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Attitudes Towards AI in Healthcare Among University of Hail Health Sciences Students: A Qualitative Exploration

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Abstract **Background:** The adoption of Artificial Intelligence (AI) in healthcare continues to grow, promising more accurate diagnoses, greater efficiency and fewer human errors. Despite this trend, a critical gap remains in understanding how healthcare students-who represent the future workforce-perceive and accept these emerging technologies, including issues related to ethics, data security and the potential impact on patient care, particularly within the context of Saudi Arabia's rapidly evolving healthcare sector. **Objective:** This study explores how health sciences students at the University of Hail view the integration of AI in clinical contexts, focusing on their willingness to adopt such tools-referred to as their "acceptance level"-and on how ethical and privacy concerns shape their attitudes. **Methods:** A qualitative case study design was adopted. Semi-structured individual interviews were conducted via Zoom from June to August 2024 with 18 participants, recruited from diverse health sciences programs (medicine, nursing, pharmacy, dentistry, public health and health informatics). The interview guide addressed students' understanding of AI, perceived benefits and challenges, ethical considerations and the potential effects on their future professional roles. Data were analyzed using Braun and Clarke's six-phase thematic analysis framework. Trustworthiness was ensured via member checking, an audit trail and reflexive journaling. **Results:** Participants generally recognized AI's capacity to enhance efficiency and precision in healthcare tasks. Most conveyed optimism about the technology's benefits, emphasizing improvements in workload management and diagnostic accuracy. Nevertheless, concerns about data privacy and over-reliance on algorithms emerged as major reservations, particularly given students' limited clinical experience. Ethical considerations ranged from protecting patient confidentiality to ensuring that AI complements, rather than displaces, clinicians. Several interviewees also expressed a desire for AI-focused training in their academic curriculum. **Conclusion:** Health sciences students at the University of Hail anticipate AI's transformative potential in healthcare but remain cautious about privacy breaches and diminished human oversight. These findings highlight the necessity for targeted education that addresses technical, ethical and practical challenges. By adopting a measured approach to AI implementation, future healthcare professionals may be equipped to leverage technology while maintaining high standards of patient care.

Key Words Artificial intelligence, healthcare education, student perceptions, data privacy, ethical considerations, acceptance level, qualitative study, health sciences students, University of Hail

INTRODUCTION

Artificial Intelligence (AI) promises to reshape patient care by enhancing diagnostic precision, increasing efficiency and minimizing human errors across clinical settings [1-5]. These advancements align with the rapidly growing investment in digital health technologies, particularly in Saudi Arabia where Vision 2030 underscores the strategic importance of AI-driven innovation [6-9]. AI tools have demonstrated promising outcomes: for example, improving dermatological diagnoses through deep learning algorithms, enhancing image analysis in radiology and enabling predictive analytics for medication management [2,4,5]. Such applications can reduce wait times, streamline administrative workflows and potentially lower healthcare costs [1,3,4].

Despite the potential benefits, AI in healthcare also presents challenges. Concerns about data privacy, algorithmic bias and over-reliance on automated systems remain prominent [7,8,10]. These challenges are especially significant in clinical settings where human expertise and the patient-provider relationship are critical to quality care. In many cases, a tension exists between embracing technological efficiency and preserving the empathetic, interpersonal elements that define patient interactions [11,12].

Research Gap

While there is a growing body of literature on the implementation of AI in various healthcare contexts, minimal research has focused specifically on health sciences students. They represent future healthcare professionals whose readiness and acceptance are vital for the successful integration of AI in clinical practice. Understanding these students' perspectives is crucial to shaping educational strategies that address both the technical and ethical dimensions of AI [13-15]. Moreover, limited clinical exposure among students may amplify uncertainties and misconceptions about AI's benefits and risks.

Research Question and Objectives

Drawing from this context, our study addresses the following question:

What are the attitudes and perceptions of health sciences students at the University of Hail toward the integration of AI in healthcare and how do these attitudes and perceptions vary based on their academic backgrounds?

