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Attitudes and Expectations of Health Sciences Students towards Artificial Intelligence in Medical Education and Professional Communication

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Abstract

The transition of healthcare systems towards digitalization, particularly through the integration of artificial intelligence (AI), is reshaping medical practice and education. AI's role in enhancing diagnosis, patient care, and distance education is becoming increasingly significant, prompting a need for strategic planning, investment, and training in the healthcare workforce. This study focuses on the attitudes of health science students at the University of Fujairah towards AI in medical services, particularly in developing countries where AI can address personnel shortages. A literature review reveals that while health science students globally exhibit positive attitudes towards AI, gaps in knowledge and skills persist, necessitating improved educational programs. The study employs a quantitative methodology, utilizing a standardized questionnaire to assess students' perceptions of AI's impact on healthcare efficiency, patient engagement, and ethical concerns. The sample comprises 92 students, ensuring representation across various academic disciplines. Findings indicate a duality in students' perspectives: while there is enthusiasm for AI's transformative potential, concerns about data privacy and the erosion of personal interactions in patient care are prevalent. Gender differences emerge, with male students showing higher trust in AI, while female students express greater apprehension regarding data security. As students progress in their studies, they become more critical of AI's impact on personal interactions, highlighting the need for educational programs to address these concerns. In conclusion, the study underscores the importance of integrating AI education into healthcare curricula, focusing on data privacy and patient-centered approaches. Recommendations include enhancing early-year educational modules on AI and conducting further research to understand the evolving perceptions of students towards AI in healthcare. This research provides a foundation for developing strategies that ensure the effective integration of AI while maintaining the essential human touch in patient care.

Keywords: *Health Sciences Students, Artificial Intelligence in Medical Education, Professional Communication.*

Introduction

Healthcare systems are experiencing a transition to digital modes of work (Dicuonzo et. al. 2023). Artificial intelligence (AI) will play an important role in shaping ordinary medical practice in diagnosis as well as patient care (Pinto-Coelho2023). In addition, digital means have created possibilities for distance education expected to affect various aspects of instruction and guidance methods profoundly (Gao 2022). It has already affected doctor-patient interaction (Sauerbrei et al., 2023) by allowing for location and time-independent contact. The significance of AI is already evident, not the least because of its impact on issues of efficiency, precision, productivity, and consequent competitiveness. Future studies increasingly focus on the need for strategic planning, investment, and employee training in integrating AI into business models to ensure data privacy, security, and ethical practices (Rubab 2023).

Future health workers therefore should be prepared with the necessary abilities to fully realize the promise of the available technological advances to provide optimal treatment (Moldt, et al., 2023) and administration (Gupta, et al., 2022). Workers in the healthcare field will not only need to be adaptable in responding to varied healthcare environments, but they will also need the ability to appropriately deal with procedures and applications incorporating AI and the associated large data. Most pertinent to this paper is the issue of AI technologies and the healthcare systems in developing countries (Guo and Li 2018). Emerging innovations could deliver services without personal presence and so make up for the evident shortages of healthcare personnel in underserved areas. This aspect of AI is particularly relevant to the present study focused on attitudes of students at college of health science of University of Fujairah toward the adoption of AI means of commuication in the provistion of medical services. In particular, the paper explores and measures students' attitudes regarding the following issues: the impact of AI on opportunities versus risks,

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its potential to save time and costs, its capacity to foster engagement among reluctant or noncooperative patients in therapeutic decision-making, its contribution to enhanced service accessibility, its role in broadening choices beyond physicians' knowledge, and its function as a neutral listener.

The paper is composed of a review of literature relevant to the above issues. Next, it describes the methodology, the results and data analysis. Finally, it discusses the findings and offers brief recommendations. The literature review indicated that while students generally view AI positively, many lack the necessary knowledge and skills, highlighting the need for improved educational programs to prepare future healthcare professionals for an AI-driven landscape. A quantitative study involving 92 students from the College of Health Sciences utilized a standardized questionnaire to assess their attitudes toward AI, covering demographics, AI awareness, perceived risks, and willingness to adopt AI technologies.

