice, hold positive attitudes towards its integration into their work, and express high intentions to adopt AI technology in their future practice. These results are consistent with earlier reports, where healthcare professional students and student nurses [17] have shown positive attitudes and high intentions to adopt AI as stated in their study cross-sectional study that the nursing students' attitude toward AI WAS Positive ($\beta = 0.485$, $p = .009$) and facilitating conditions ($\beta = 0.117$, $p = .045$) predicted intent to use. Such agreement was reported by [18] who stated that the students appeared to have good perceptions and opinions about AI and its benefits in healthcare, a study among medical students showed that 50% of the students agreed that they have a good understanding of AI and well recognized its future implications for improving the human competences and increasing the productivity and efficiency of care delivery. As well, AI will improve healthcare practitioners' experience, assisting them to focus more on direct patient care and reducing workload. This study was limited by the sample that was relatively small and selected from one setting, which may affect the generalization of the results.

5. Conclusion

The study findings support the utilization of artificial intelligence throughout the health care, as evidenced by positive attitude and favorable perception of the nursing students toward utilization of AI in healthcare as well there was a significant positive relation existed between perception and positive attitudes among the nursing students.

6. Recommendations

- Integration of AI technology and their utilization in nursing practice as a partner for improving patient outcomes in the health care field.
- Conducting similar studies on a wide range of samples in multicenter educational settings for generalizing the findings.
- Conducting regular training programs and workshops for student nurses and health care teams for enhancing their knowledge towards artificial intelligence.

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