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Patient Experiences with AI in Healthcare Settings

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A B S T R A C T

This study aims to explore patient experiences with AI in healthcare settings, identifying their perceptions, concerns, and the perceived impact of AI on their care. The objective is to provide insights into patient attitudes towards AI, which can inform the development, implementation, and policy-making of AI technologies in healthcare. We conducted a qualitative study using semi-structured interviews with 26 participants who have interacted with AI-driven healthcare services. Participants were selected to represent a diverse range of ages, backgrounds, and experiences. Thematic analysis was employed to identify major themes and categories from the interview data, focusing on patient perceptions, experiences, and expectations of AI in healthcare. Five major themes emerged from the data: Understanding and Perceptions; Quality and Accessibility; Integration and Adaptation; Operational Challenges; and Patient Empowerment and Engagement. These themes encompassed various categories, including AI literacy, privacy concerns, care personalization, technical issues, and patient rights, among others. The findings highlight a general optimism about the potential of AI to improve healthcare outcomes, coupled with significant concerns about data privacy, ethical use, and the need for greater patient education and involvement in AI development. Patients perceive AI as a potentially transformative force in healthcare but underscore the importance of addressing ethical considerations, ensuring transparency, and enhancing patient engagement in the deployment of AI technologies. The study advocates for a patient-centered approach in the development and implementation of AI in healthcare to maximize its benefits while mitigating challenges.

Keywords: *Artificial Intelligence, Patient Experience, Healthcare Quality, Patient-Centered Care, Ethics, Data Privacy, Technology Acceptance.*

1. Introduction

The realm of healthcare is undergoing a seismic shift, propelled by the rapid integration of Artificial Intelligence (AI) technologies. This evolution marks a significant departure from traditional practices, promising to enhance diagnostic precision, optimize treatment protocols, and predict care outcomes with unparalleled accuracy. The journey of AI in healthcare is not a recent phenomenon; it traces back to the 1970s with the inception of medical expert systems designed to diagnose and recommend treatments for various conditions, setting the stage for the profound impact AI would have on healthcare delivery (Owoyemi et al., 2020). As we delve into the current landscape, it's clear that the potential of AI in healthcare extends far beyond its early applications, promising to revolutionize patient care and satisfaction

through advanced algorithms and machine learning techniques (Macrae, 2019).

The transformative power of AI in healthcare is multifaceted, offering to improve the quality of medical practice and patient experiences significantly. With AI technologies such as machine learning algorithms, healthcare professionals can predict outcomes, assist in decision-making, and streamline healthcare delivery processes, thereby enhancing the efficiency and effectiveness of patient care (Alharbi & Almutiq, 2022). This integration holds promise for a future where healthcare is more responsive, personalized, and efficient, aligning closely with the needs and expectations of patients (Boeru, 2022). However, the deployment of AI in healthcare is accompanied by challenges, including ethical dilemmas and privacy concerns, necessitating the establishment of robust guidelines to navigate these complexities (Rao, 2023).

As AI technologies advance, their application in healthcare broadens, influencing various domains from clinical nursing care to dental health management. Innovations in AI are now enabling healthcare providers to manage oral diseases more effectively, enhance clinical nursing care, and even predict dental implant outcomes with greater accuracy (Lee, 2022; Ng et al., 2021). The capacity of AI to automate care processes and refine the quality of healthcare services underscores its potential as a transformative tool in healthcare. Yet, its successful adoption hinges on overcoming inherent challenges such as data quality issues and the acceptance of AI methodologies by healthcare professionals (Fernandez-Llatas et al., 2022).

The integration of AI into healthcare presents a complex interplay of challenges and opportunities. On one hand, AI has the potential to bolster healthcare services and enrich patient-doctor relationships through improved diagnostic accuracy and efficiency. On the other, it raises questions about the role of intelligent robots in nursing and the possibility of AI and robotic nurses replacing human roles in operating rooms (Karim et al., 2021). Furthermore, the regulatory landscape governing AI in healthcare is still in flux, with stakeholders facing the critical task of developing strategies to foster the acceptance and integration of AI technologies in healthcare settings (Wouters, 2022).