Findings revealed that students are optimistic about AI's potential to improve healthcare but are concerned about data privacy and the loss of personal interactions in patient care. Notably, first-year students showed more apprehension regarding data privacy than seniors, suggesting that familiarity with AI may alleviate concerns over time. Gender differences emerged, with male students exhibiting more trust in AI compared to their female counterparts, who were more cautious about data security. The study advocates for a balanced approach to AI integration, emphasizing the need for educational curricula to include data privacy and a patient-centric perspective. Overall, it highlights the evolving perceptions of students towards AI, underscoring the importance of continuous education in AI technologies and the need for further research into the factors influencing these attitudes.

Literature Review

Exploring students' attitudes towards artificial intelligence (AI) is crucial, particularly as these students will become the next generation of healthcare professionals who will utilize AI in clinical settings. The literature indicates that health science students worldwide generally hold positive views about the integration of AI into medical services. However, to fully leverage the benefits of AI in healthcare, it is vital to address existing knowledge gaps and concerns through comprehensive educational programs. This preparation will enable future healthcare workers to effectively engage with AI technology, ultimately enhancing patient care and healthcare delivery.

Research shows that students, both globally and in the Middle East, are familiar with current AI technologies. However, there is a need for studies that employ larger sample sizes and encompass multiple sites to better understand students' attitudes. A systematic review of 38 studies revealed that while healthcare students generally have a positive outlook on AI, many lack the necessary knowledge and skills, underscoring the need for improved education and training (Mousavi et al., 2023). A survey involving 4,492 Arab medical students indicated limited AI knowledge but a strong belief in its potential to revolutionize medicine, highlighting an urgent need for enhanced AI education (Allam et al., 2024). In nursing, AI is transforming practices by improving decision-making and efficiency. A study of 1,713 nursing students across ten Arab countries found gaps in AI knowledge despite a general awareness of its importance. Positive attitudes towards AI correlated with intentions to use it, emphasizing the necessity for targeted education to prepare students for an AI-driven healthcare environment (Al Omari et al., 2024).

A scoping review indicated that health science students generally view AI positively and express interest in its applications, although concerns about job security and the realism of technology persist (Derakhshanian and Wood, 2024). In Lebanon, students demonstrated limited comprehension of AI and expressed a preference for its integration into the curriculum. Research on Lebanese students also highlighted the need for improved AI education to address gender disparities and ethical decision-making (Kharroubi et al., 2024). A study in Syria assessed AI knowledge among 1,494 physicians and medical students, revealing that while 70% were aware of AI, only 23.7% recognized its medical applicability. Despite this limited understanding, participants exhibited positive attitudes towards AI's role in healthcare, indicating a need for enhanced AI education to improve healthcare outcomes in Syria (Swed et al., 2022).

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However, researchers have noted that the implementation of AI in healthcare, despite its anticipated benefits in diagnosis and efficiency, should be approached strategically, addressing challenges before widespread adoption (Lee & Yoon, 2021). The introduction of AI is not an automatic process, as students possess diverse personalities, attitudes, beliefs, and practical goals. Therefore, a more detailed examination of their attitudes is necessary. This study focuses on eight key issues related to students' attitudes towards AI, drawing from various studies conducted globally that provide a basis for comparison and inspiration.

The first issue is whether AI presents more opportunities than risks. Raso et al. (2018) noted that while AI is revolutionizing fields like healthcare and finance, it raises significant concerns regarding privacy and potential biases stemming from extensive data collection. Ethical AI development is being advocated to ensure that human rights considerations are integrated into AI applications.

The second issue is the potential for AI to save time. A study demonstrated that AI could significantly enhance the quality of radiology reports, leading to improved concordance in measurements and reduced interpretation times (Do et al., 2020). This suggests that automation can enhance report quality and improve patient care.