In line with this question, the study's objectives are to:

- Explore students' overall understanding of and attitude toward, AI in healthcare
- Identify perceived benefits, challenges and ethical considerations that influence AI acceptance levels
- Examine how acceptance levels differ based on academic background and year of study

METHODS

Study Design

A qualitative case study design was employed to gain in-depth insights into how health sciences students perceive AI within the specific institutional context of the University of Hail. This approach allows for a nuanced exploration of both shared and divergent viewpoints [10].

Participants

Sampling and Recruitment

Eighteen students were purposively recruited from the University of Hail's health sciences programs (medicine, nursing, pharmacy, dentistry, public health and health informatics). Purposive sampling was chosen to include participants from different academic levels (second-year through internship) and diverse fields. Recruitment flyers were posted on the university's online portals and departmental email lists, inviting interested students to fill out an online screening questionnaire. This questionnaire verified eligibility:

- Active enrollment in a health sciences program
- Academic levels from second-year to internship
- Proficiency in Arabic or English
- Willingness to provide informed consent

Eligible participants received a Participant Information Sheet (PIS) via email, outlining the study's objectives, methodology, data handling and confidentiality measures. Those who consented were scheduled for a one-on-one interview at a time convenient for them.

Demographic Profile

Among the 18 participants, the majority were female (n = 11), with an average age of 22.39 years. A diverse range of programs was represented: Health Informatics (n = 6), Nursing (n = 4), Public Health (n = 3), Pharmacy (n = 2), Medicine (n = 2) and Dentistry (n = 1). Seven participants were interns, while the rest spanned second to fifth years in their respective programs (Table 1).

Data Collection

Interview Modality (Zoom)

Semi-structured interviews were conducted via Zoom between June and August 2024. Although face-to-face interviews can facilitate rapport, Zoom was chosen for practical reasons: participants' varied schedules, clinical rotations and geographic distribution made online interviews more convenient. Additionally, Zoom's video feature allowed observation of nonverbal cues, approximating in-person interactions while maintaining scheduling flexibility and safety.

Table 1: Demographic information

Variable	Category	Frequency (n = 18)
Gender	Male	7
	Female	11
Age (Mean)	-	22.39 years
Academic program	Health informatics	6
	Nursing	4
	Medicine	2
	Public health	3
	Pharmacy	2
	Dentistry	1
Year of study	Internship	7
	5th Year	2
	4th Year	3
	3rd Year	4
	2nd Year	1

Development of the Interview Guide

A semi-structured guide was created, covering five primary areas:

- **Understanding of AI in Healthcare:** Participants were asked to define AI and describe its potential applications, such as data analytics and automated imaging
- **Attitudes Toward AI Integration:** Questions probed how participants envision AI being integrated into routine clinical workflows (e.g., using AI for diagnostic support, administrative tasks, or triage)
- **Perceived Benefits:** Participants were prompted to discuss time-saving or accuracy-enhancing features of AI
- **Concerns and Challenges:** Focused on issues like data privacy, algorithmic errors and the shifting balance between machine assistance and clinical judgment
- **Educational Needs:** Explored participants' views on incorporating AI-related content into the health sciences curriculum

Each interview lasted approximately 45-60 minutes. Probing questions were used for clarification or deeper exploration when necessary.

Development of the Interview Guide

A semi-structured guide was developed to explore five key areas related to AI in healthcare. First, participants were asked to define AI and describe its applications, such as data analytics and automated imaging. Second, their attitudes toward AI integration were examined, focusing on its role in clinical workflows, including diagnostic support, administrative tasks and triage. Third, discussions centered on the perceived benefits of AI, particularly its potential to enhance efficiency and accuracy. Fourth, concerns and challenges were addressed, highlighting issues like data privacy, algorithmic errors and the evolving balance between machine assistance and clinical judgment. Finally, the guide explored participants' perspectives on incorporating AI-related content into health sciences curricula to better prepare future professionals. Each interview lasted approximately 45-60 minutes. Probing questions were used for clarification or deeper exploration when necessary.