The advent of AI in healthcare is a testament to the relentless pursuit of innovation and improvement in patient care. As we stand on the brink of this new era, it is imperative to critically assess the implications of AI's integration, balancing the promise it holds for enhancing healthcare delivery with the ethical, privacy, and professional challenges it presents. This study aims to explore patient experiences with AI in healthcare settings, providing valuable insights into the impact of AI technologies on patient care and the evolving dynamics of healthcare delivery. Through this exploration, we seek to contribute to the ongoing dialogue on the role of AI in healthcare, highlighting the potential benefits while addressing the challenges that lie ahead.

2. Methods and Materials

2.1. Study Design and Participants

This study employed a qualitative research methodology to explore patient experiences with artificial intelligence (AI) in healthcare settings. The aim was to gain in-depth insights into patients' perceptions, feelings, and attitudes towards the use of AI in their healthcare journey. By adopting a qualitative approach, this study could capture the complexity of patients' experiences and the nuanced implications of AI integration into healthcare practices.

Participants were recruited from a diverse range of healthcare settings, including hospitals, clinics, and online health services, where AI technologies are implemented. Inclusion criteria were adults over 18 years of age who had experienced AI-driven healthcare services, such as diagnostic tools, treatment recommendations, or patient support systems, within the past 12 months. The study aimed for a purposive sample of participants to ensure a wide representation of experiences based on age, gender, health condition, and type of AI interaction.

Participants were informed about the study's purpose, the voluntary nature of their participation, and their right to withdraw at any time without consequence. Informed consent was obtained from all participants prior to the commencement of the interviews. Measures were taken to ensure the confidentiality and anonymity of participants' data throughout the study.

2.2. Data Collection

Data were collected through semi-structured interviews, which allowed for flexibility in exploring the research questions while providing participants with the opportunity to express their views and experiences in their own words. The interview guide was developed based on a review of relevant literature and preliminary discussions with

healthcare professionals knowledgeable about AI applications in healthcare. Key areas explored in the interviews included participants' understanding of AI, their perceptions of the benefits and challenges of AI in healthcare, their trust in AI-driven healthcare services, and the impact of AI on their care experience.

Interviews were conducted either face-to-face, via telephone, or through online video conferencing platforms, depending on participant preference and geographical location. Each interview lasted between 30 to 60 minutes and was audio-recorded with participant consent. To ensure confidentiality, all identifying information was removed from the transcripts.

Sample questions are presented as follows:

Can you describe your understanding of artificial intelligence (AI) in healthcare?

What has been your experience with AI-driven healthcare services?

How do you feel about the reliability and accuracy of AI in diagnosing or treating medical conditions?

Have you had any concerns regarding privacy and the ethical use of your data in AI-driven healthcare?

In what ways do you believe AI has impacted the quality of care you receive?

What improvements or changes would you like to see in the future regarding the use of AI in healthcare?

2.3. Data Analysis

The audio recordings of the interviews were transcribed verbatim. Thematic analysis was used to analyze the data, following Braun and Clarke's (2006) six-phase process. This involved familiarizing oneself with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report. This iterative process allowed for the emergence of both expected and unexpected themes related to patient experiences with AI in healthcare settings.

3. Findings

In this study, we explored the experiences of 26 participants with artificial intelligence in healthcare settings. The demographic breakdown included 14 females (54%) and 12 males (46%), representing a diverse age range: 18-29 years (5 participants, 19%), 30-49 years (11 participants, 42%), 50-69 years (8 participants, 31%), and over 70 years (2 participants, 8%). Participants came from varied backgrounds, including 10 (38%) with a background in healthcare, 8 (31%) from technology fields, and 8 (31%) with no specific affiliation to healthcare or technology professions. Education levels among participants varied, with 8 (31%) holding a college degree, 12 (46%) having a postgraduate degree, and 6 (23%) possessing a high school diploma or equivalent.