The third issue is the cost-saving potential of AI in healthcare. Cutler (2024) highlighted that AI technology could streamline processes and enhance efficiency, potentially reducing healthcare spending by 5-10%. This is particularly relevant for students entering competitive business environments.

The fourth issue is AI's ability to encourage patient participation in therapy decisions. Advanced AI may surpass human practitioners, creating obligations to align with AI recommendations, which complicates patient-centered care (Bjerring & Busch, 2021).

The fifth issue is AI's potential to engage reluctant or noncooperative patients in therapy. For instance, dentists can utilize behavioral classification systems to enhance communication (Antel, Ryan, et al. 2022) and improve treatment acceptance (Scarbecz, 2007).

The sixth issue is AI's ability to make therapy more accessible regardless of time and location. Research indicates that assistive technologies can enhance the functional abilities of individuals with disabilities, emphasizing the need for quality manufacturing and government support (Alabi, 2024).

The seventh issue is AI's capacity to provide knowledge and choices beyond what physicians can offer, which can enhance shared decision-making (McDougall, 2019).

Lastly, the eighth issue is AI's role as a neutral listener, free from personal judgments, which can significantly influence patient decision-making processes (British Columbia study).

Methodology, Measurement and Process of Study

This study brings together quantitative methods for the sake of understanding and measuring the attitudes of students toward AI. The students at the medical school of are asked to complete a self-developed standardized questionnaire to assess their attitudes toward medical AI in general and the ideas of integrating AI training into the curriculum of their school. The questionnaire consists of eight questions as explained above. Out of the 310 students attending the univesity's college of health sciences, 92 were selected using a systematic sample taking every third student. The sample size is numecally representative because it amounts to almost one third of the entire population of the college.

This study utilizes a quantitative research approach to assess the varying significance of students' perceptions regarding the use of artificial intelligence (AI) in healthcare services within the United Arab Emirates (UAE). A cross-sectional survey methodology is employed to gather data from university students across diverse academic disciplines, specifically those in health sciences. The research seeks to measure students' perspectives, acceptance rates, and apprehensions concerning the use of AI in healthcare services through statistical analysis. The target population comprises undergraduate and graduate students registered

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in universities throughout the UAE, utilizing a systetmatic random sample method to guarantee representation from various academic disciplines and institutions. The strata encompass students of health sciences including medicine, nursing, and pharmacy). A minimum sample size of 92 responders is established using power analysis to guarantee statistical significance.

A standardized questionnaire serves as the principal data collection instrument to assess students' perspectives toward the integration of AI in healthcare. The survey instrument comprises five principal sections: demographic information (age, gender, academic discipline, year of study, and prior exposure to AI-related courses or training); awareness and knowledge of AI in healthcare (self-reported familiarity with AI applications in healthcare, including chatbots, robotic surgery, predictive diagnostics, and AI-assisted drug discovery); attitudinal measures (students' perceptions of AI's impact on healthcare efficiency, safety, accessibility, and ethical concerns, assessed using a five-point Likert scale from 1 = Strongly Disagree to 5 = Strongly Agree); concerns and barriers (perceived risks associated with AI integration, such as job displacement, diminished human interaction in patient care, and data privacy issues); and future adoption willingness (students' readiness to utilize AI-powered healthcare services in the future). The questionnaire undergoes validation via expert evaluation by healthcare professionals and AI specialists, in addition to a pilot study involving 50 students to ascertain clarity, reliability, and content validity. Cronbach's alpha assesses internal consistency, aiming for a reliability coefficient exceeding 0.7.

