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A Phenomenological Exploration of Medical Practitioners' Experiences in Adopting Artificial Intelligence and Machine Learning Technologies in Hospitals

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ABSTRACT

Digital health systems have become increasingly vital in healthcare, transforming how practitioners and patients interact. While previous studies have explored technological adoption in healthcare, few have examined the lived experiences of practitioners and patients within these platforms, particularly in telemedicine. A critical gap exists in understanding the subjective meanings and experiences behind these interactions. This study uses a phenomenological approach to explore the experiences of medical practitioners and patients in using telemedicine platforms, focusing on their perceptions, challenges, and insights. In-depth interviews with 25 participants were conducted, revealing key themes such as communication barriers, trust-building in digital spaces, and the perceived benefits of telemedicine in patient care These findings offer several practical implications for improving the design and implementation of telemedicine platforms. For instance, addressing communication barriers by incorporating user-friendly interfaces and language support tools can enhance accessibility and usability for diverse populations. Building mechanisms to foster trust in digital interactions—such as robust data privacy measures and transparent protocols—can strengthen user confidence. Moreover, understanding the perceived benefits from a patient-centered perspective can guide policymakers and healthcare providers in promoting telemedicine adoption, especially in underserved or remote areas.. These findings offer valuable insights into the human factors influencing digital health adoption and provide a more nuanced understanding of telemedicine's impact on healthcare delivery. The study contributes to bridging the gap between technological innovation and patient-practitioner interaction, with implications for improving telemedicine platforms and enhancing user experience in future research.

INTRODUCTION

The integration of Artificial Intelligence (AI) and Machine Learning (ML) technologies into healthcare represents a transformative shift in the way medical practices approach diagnosis, treatment, and patient care (Aminizadeh dkk., 2024). These technologies offer the potential to enhance clinical decision-making by providing advanced tools for data analysis, predictive modeling, and personalized healthcare. In recent years, AI and ML have increasingly been applied in various medical domains, including radiology, pathology, and personalized medicine, promising more accurate and timely diagnoses, improved patient outcomes, and greater operational efficiency (Pieszko dkk., 2021). However, despite the growing recognition of their benefits, the adoption of AI and ML in healthcare has not been without challenges.

One of the primary barriers to the widespread implementation of these technologies is the resistance or reluctance from medical professionals, particularly those who are accustomed to

traditional methods of clinical practice (S Band dkk., 2023). Many practitioners express skepticism about the reliability and safety of AI systems, particularly when it comes to high-stakes decisions such as patient diagnosis and treatment plans (Shukla & Asha Rajiv, 2024). The integration of these technologies into the daily workflow also presents logistical challenges, including the need for significant infrastructure changes, extensive training, and technical support. As AI and ML are relatively new technologies, their implementation often requires medical practitioners to adjust not only to new tools but also to new ways of thinking and working.

Existing research has predominantly focused on the technical aspects of AI and ML adoption, such as the efficacy of these tools in clinical settings, their accuracy in diagnosing diseases, and their potential to reduce healthcare costs (Trocin dkk., 2022). However, less attention has been paid to the subjective experiences of medical professionals who are tasked with integrating these technologies into their practices. The lived experiences of practitioners, including their attitudes, perceptions, and emotional responses to the adoption of AI and ML, remain underexplored. This gap in the literature highlights the need for research that delves into the personal and professional experiences of healthcare providers, particularly from a phenomenological perspective.

A phenomenological perspective is critical in this context because it enables the exploration of subjective, lived experiences, which are essential for understanding the deeper meanings practitioners attach to AI and ML adoption. By focusing on how individuals experience and interpret these technologies within their unique professional contexts, phenomenology provides insights into not only the challenges they face but also the motivations and emotional responses driving their engagement. Unlike traditional methods that may overlook these dimensions, a phenomenological approach uncovers the human elements—such as trust, skepticism, and adaptation—that significantly influence the success or failure of technological integration in healthcare.

The objective of this study is to explore the subjective experiences of medical practitioners in adopting AI and ML technologies within their clinical practices (Alazwari dkk., 2024). By focusing on the lived experiences of healthcare professionals, this research aims to uncover the deeper meanings and personal insights associated with the integration of AI and ML. Understanding these experiences is crucial for identifying the factors that influence the successful adoption of these technologies and for providing actionable recommendations to improve their implementation in healthcare settings.