Table 1

Major Themes, Minor Themes, and Concepts

Major Theme	Minor Theme	Concepts
Understanding and Perceptions	AI Literacy	AI definitions, Public vs. professional knowledge
	Trust Factors	Reliability, Safety, Accuracy
	Privacy Concerns	Data handling, Anonymity, Security measures
	Societal Impact	Cultural acceptance, Social trust, Ethical considerations
Quality and Accessibility	Care Personalization	Tailored treatment plans, Patient-centered approaches
	Access Issues	Digital divide, Economic access, Rural vs. urban
	Quality of Outcomes	Improvement in health outcomes, Patient satisfaction
	Innovation and Efficiency	Streamlining processes, Reducing wait times, Enhancing diagnostics
Integration and Adaptation	Professional Dynamics	Role adjustments, Interdisciplinary collaboration
	Patient Experience	User interface design, Patient education, Support services
	System Integration	Compatibility with existing tech, Data exchange standards
	Adaptation Barriers	Resistance to change, Technophobia, Training deficiencies
Operational Challenges	Technical Issues	Bug reports, Downtime, Software updates
	Financial Considerations	ROI, Funding challenges, Cost-benefit analysis
	Infrastructure Needs	Hardware requirements, Network capabilities
	Scalability Concerns	Growth planning, Capacity limits, Upgrade paths
Patient Empowerment and Engagement	Self-Care Facilitation	Health apps, Wearable devices
	Patient Rights	Informed consent, Data ownership, Right to opt-out
	Engagement Opportunities	Community forums, Patient advisory boards
	Feedback and Improvement	User feedback collection, Continuous improvement processes

In our study, we meticulously explored patient experiences with artificial intelligence (AI) in healthcare, which culminated in the identification of five pivotal themes: Understanding and Perceptions; Quality and Accessibility; Integration and Adaptation; Operational Challenges; and Patient Empowerment and Engagement. These themes were further dissected into specific categories, each encompassing a range of concepts derived from the participants' insights, thereby offering a comprehensive view of the multifaceted impact of AI in healthcare settings.

Understanding and Perceptions emerged as a foundational theme, where participants expressed a spectrum of knowledge levels and attitudes towards AI. Categories under this theme included AI Literacy, Trust Factors, Privacy Concerns, and Societal Impact. One participant remarked, "I know AI can do a lot, but I'm not sure how it all works in my care," highlighting a gap in AI Literacy. Trust Factors were critical, with another participant stating, "I need to know that the AI system is accurate...that it won't make mistakes with my health." Privacy Concerns were palpable, as one individual pointed out, "My biggest worry is who else is seeing my health information." Societal Impact discussions reflected broader implications, with comments like, "How we handle AI in healthcare could really set the tone for its use everywhere."

Quality and Accessibility addressed how AI could enhance or hinder healthcare delivery, dissected into Care Personalization, Access Issues, Quality of Outcomes, and Innovation and Efficiency. Personalized care was a key benefit, with a participant sharing, "AI could make treatments more about the individual, which is exciting." However, Access Issues were evident, as another noted, "Not everyone can access these fancy AI tools, and that's a problem." The promise of improved outcomes was acknowledged: "If AI can catch things faster and more accurately, that's a win for everyone."

Integration and Adaptation revealed the dynamics of incorporating AI into existing healthcare frameworks, focusing on Professional Dynamics, Patient Experience, System Integration, and Adaptation Barriers. The challenge of integration was summarized by a healthcare professional: "Blending AI with our current tools without disrupting care is tricky but necessary." Patients' experiences with AI tools were mixed, with one saying, "When it works, it's seamless; when it doesn't, it's frustrating."

Operational Challenges underscored the logistical and technical hurdles of AI implementation, including Technical Issues, Financial Considerations, Infrastructure Needs, and Scalability Concerns. The reality of technical glitches was captured in the comment, "AI isn't perfect; we've had our share of system crashes." Financial concerns were also prominent, with an administrator noting, "The upfront cost is high, but we're betting on long-term savings and efficiencies."

Patient Empowerment and Engagement emphasized the role of patients in driving AI development and application, through Self-Care Facilitation, Patient Rights, Engagement Opportunities, and Feedback and Improvement. The empowerment aspect was praised, "Using an app to track my health has made me feel more in control," illustrating the potential of AI to foster patient agency. Yet, the need for patient involvement in AI development was clear, with a participant advocating, "Patients should have a say in how these AI systems are built and used."

4. Discussion and Conclusion

This study has shown the experiences of the integration of Artificial Intelligence (AI) in healthcare settings. The findings reveal that patients generally perceive AI as a promising tool for enhancing the accuracy of diagnoses, personalizing treatment plans, and improving overall care efficiency. However, concerns regarding data privacy, ethical use of AI, and the need for transparency and patient engagement in AI-driven care processes were prominently highlighted. Furthermore, the study underscores the significance of patient education and the establishment of trust in AI technologies to facilitate their acceptance and integration into healthcare practices.