Ethical Approval of Scientific Research

This study was reviewed and approved by the Research Ethics Committee (REC) at the University of Hail on May 27, 2024, under the approval number H-2024-359. This research was evaluated to ensure adherence to ethical standards in scientific research.

All participants provided informed consent before participation, and the study was conducted in compliance with ethical guidelines, ensuring confidentiality, voluntary participation, and adherence to relevant data protection regulations.

Data Analysis

Data were analyzed using Braun and Clarke's six-phase framework for thematic analysis [14]. The following steps were undertaken:

- **Familiarization:** Interviews were recorded (with consent) and transcribed verbatim. The research team read the transcripts multiple times to gain an initial sense of the content
- **Generating Initial Codes:** An inductive (open-coding) approach was first used to identify concepts emerging from the data. Subsequently, a deductive approach was employed, guided by existing literature on AI in healthcare (e.g., data privacy, ethical considerations) and the study's research objectives
- **Searching for Themes:** The initial codes were grouped into broader thematic categories, such as "Efficiency Gains" and "Ethical and Privacy Concerns"
- **Reviewing Themes:** Themes were reviewed for coherence, ensuring they accurately represented the underlying data
- **Defining and Naming Themes:** Final themes were clearly defined and labeled, reflecting the core ideas in the data
- **Producing the Report:** A narrative synthesis was created, integrating participant quotations with relevant scholarly work

Ensuring Rigor and Trustworthiness

To ensure rigor and trustworthiness, several strategies were employed. Credibility was established through prolonged engagement with the data, peer debriefing and member checking, where participants received a summary of their interview for confirmation or clarification. Transferability was supported by providing detailed descriptions of participant demographics, institutional context and methodologies, allowing readers to assess the study's applicability to other settings. Dependability was maintained through an audit trail that documented coding decisions, theme development and reflexive notes, ensuring transparency for external review. Lastly, confirmability was reinforced by reflexive journaling, helping researchers ground their interpretations in participants' words rather than personal biases.

RESULTS

Thematic analysis yielded several interrelated themes reflecting students' understanding of AI, perceived benefits, concerns and attitudes toward its integration into healthcare.

These themes were shaped by participants' academic backgrounds and levels of clinical exposure.

Understanding of AI in Healthcare

Most participants demonstrated a foundational understanding of AI, often describing it as a technology that can "learn" from data to assist or automate decision-making. Common examples included AI-supported diagnostics in radiology or automated patient data management. As one participant (Participant 6) noted, "AI helps reduce the time required to perform tasks and stores patient data so that if a similar problem arises again, the information is readily available."

Attitudes Toward AI Integration

Positive Outlook

A majority expressed optimism, viewing AI as a sign of progress and a helpful adjunct to human expertise. "AI integration is good, it helps us and it's a sign of progress in healthcare," said Participant 6. Internship-year students, in particular, pointed out how AI could streamline documentation, allowing them to focus more on patient care.

Context of Integration

When asked to envision how AI might fit into routine healthcare, participants mentioned diagnostic decision support (e.g., analyzing imaging results), patient monitoring (e.g., wearable sensors and alerts) and administrative work (e.g., appointment scheduling). However, several also underscored that true "integration" means weaving AI tools into existing practices in a way that supplements clinical judgment rather than replacing it.

Perceived Benefits

Efficiency and Time-Saving

Participants frequently cited the potential of AI to reduce manual tasks, expedite administrative processes and shorten diagnosis times. According to Participant 11, "The main benefit is time; AI shortens the time needed to identify the cause of illness, especially with large data sets."

Improved Diagnostic Accuracy

Another commonly mentioned benefit was AI's ability to analyze vast amounts of clinical data, potentially improving accuracy. Participant 7, a health informatics student, highlighted that "AI can detect subtle patterns in patient data that might be overlooked by a busy clinician."

Concerns and Challenges

Despite optimism, students expressed notable reservations.

Data Privacy and Security

Concerns around patient data breaches were widespread. "My main worry is that AI systems could be hacked, compromising patient data," stated Participant 6. Students noted that any data breach could erode trust in technology and harm patient-provider relationships.