Data collection is executed through an online survey using Google Forms and disseminated via email and social media channels aimed at student groups and academic networks. Participation is optional, and informed consent is secured prior to the completion of the survey. The gathered data is examined utilizing SPSS. Descriptive statistics, such as mean, standard deviation, frequency, and percentage distributions, are employed to encapsulate students' views and demographic attributes. Inferential statistical tests encompass an independent samples t-test for comparing attitude disparities between male and female students, a one-way ANOVA for evaluating variations among distinct academic disciplines, Pearson correlation analysis for investigating relationships between AI knowledge and attitudes toward AI in healthcare, and multiple regression analysis for identifying predictors of AI acceptance, including demographic factors, AI awareness, and perceived benefits or risks.

The research complies with ethical criteria established by UAE universities, having secured approval from the Institutional Review Board (IRB) prior to data collection. The confidentiality and privacy of participants are guaranteed, and data is securely preserved. Participants are notified that their replies will be utilized exclusively for research purposes and that they may withdraw at any point without repercussions. Possible drawbacks encompass self-report bias, potentially compromising response accuracy, and the study's cross-sectional design, which fails to account for attitudinal changes over time. The study may exhibit sampling biases owing to the voluntary nature of participation. Future study may utilize longitudinal studies to monitor changes in students' perceptions of AI in healthcare. This methodology offers a thorough framework for evaluating students' perceptions of AI in healthcare services in the UAE, guaranteeing rigorous data gathering and statistical analysis.

Results and data analysis

	Count	Percentage
Female	53	57.6 %
Male	39	42.4 %
Total	92	100%

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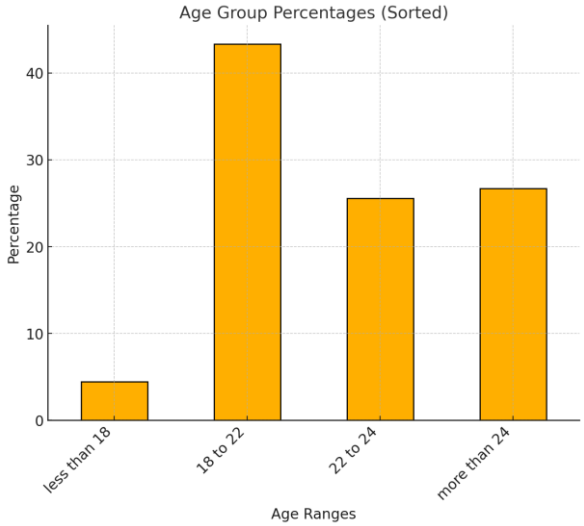
Age

Mean: 21.97 years

Standard Deviation: 2.36 years

Minimum: 17.0 years

Maximum: 25.0 years



logical groupings based on the survey questions:

AI Trust:

Questions about belief in AI's capabilities or future success.

Data Privacy Concerns:

Questions about data manipulation, security, and unauthorized access.

Patient Interactions:

Questions about personal contact and readiness to discuss sensitive topics.

1. AI Trust

16) AI may face communication problems due to underdeveloped technology.

17) AI is not established enough yet, and long-term success is yet to come.

2. Data Privacy Concerns

12) I believe in AI that data protection and data security cannot be fully guaranteed.

13) With AI, health data can be easily manipulated.

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18) AI may transfer my data for evaluation by uninvolved third parties.

3. Patient Interactions

14) With AI, personal contact gets lost.

15) Patients may not all be ready to discuss sensitive data with AI.

ANOVA & Kruskal-Wallis analysis

	ANOVA F-statistic	ANOVA p-value	Kruskal-Wallis H-statistic	Kruskal-Wallis p-value
AI Trust	0.718	0.544	1.625	0.654
Data Privacy Concerns	2.737	0.048	5.615	0.132
Patient Interactions	2.817	0.044	5.945	0.114

The statistical comparison of responses across years of study has been updated.

The key findings:

Results

AI Trust:

ANOVA: F=0.72,p=0.54F=0.72,p=0.54

Kruskal-Wallis: H=1.62,p=0.65H=1.62,p=0.65

No significant differences were found across years.