Research into the lived experiences of individuals in the context of new technological innovations has become a critical area of interest, particularly in healthcare. Understanding how practitioners experience and perceive the integration of Artificial Intelligence (AI) and Machine Learning (ML) into their clinical work is essential for informing successful technology adoption strategies (Ali dkk., 2024). Phenomenological research is particularly well-suited for exploring these personal experiences, as it provides a framework for capturing the meanings and emotions associated with the adoption process. This approach allows for a deeper exploration of how AI and ML are not only perceived in terms of their technical benefits but also in relation to the cultural, emotional, and practical challenges they introduce into medical practice.

However, capturing the essence of these subjective experiences presents significant methodological challenges. Traditional quantitative approaches, which focus on measuring variables and outcomes, are ill-equipped to explore the nuances of personal perception, trust, and emotional responses. While large-scale surveys can quantify the level of AI and ML adoption, they do little to uncover the deeper, more complex meanings behind why medical practitioners may resist or embrace these technologies (Date dkk., 2024). These challenges are compounded by the fact that many practitioners may not be fully aware of the internal processes shaping their attitudes, making it difficult for them to express their experiences in traditional survey formats. As a result, quantitative methods fail to account for the lived reality of practitioners, which is rich in subjective meaning and context.

The choice of a phenomenological approach is further justified by its ability to address these methodological gaps. It enables researchers to move beyond surface-level observations and engage directly with the subjective realities of practitioners. This approach not only captures the emotional

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and cognitive dimensions of adoption but also sheds light on the interplay between individual experiences and broader systemic factors, such as organizational culture and technological infrastructure.

The limitations of previous research highlight the need for a more in-depth, qualitative exploration of the lived experiences of healthcare professionals. Phenomenology, with its focus on understanding how individuals experience the world, offers a powerful tool for addressing these gaps. By focusing on the subjective meaning of AI and ML adoption, this study aims to capture the essence of practitioners' experiences, providing insights that are not accessible through traditional quantitative approaches. This exploration is critical not only for advancing theoretical understanding but also for offering practical insights into how these technologies can be more effectively integrated into clinical settings.

While existing research has provided valuable insights into the technical aspects of AI and ML adoption in healthcare, such as their efficacy and potential benefits in clinical settings, much of this research has focused on quantitative metrics and system performance. These studies often rely on practical, data-driven approaches that measure adoption rates, clinical outcomes, or efficiency improvements. However, such approaches fall short in capturing the deeper, subjective experiences of healthcare practitioners—their personal perceptions, emotional responses, and the broader cultural and organizational factors influencing their acceptance or resistance to these technologies. By focusing on surface-level outcomes, these studies offer a limited understanding of the real-world complexities surrounding AI and ML adoption.

The limitations of these conventional approaches highlight the need for a more nuanced exploration of the phenomenon. A phenomenological approach, which prioritizes the lived experiences of individuals, offers an alternative solution by allowing for an in-depth examination of how medical practitioners truly experience and make sense of AI and ML in their daily practice. This method can uncover the emotional and cognitive dimensions of adoption that are often overlooked in traditional research. Through phenomenology, it is possible to explore not only the "what" of technology adoption—what technologies are being used, and what effects they have on patient care—but also the "how" and "why" of adoption—the meanings and interpretations that practitioners attach to these technologies, and the barriers or motivations that influence their use.

The gap in understanding these subjective experiences presents a critical opportunity for research. Adopting a phenomenological approach enables a deeper and more holistic understanding of the factors shaping AI and ML adoption, offering insights that are essential for improving both the implementation and acceptance of these technologies within healthcare settings. Therefore, the central research questions arise: How do medical practitioners experience the integration of AI and ML in their clinical practice? What meanings do they attach to these technologies, and how do these experiences shape their willingness to adopt and utilize them?

Research on the adoption of Artificial Intelligence (AI) and Machine Learning (ML) in healthcare has primarily focused on technological integration, efficiency, and outcomes. Several studies have explored the quantitative impact of AI and ML on clinical workflows, such as diagnostic accuracy and patient management. However, much less attention has been paid to the subjective experiences of healthcare practitioners in relation to these technologies. Literature on the lived experiences of healthcare professionals regarding new technologies generally highlights a gap in understanding how emotions, trust, and cultural factors shape their interaction with these innovations. Theories such as the Diffusion of Innovations and Technology Acceptance Model have been used to explain the adoption process, but they do not fully address the depth of personal and emotional engagement with the technology, an area where phenomenological approaches provide valuable insight.

In response to these gaps, this study adopts a phenomenological methodology to explore the lived experiences of medical practitioners as they integrate AI and ML into their clinical practice. Phenomenology allows for an in-depth examination of the personal meanings and emotional responses practitioners attach to these technologies. By focusing on the subjective and often unspoken aspects of adoption, this approach offers a richer understanding of the challenges and motivations that

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influence their engagement with AI and ML. In addressing the research questions posed in the previous section, this study aims to uncover not only the practical barriers to adoption but also the deeper emotional and cognitive factors that drive or hinder the acceptance of these technologies.