In this study, we identified five main themes related to patient experiences with artificial intelligence (AI) in healthcare settings. These themes encompass Understanding and Perceptions; Quality and Accessibility; Integration and Adaptation; Operational Challenges; and Patient Empowerment and Engagement. Each theme was further divided into categories, providing a structured insight into the various aspects of patient interactions with AI technologies. The categories under each theme were derived from the participants' responses, highlighting specific concerns, expectations, and experiences related to the use of AI in healthcare.

Understanding and Perceptions encompassed categories such as AI Literacy, Trust Factors, Privacy Concerns, and Societal Impact. AI Literacy covered concepts like definitions of AI and public vs. professional knowledge, pointing to a gap in understanding between healthcare providers and patients. Trust Factors delved into reliability, safety, and accuracy concerns, indicating the importance of these factors in patient acceptance of AI. Privacy Concerns focused on data handling, anonymity, and security measures, reflecting patient anxieties about data protection. Societal Impact discussed cultural acceptance, social trust, and ethical considerations, suggesting broader societal implications of AI integration into healthcare.

Quality and Accessibility included Care Personalization, Access Issues, Quality of Outcomes, and Innovation and Efficiency. Care Personalization highlighted tailored treatment plans and patient-centered approaches, showing a desire for personalized healthcare solutions. Access Issues addressed the digital divide, economic access, and rural vs. urban disparities, emphasizing the need for equitable AI implementation. Quality of Outcomes discussed improvement in health outcomes and patient satisfaction, underlining the potential benefits of AI. Innovation and Efficiency referred to streamlining processes, reducing wait times, and enhancing diagnostics, indicating operational benefits of AI in healthcare.

Integration and Adaptation featured Professional Dynamics, Patient Experience, System Integration, and Adaptation Barriers. Professional Dynamics explored role adjustments and interdisciplinary collaboration, reflecting on the changing landscape of healthcare professions. Patient Experience covered user interface design, patient education, and support services, highlighting the importance of user-friendly AI applications. System Integration discussed compatibility with existing technology and data exchange standards, emphasizing technical challenges. Adaptation Barriers addressed resistance to change, technophobia, and training deficiencies, pointing out obstacles to AI adoption.

Operational Challenges consisted of Technical Issues, Financial Considerations, Infrastructure Needs, and Scalability Concerns. Technical Issues involved bug reports, downtime, and software updates, revealing the technical difficulties encountered. Financial Considerations covered ROI, funding challenges, and cost-benefit analysis, reflecting economic obstacles. Infrastructure Needs discussed hardware requirements and network capabilities, indicating the foundational needs for AI integration. Scalability Concerns highlighted growth planning, capacity limits, and upgrade paths, suggesting the need for scalable AI solutions.

Patient Empowerment and Engagement included Self-Care Facilitation, Patient Rights, Engagement Opportunities, and Feedback and Improvement. Self-Care Facilitation focused on health apps and wearable devices, showing the potential for AI to support patient self-management. Patient Rights covered informed consent, data ownership, and the right to opt-out, emphasizing the importance of respecting patient autonomy. Engagement Opportunities discussed community forums and patient advisory boards, pointing to ways to involve patients in AI development. Feedback and Improvement referred to user feedback collection and continuous improvement processes, highlighting the need for iterative AI development based on patient input.

This study has illuminated the multifaceted impact of AI technologies on patient care, aligning with and expanding upon findings from existing literature. Richardson et al. (2021) have previously highlighted the medical community's enthusiasm for AI technologies, pointing out the scarcity of research focusing on patient perspectives (Richardson et al., 2021). Our study contributes to filling this gap by exploring how patients perceive and experience AI in their healthcare journeys, echoing the call for more patient-centered research in the realm of AI in healthcare.

Lee & Yoon (2021) delved into the opportunities and challenges of AI-based technologies in healthcare, providing insights into the real-world applications of AI. Similarly, our findings underscore the transformative potential of AI in enhancing diagnostic accuracy, optimizing treatment plans, and personalizing patient care (Lee & Yoon, 2021). However, consistent with Lee & Yoon's observations, our study also recognizes the challenges in adopting AI, including the need for improved data quality and the acceptance of AI technologies by both patients and healthcare professionals.