Data Privacy Concerns:

ANOVA: F=2.74,p=0.048F=2.74,p=0.048 (statistically significant)

Kruskal-Wallis: H=5.61,p=0.13H=5.61,p=0.13 (not statistically significant)

ANOVA suggests a significant difference in attitudes towards data privacy concerns across years.

Patient Interactions:

ANOVA: F=2.82,p=0.044F=2.82,p=0.044 (statistically significant)

Kruskal-Wallis: H=5.95,p=0.11H=5.95,p=0.11 (not statistically significant)

ANOVA indicates significant differences in perceptions of AI's impact on patient interactions by year.

Interpretation

Data Privacy Concerns and **Patient Interactions** show notable differences across years based on ANOVA results, suggesting that perceptions evolve as students progress in their studies.

AI Trust remains consistent across years, indicating uniform optimism or skepticism throughout.

The statistical tests comparing responses by gender across themes have been completed. Here are the results:

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Key Findings

AI Trust:

T-Test: t=−0.802,p=0.425t=−0.802,p=0.425 (not significant)

Mann-Whitney U: U=965.0,p=0.578U=965.0,p=0.578 (not significant)

No significant difference in responses between genders.

Data Privacy Concerns

T-Test: t=−0.196,p=0.845t=−0.196,p=0.845 (not significant)

Mann-Whitney U: U=1079.5,p=0.715U=1079.5,p=0.715 (not significant)

No significant difference in concerns about data privacy between genders.

Patient Interactions:

T-Test: t=−0.306,p=0.761t=−0.306,p=0.761 (not significant)

Mann-Whitney U: U=1028.5,p=0.971U=1028.5,p=0.971 (not significant)

No significant difference in perceptions of AI's impact on patient interactions.

Post-Hoc Analysis Results

1. Data Privacy Concerns

Significant difference between:

Year 1 and Year 4 (p=0.032p=0.032): Year 1 participants tend to have higher agreement on data privacy concerns compared to Year 4.

No significant differences between other year-pairs.

2. Patient Interactions

No statistically significant differences between any year-pairs, though:

Year 1 and Year 4 (p=0.065p=0.065) and **Year 2 and Year 4** (p=0.064p=0.064) are close to significance, indicating potential trends worth exploring further.

Key Insights

Data Privacy Concerns show that senior students (Year 4) might have lower concern compared to Year 1 students, possibly due to increased familiarity with AI or real-world exposure.

Patient Interactions do not exhibit statistically significant differences, but Year 4 students tend to rate AI's impact on interactions slightly more critically.

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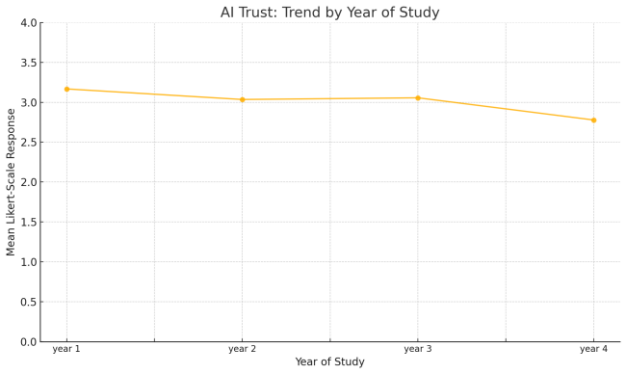