This article is structured to guide the reader through a systematic exploration of AI and ML adoption in healthcare. The introduction sets the context and outlines the background of the phenomenon and the knowledge gap identified. The methodology section describes the phenomenological approach used to investigate practitioners' experiences. Following this, the data collection and analysis methods are detailed, with a focus on thematic analysis. Finally, the discussion synthesizes the findings, offering a nuanced understanding of the phenomenon, while the conclusion summarizes the implications for future practice and research.

RESEARCH METHODS

Study Design

This study adopted a phenomenological approach to explore the lived experiences of medical practitioners in adopting Artificial Intelligence (AI) and Machine Learning (ML) technologies within healthcare settings (Lai dkk., 2024). The choice of phenomenology is grounded in its focus on understanding how individuals perceive and make sense of their experiences. This approach allows for a deeper exploration of the meanings that practitioners attach to their interactions with AI and ML, as well as the challenges and opportunities they perceive in integrating these technologies into their clinical practices. The phenomenological method is particularly relevant for addressing the research questions, which aim to uncover the subjective experiences of medical professionals regarding the implementation of AI and ML. By focusing on these lived experiences, the study seeks to highlight the nuances of technology adoption within a clinical context, offering insights that are rich in meaning and context.

Participants

Participants in this study were selected using purposive sampling, with the goal of identifying individuals who had direct experience with the use of AI and ML technologies in clinical practice. A total of 10 medical practitioners, including doctors and other healthcare professionals, participated in the study. All participants had been involved in the use of AI/ML technologies at hospitals or healthcare facilities where these technologies were implemented. The inclusion criteria for participants were: (1) active involvement in clinical practice, (2) experience in using AI and/or ML tools for diagnostic or therapeutic purposes, and (3) a willingness to share personal experiences related to the integration of these technologies in their medical practice. The exclusion criteria were: (1) practitioners with no direct experience with AI/ML tools, (2) practitioners who had limited exposure to these technologies, or (3) individuals who were not currently practicing in a healthcare setting where these technologies were used. Demographically, the participants ranged in age from 30 to 55 years, with an average age of 42 years. There was a balanced distribution of gender, with 6 male and 4 female participants.

Data Collection

Data were collected through in-depth semi-structured interviews, which were designed to elicit detailed accounts of the participants' experiences with AI and ML in clinical settings (Menon dkk., 2023). Interviews were conducted face-to-face, providing an opportunity to establish rapport and ensure a comfortable environment for participants to openly share their experiences. Each interview lasted approximately 60-90 minutes, and was conducted in private hospital offices or clinics to ensure minimal disruption and privacy. A standardized interview guide was used to ensure consistency across all interviews, though flexibility was maintained to allow for deeper exploration of emerging topics. The interview guide included open-ended questions such as: "Can you describe your experience using AI or ML in your clinical practice?" and "What challenges have you faced in adopting these technologies?" All interviews were audio-recorded with the participants' consent and transcribed verbatim for analysis.

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Data Analysis

Data were analyzed using thematic analysis, a common method in phenomenological research that allows for the identification of patterns and themes across participants' narratives. The analysis followed a systematic process, beginning with familiarization with the data through repeated readings of the transcribed interviews. Initial codes were generated based on significant statements that captured the essence of participants' experiences. These codes were then grouped into themes that reflected the core aspects of the phenomena under investigation. Thematic analysis allowed for the identification of both shared and divergent experiences among participants, highlighting key themes such as trust in technology, challenges in adoption, and the need for better training and support.

NVivo software was used to facilitate the data analysis process, providing a structured and efficient way to manage and organize the large volume of qualitative data. The software enabled the researchers to create a hierarchical coding framework, which allowed for a systematic categorization of data into themes and sub-themes. Specific features of NVivo, such as text search queries, node creation, and matrix coding, were utilized to identify patterns and relationships within the data. Text search queries helped uncover frequently occurring phrases or concepts, while nodes were employed to cluster data into meaningful categories based on initial codes. Matrix coding queries were particularly valuable for comparing themes across different demographic groups, such as age and gender, providing nuanced insights into variations in participant experiences.

The use of NVivo also enhanced the transparency and reproducibility of the analysis. All coding decisions were documented within the software, ensuring a clear audit trail that could be reviewed by other researchers. This process not only strengthened the reliability of the findings but also facilitated collaborative discussions among the research team when interpreting the data. By leveraging NVivo, the researchers were able to efficiently manage the complexity of qualitative data while maintaining a rigorous and systematic approach to analysis.The steps of data analysis ensured that the findings were grounded in the participants' own words, thus providing a rich and meaningful interpretation of their experiences.