The importance of assessing the impact of AI on healthcare practices, as emphasized by Fasterholdt et al. (2022), resonates with our study's focus on patient experiences (Fasterholdt et al., 2022). Our research supports the notion that understanding the patient perspective is crucial for evaluating the value of AI in healthcare settings, thereby contributing to a more nuanced comprehension of AI's role in medical imaging and beyond.

Richardson et al. (2022) proposed a framework for examining patient attitudes towards AI applications in

healthcare, aiming to provide a theoretical basis for understanding patient orientations to AI (Richardson et al., 2022). Our study builds on this framework by offering empirical data on patient experiences, thus providing tangible insights into how patients perceive the integration of AI into their care. Similarly, Boeru (2022) and Esmaeilzadeh (2020) have highlighted the role and effects of AI in healthcare delivery (Boeru, 2022; Esmaeilzadeh, 2020), findings that align with our observations on AI's potential to enhance patient-doctor relationships and healthcare services.

Ethical considerations, a critical aspect of AI integration in healthcare, have been thoroughly discussed in the literature (Elendu, 2023; Kooli & Muftah, 2022; Wang & Liu, 2023). Our study echoes these concerns, underlining the significance of ethical practices, patient privacy, and the need for transparency in AI applications. The transformative potential of AI in patient care, as discussed by Elendu (2023), is particularly relevant to our findings, which underscore the necessity of ethical guidelines to navigate the challenges presented by AI technologies (Elendu, 2023).

Finally, the exploration of AI's challenges and opportunities in healthcare by Petersson et al. (2022), Wang et al. (2021), and Mishra (2022) provides a valuable context for our study. These studies highlight the potential of AI to improve treatment, minimize errors, and enhance patient experiences—themes that are strongly reflected in our research findings (Mishra, 2022; Petersson et al., 2022; Wang et al., 2021). Our study contributes to the discourse on the importance of responsible AI implementation and the role of engagement mechanisms in facilitating AI adoption in healthcare settings.

As the healthcare sector continues to navigate the challenges and opportunities presented by AI, our findings highlight the need for ongoing research, ethical consideration, and patient engagement to fully realize AI's potential in improving healthcare outcomes. In conclusion, this study contributes to the burgeoning field of AI in healthcare by highlighting patient perspectives, which are crucial for the ethical and effective implementation of AI technologies. It reinforces the potential of AI to revolutionize healthcare delivery while also cautioning against the challenges that must be addressed to harness this potential fully. The findings advocate for a patient-centered approach in the development and deployment of AI applications, ensuring that technological advancements align with patient needs, preferences, and ethical standards.

5. Limitations and Suggestions

The study acknowledges several limitations, including the limited demographic diversity of participants, which may affect the generalizability of the findings. Furthermore, the reliance on self-reported experiences introduces the potential for subjective bias, and the rapidly evolving nature of AI technologies means that perceptions of AI may quickly change. These limitations underscore the need for ongoing research to continuously capture and understand patient experiences with AI in healthcare.

Future research should aim to include a more diverse participant pool to capture a broader range of patient experiences and perspectives on AI in healthcare. Longitudinal studies could provide insights into how patient perceptions of AI evolve over time, especially as AI technologies become more integrated into healthcare systems. Additionally, comparative studies assessing patient experiences across different healthcare contexts could illuminate the factors that influence the successful adoption of AI.

For healthcare practitioners and policymakers, the study suggests the importance of incorporating patient feedback into the design and implementation of AI technologies. Efforts should be made to enhance patient literacy regarding AI, addressing misconceptions and providing clear, accessible information about the benefits and limitations of AI in healthcare. Moreover, ethical considerations and privacy protections must be prioritized to build trust and ensure the responsible use of AI. Ultimately, by aligning AI innovations with patient-centered values, healthcare systems can leverage AI to improve care outcomes while maintaining the trust and confidence of those they serve.

Authors' Contributions

All authors have contributed equally to the research process and the development of the manuscript.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

In this research, ethical standards including obtaining informed consent, ensuring privacy and confidentiality were observed.

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