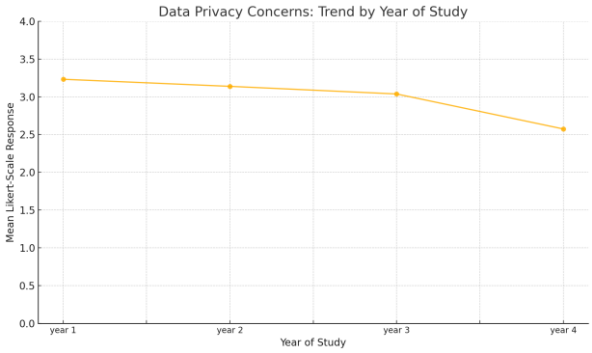

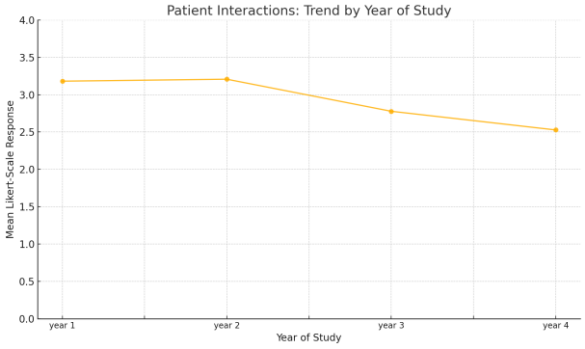

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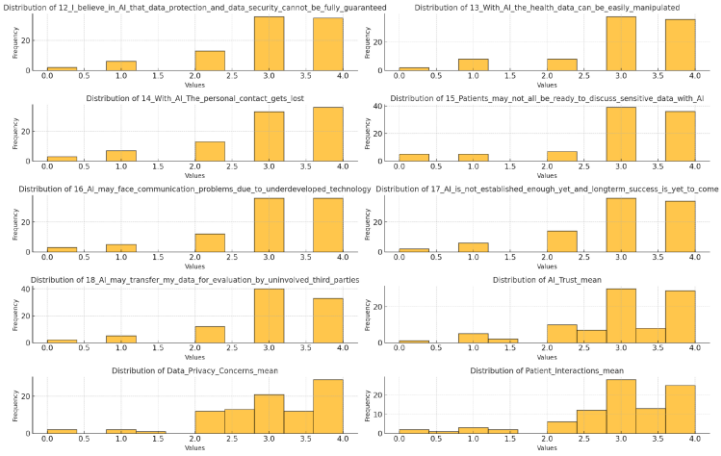

Key Data Insights

From the analysis and visualizations, here are the major insights derived from the data:

1. General Response Trends

Positive Perceptions: Overall, respondents show optimism towards AI's long-term success and capabilities.

Concerns About Data Privacy: Responses regarding data protection and manipulation indicate some skepticism, with a range of neutral to agreement responses.

Impact on Patient Interactions: A consistent concern is the potential loss of personal contact due to AI, especially among female participants and later-year students.

2. Gender-Based Trends

Trust in AI: Male respondents generally exhibit higher trust in AI compared to females across years.

Data Privacy Concerns: Females show slightly more concern about data security and third-party data access.

Patient Interactions: Females are more likely to agree that AI may reduce personal interaction in healthcare settings.

3. Year-Based Trends

AI Trust: Perceptions remain stable across years, indicating consistent optimism among students.

Data Privacy Concerns: Concerns about data security tend to decline in senior years, potentially due to increased familiarity with AI's practical applications.

Patient Interactions: Critical perspectives increase in senior years, likely reflecting exposure to clinical settings where personal interactions are valued.

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4. Statistical Insights

Significant Year Differences:

Data Privacy Concerns: Significant differences exist between Year 1 and Year 4 ($p=0.032p=0.032$), with Year 1 students showing higher concern.

Patient Interactions: Trends are not statistically significant but indicate potential shifts in perception in senior years.

No Significant Interaction Effects:

Interaction tests (Gender × Year) did not reveal significant effects for any theme.

5. Variable Distributions

Normality:

Variables such as AI trust and data privacy concerns show near-normal distributions, with some skewness for extreme agreement/disagreement.

Responses for patient interaction items tend to cluster at the higher end (agreement).

Recommendations

Targeted Education:

Address data privacy concerns in early years through case studies and technical knowledge about AI's security features.

Patient-Centric AI Training:

Incorporate modules to ensure AI complements rather than replaces personal interactions.

Further Research:

Investigate why senior students exhibit lower concern for data privacy but greater concern for patient interactions.