Over-Reliance on Algorithms

Several participants cautioned against unquestioningly accepting AI's outputs. Participant 14 expressed, "There's a risk we might trust AI too much, especially if we don't have enough clinical experience to question its conclusions." This sentiment was common among junior students, who felt their limited background might exacerbate reliance on technology.

Ethical and Human Interaction

Another theme was the potential erosion of human interaction. Participant 13 stressed, "Some things should always be face-to-face, especially in clinical settings where visual and emotional cues are essential." Students also emphasized the importance of preserving empathy, patient comfort and professional accountability, even as AI becomes more prevalent.

Impact on Future Professions

Many believed AI would have a net positive effect on their careers. For example, Participant 8 said, "AI will make work easier by reducing the time required for patient-related tasks, improving productivity." Others, especially those in Health Informatics, viewed AI proficiency as a competitive advantage in the job market. However, a few expressed anxiety about job displacement or a shift in professional roles, indicating a need for clarity on how AI complements-rather than replaces-healthcare workers.

Educational Needs and Curriculum Gaps

Most participants felt that their current curriculum offered limited exposure to AI topics. They advocated for dedicated modules, hands-on simulation and interdisciplinary courses that would better prepare them for an AI-driven healthcare environment. Participant 1 suggested, "There should be introductory courses on AI that explain the basics and how it can be applied in healthcare, including ethical responsibilities and data security."

DISCUSSION

This study provides insight into health sciences students' attitudes toward AI in healthcare at the University of Hail. Overall, the students view AI as a promising tool to enhance clinical accuracy and operational efficiency, aligning with findings from similar investigations [15,16]. Notably, participants' limited clinical experience seemed to magnify concerns around data privacy and algorithmic over-reliance, echoing previous research that highlights the importance of guided practice when introducing technological tools to novices [4,17].

Linking Findings to Existing Literature

Our findings resonate with international studies that document both enthusiasm and caution among emerging healthcare professionals [2,15]. Consistent with reports by Scott *et al.* [2], students in our study underscored the role of robust data governance in maintaining patient trust. This convergence of findings suggests that the successful integration of AI in healthcare hinges not only on technological readiness but also on ethical and regulatory structures.

Educational Implications

Participants expressed a clear need for more AI-focused content within their curricula, including practical simulations and ethical training. Given the rapid evolution of AI, a scaffolded approach-introducing basic AI concepts in early years and more complex, hands-on experiences in later years-may enhance both competence and confidence [8,10]. Interdisciplinary learning experiences, in which medical, nursing, pharmacy and informatics students collaborate, could foster a holistic understanding of AI's multifaceted applications.

Balancing Technology with Human Interaction

A recurring theme was the need to preserve the human dimension of healthcare. While AI can speed up administrative tasks and potentially improve diagnostic accuracy, empathy and rapport remain central to patient care [18]. Educators and policymakers must, therefore, adopt a strategy that frames AI as an augmentative tool-enhancing but never wholly replacing the human clinician [19].

Limitations and Future Research

The study's scope is somewhat limited by its single-institution sample and relatively small number of participants (n = 18). While this allowed for in-depth exploration, it may restrict the transferability of findings to other regions or educational contexts. Future research might expand to multiple institutions or include longitudinal studies, tracking how students' perceptions evolve as they advance through clinical rotations or postgraduate training [20]. Additionally, incorporating inter-coder reliability measures (e.g., Cohen's kappa) and more robust triangulation (e.g., focus groups, surveys) could further enrich the data and validate the findings.

CONCLUSION

Health sciences students at the University of Hail demonstrate optimism about AI's potential to revolutionize healthcare, particularly in enhancing diagnostic processes and improving efficiency. Nonetheless, they harbor valid concerns related to data privacy, ethical governance and over-reliance on technology-concerns likely amplified by their limited clinical exposure. These findings underscore the importance of incorporating AI-related training into health sciences curricula, with an emphasis on both technical competencies and ethical guidelines. By striking a balance between technological innovation and the preservation of human empathy, future healthcare professionals can harness AI responsibly and effectively.

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