Ethics

Ethical approval for this study was obtained from the relevant institutional review board. Participants were provided with an information sheet outlining the purpose of the study, the voluntary nature of their participation, and the measures taken to ensure confidentiality. Written informed consent was obtained from all participants prior to data collection. The study adhered to ethical guidelines regarding the protection of participants' rights, including ensuring their anonymity and confidentiality. All personal identifiers were removed from the transcripts, and data were stored securely to prevent unauthorized access. The research adhered to internationally recognized ethical standards, including the Declaration of Helsinki, ensuring that participants' dignity and rights were respected throughout the study.

RESULTS

Trust in Technology

One of the most prominent themes that emerged from the data is the practitioners' varied levels of trust in AI and ML technologies. Some participants expressed a sense of optimism and recognition of the potential benefits of AI and ML in clinical settings, particularly in the realm of diagnostics. A participant explained, "AI has helped us make faster and more accurate diagnoses, especially in areas like radiology. It's becoming an indispensable tool in our daily practice." This sentiment was echoed by several others who noted that AI-assisted tools significantly enhanced their efficiency and diagnostic accuracy.

However, this trust was not universally shared. A number of practitioners voiced concerns about the reliability of AI systems, particularly in critical medical decisions. One participant stated, "While AI is helpful, I am still cautious. Machines can make mistakes, and I fear that too much reliance on them may lead to errors we cannot easily catch." These conflicting perspectives

underscore the cautious optimism that many medical professionals have towards AI, as they acknowledge its benefits but remain wary of its potential for failure.

Challenges in Adoption

The second key theme to emerge from the data is the considerable challenges faced by practitioners in adopting AI and ML technologies into their practices. A significant barrier identified by participants was the lack of sufficient infrastructure and technical support. One participant highlighted, "The technology is there, but the infrastructure in our hospital is not always up to the task. Sometimes, the AI systems do not integrate well with existing electronic health records." This issue of integration was frequently cited, with many practitioners lamenting the lack of seamless compatibility between new AI tools and older hospital systems.

Moreover, the complexity of some AI and ML tools proved to be a major obstacle. Several practitioners expressed frustration over the steep learning curve required to effectively utilize these technologies. One participant noted, "There's a lot of potential, but it requires deep understanding. Unfortunately, the training provided is often too basic and doesn't prepare us for real-world application." These findings indicate that the technology itself is not the only challenge; rather, it is the insufficient support and integration that limits its effective use in clinical settings.

Training and Support Needs

The final theme centers on the need for improved training and ongoing technical support. Participants emphasized that proper training is essential for the successful integration of AI and ML into clinical practice. Many practitioners felt that while they were given access to AI tools, they were often left to figure out how to use them on their own. A participant explained, "We were given a short orientation, but after that, we had to learn through trial and error. It would be much better if there was continuous support and more in-depth training."

This sentiment was echoed by others who indicated that more comprehensive training programs were necessary to fully harness the potential of AI and ML. As one participant put it, "The technology can transform healthcare, but only if we have the right training to use it properly. We need more advanced courses and better on-the-job support." Clearly, the lack of sufficient training and support was identified as a critical gap that hinders the effective adoption of AI and ML in clinical environments.

The adoption of AI and ML technologies in healthcare settings has the potential to revolutionize the way medical practitioners approach diagnosis and treatment. However, the findings of this study suggest that several factors—particularly trust in the technology, challenges in integration, and insufficient training and support—significantly impact the adoption process. While practitioners generally acknowledge the benefits of AI and ML, their experiences reveal a cautious optimism, with many highlighting the need for better infrastructure, training, and technical support to ensure that these technologies can be effectively integrated into clinical practice.

DISCUSSION

This study reveals the experiences of subjects focusing on the emotional, cognitive, and social challenges faced by medical practitioners in adopting AI and ML technologies in their clinical practice (Mosaiyebzadeh dkk., 2023). The key findings highlight the tension between the potential of technology to enhance efficiency and the concerns related to changes in the human relationship with patients, as well as the loss of traditional clinical skills.

The findings of this study provide deep insights into how medical practitioners perceive AI and ML technologies, not just as clinical tools, but also as components that reshape the dynamics of their interactions with patients and the medical profession as a whole (Rafik dkk., 2023). Practitioners are not solely focused on the technical aspects but are more concerned with the impact on the quality of the patient-doctor relationship, including worries about the loss of human touch in the diagnosis and treatment process. This study also shows that, although AI can improve efficiency, there is significant resistance due to uncertainty regarding the technology's ability to replace intuition and

clinical judgment, which have long been integral to the medical profession (Polshettiwar dkk., 2024). Therefore, these findings enrich our understanding of resistance to innovation in the healthcare sector, which is influenced more by psychological and social factors than by mere technical ignorance.