Discussion

In our study examining the impact of artificial intelligence (AI) on healthcare, several key themes emerged, centering on patient interactions, data privacy concerns, and overall trust in AI. Participants raised questions about whether AI can effectively manage personal contact and handle sensitive topics. For instance, some expressed that while AI technology holds promise, its current limitations might hinder effective communication. Concerns were also voiced that as AI becomes more integrated into healthcare, there is a risk of losing the personal touch that is crucial for patient care, with some patients potentially feeling uncomfortable discussing sensitive issues with a non-human system.

Data privacy issues formed another significant part of the discussion. Many respondents believed that despite advancements in technology, AI cannot fully guarantee the protection and security of personal health data. There were worries that health data could be easily manipulated or inappropriately shared with third parties for evaluation. These apprehensions underscore a broader skepticism about the readiness of AI systems to handle sensitive information without compromising patient confidentiality.

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Interestingly, while concerns about AI's technical shortcomings and data security were evident, trust in AI itself remained relatively consistent across different stages of study. This suggests that regardless of the potential drawbacks, there is a baseline level of optimism—or skepticism—about AI's long-term success that does not significantly vary with experience.

A deeper dive into the data revealed notable trends based on both academic year and gender. For data privacy concerns, analysis of variance (ANOVA) showed a significant difference between first year and fourth-year students ($p = 0.032$), with first-year students expressing higher levels of concern compared to their senior counterparts. This trend may reflect a gradual increase in familiarity and comfort with AI as students gain more exposure to its practical applications. Conversely, while overall perceptions of patient interactions did not differ significantly between years, near-significant trends ($p = 0.065$ for Year 1 vs. Year 4 and $p = 0.064$ for Year 2 vs. Year 4) suggested that senior students might be more critical of AI's impact on personal contact.

Gender-based differences were also apparent. Male respondents tended to show higher trust in AI, whereas female respondents were slightly more concerned about data security and the possibility of third-party access to their information. Additionally, females were more inclined to agree that AI could erode the quality of personal interactions in healthcare settings.

Conclusion and Recommendations

At the University of Fujairah, the above study of students of health sciences revealed a fascinating interplay of optimism and caution regarding artificial intelligence (AI). On one hand, there was a palpable sense of enthusiasm about the transformative potential of AI in healthcare. On the other, many students expressed significant concerns about its current limitations, particularly in relation to data privacy and the impact on patient interaction. This duality in responses reflects a broader tension between embracing innovation and safeguarding the fundamental aspects of human-centered care.

The study also uncovered interesting trends when considering the progression of students' academic journeys. As students advanced in their studies, they tended to worry less about data privacy, possibly as a result of increased exposure to and understanding of AI technology. However, this same group became more critical of AI's potential to diminish personal interactions in patient care. It seems that with growing familiarity with technology, students become more attuned to the subtle trade-offs between efficiency and the irreplaceable value of human connection in healthcare.

Gender differences added another layer of complexity to the findings. Generally, male students demonstrated a higher level of trust in AI, while female students were more inclined to voice concerns about data protection and the broader implications of AI integration in personal healthcare interactions. This divergence underscores the importance of considering diverse perspectives when evaluating the role of technology in sensitive areas like patient care.

Based on these insights, several recommendations have been proposed. First, educational programs - especially those targeting early-year students - should incorporate dedicated modules on data privacy, using case studies to clearly illustrate both the security features and the limitations of AI. Furthermore, training should focus on a patient-centric approach, ensuring that AI is viewed as a tool to complement, rather than replace, the essential human elements of healthcare. Finally, further research is necessary to delve into the underlying reasons for these observed differences, particularly why senior students are less concerned about data privacy but more wary of the erosion of personal interaction.

Overall, these insights provide a crucial foundation for developing strategies that enhance the integration of AI into healthcare in a manner that maintains trust, rigorously protects data privacy, and preserves the core human touch that is vital to patient care.

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