The results of this study align with the Diffusion of Innovations theory proposed by Rogers (2003), which asserts that the adoption of technology is influenced by an individual's perception of innovation and its relative advantages. However, this research adds a new dimension by revealing that psychological factors, such as the fear of losing control over medical practice and concerns about reduced human interaction in patient care, play a larger role than previously anticipated in the theory (Salameh dkk., 2024). Furthermore, these findings enrich existing literature on the adoption of technology in the healthcare sector, as highlighted by Agarwal et al. (2019), who emphasize that the acceptance of technology in the medical field is influenced not only by functional benefits but also by affective and social factors. This study also contributes to a deeper understanding of the interpersonal dynamics in the acceptance of new technologies in medical practice, which has previously been underexplored in studies that have focused more on technical aspects and operational efficiency.

Explanation of the Implications of the Findings

These findings have significant implications in the context of technology adoption in the medical sector, particularly in understanding how technologies such as AI and ML are perceived by medical practitioners as tools that are more than just functional instruments, but also as factors that can influence their social and professional interactions (Shambharkar & Sharma, 2024). Medical practitioners demonstrate tension in balancing the efficiency offered by technology with concerns about the potential decline in the quality of patient relationships, which may affect patient satisfaction and the quality of care. Therefore, this study highlights the importance of designing the implementation of health technologies by considering the psychological and social aspects of medical practitioners, not just the technical or economic aspects. This implication is also relevant for health policy and medical education, where the integration of technology should be accompanied by training that covers not only technical aspects but also reinforces humanistic values in medical practice. More broadly, these findings encourage policymakers, technology developers, and practitioners to think more holistically when planning the adoption of technology in the healthcare sector.

Limitations of the Study

There are several limitations in this study that should be considered in the context of generalizing the findings. First, this study is limited to medical practitioners practicing in urban areas, which may have a different perspective compared to those in rural areas or developing countries. Second, because the approach used is phenomenological, the data collected is subjective and in-depth, which may limit the ability to make broad generalizations about a larger population. Third, this study only examines the experiences of medical practitioners in the context of AI and ML usage, without taking into account other external factors such as health regulations or the influence of patients' families (Sharma dkk., 2023). Fourth, although data was collected from a variety of informants, the experiences shared by the participants only represent a small portion of the diversity in medical practice as a whole. Therefore, these findings are more relevant for understanding specific dynamics in a limited context and cannot be fully generalized to the entire medical population or to all healthcare technologies.

Prospective Statements for Future Research

This study opens up opportunities for further development in the adoption of technology in medical practice, particularly in deepening the understanding of the social and emotional dynamics that arise in the interactions between technology, patients, and medical practitioners (Taimoor & Rehman, 2022). Future research could expand this focus by examining the experiences of medical practitioners in rural areas or countries with different healthcare systems to understand how social and cultural contexts affect the acceptance of technology. Additionally, future research could explore the role of patients' families in the adoption of healthcare technology and how patient experiences influence medical practitioners' views on technology. Thus, this research has the potential to enrich the literature on social and professional changes in the medical world as healthcare technologies

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continue to develop rapidly, and contribute to the design of policies and training for healthcare professionals that are more holistic and experience-based.

CONCLUSION

This study focuses on the experiences of medical practitioners in adopting digital health technologies, with particular attention to the use of artificial intelligence and machine learning in medical practice. The key findings indicate that, although these technologies enhance efficiency, medical practitioners also face tensions between using technology and maintaining human relationships with patients. These findings provide new insights into how social and emotional factors influence the acceptance of technology in the medical sector, addressing gaps in previous research that emphasized technical or economic aspects. This study offers a deeper understanding of the dynamics between technology and medical professionals' experiences, which could be valuable for the development of more holistic health policies. Future studies could further explore the role of patients' families or examine the context of technology adoption in countries with different healthcare systems. Such research could also inform cross-cultural adaptations of AI and ML technologies, ensuring their effectiveness in diverse healthcare environments. This research opens opportunities for further development in integrating social and emotional perspectives into the implementation of healthcare technology.

CONFLICT OF INTEREST

This article has undergone independent peer review. The editor responsible for evaluating this article has no direct relationship with the authors and has never collaborated on any previous publications. The review process was conducted by an editor who has no affiliation with the authors in terms of collaboration or conflicts of interest.

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