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Professional Adaptation to AI-Based Nursing Systems: An Interpretative Phenomenological Study Among Novice Outpatient Nurses

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ABSTRACT

The integration of artificial intelligence (AI) into healthcare has significantly transformed clinical practices, particularly within nursing services. While existing research has focused on technical adoption, little is known about how novice nurses experience their adaptation to AI-based nursing systems in outpatient care. This study addresses that gap by asking: How do novice nurses make sense of their professional roles during early encounters with AI in clinical settings? Using an interpretative phenomenological approach, this study explores the lived experiences of eight novice nurses working with AI-assisted systems. Data were collected through semi-structured interviews and analyzed using thematic analysis to uncover emotional, cognitive, and professional dimensions of adaptation. Three key themes emerged: emotional turbulence in the initial phase, the development of adaptive strategies, and the reshaping of professional identity. Nurses described feelings of anxiety, uncertainty, and eventual empowerment as they navigated unfamiliar technological environments. These insights contribute to a deeper understanding of how digital systems influence early professional development in nursing. The study underscores the need for targeted mentorship, emotional support programs, and policy frameworks that promote both technological competence and psychological well-being. Future research may explore long-term impacts of AI exposure on professional identity formation.

INTRODUCTION

The rapid integration of artificial intelligence (AI) into healthcare systems has reshaped the landscape of clinical practice across various settings, including outpatient nursing care. In recent years, AI-based systems have been increasingly adopted to support decision-making, automate documentation, and enhance patient monitoring (Carayon et al., 2021). While these innovations improve efficiency, they also present significant adaptation challenges, especially for novice nurses.

Among those most affected are newly practicing nurses—individuals who are simultaneously navigating the transition from academic preparation to real-world clinical responsibilities. For them, AI systems add complexity to an already difficult adjustment process. Lacking clinical intuition and prior experience, novice nurses may become heavily reliant on AI, which can lead to feelings of vulnerability and professional uncertainty.

This transformation is not merely technical—it engages emotional, cognitive, and professional dimensions. AI integration influences how nurses perceive their roles, exercise clinical judgment, and interact with patients. The promise of AI efficiency often contrasts with frontline nurses' experiences of disconnection, anxiety, or doubt (Nowell et al., 2019; Braun et al., 2022). In many settings, the promise of AI-driven efficiency contrasts sharply with the subjective experiences of uncertainty, anxiety, or disconnection felt by frontline nurses.

Given these tensions, there is a pressing need to explore how novice nurses experience and make sense of their adaptation to AI-based systems. A phenomenological inquiry is especially appropriate, as it allows for an in-depth understanding of lived experiences—capturing the nuanced, personal meanings that cannot be fully articulated through objective measurements alone. By focusing

on subjective perception and contextual interpretation, this study seeks to illuminate the human side of technological adaptation in nursing, contributing to a more empathetic and grounded approach to innovation in healthcare.

Within the expanding field of healthcare innovation, research on the lived experiences of healthcare professionals—particularly in the context of digital transformation—has become increasingly vital. As technological tools such as artificial intelligence (AI) systems are embedded into clinical workflows, understanding how these tools are perceived, interpreted, and internalized by their users becomes central to evaluating the real impact of innovation. This is especially critical for novice nurses, whose professional identities are still in formation and whose interactions with technology may profoundly shape their early career trajectories.

However, capturing the subjective essence of such adaptation poses distinct methodological challenges. Despite growing recognition of these challenges, current institutional responses tend to prioritize technical training and performance metrics, such as error reduction or usage rates (Singh et al., 2023). These strategies offer operational support but overlook how nurses emotionally and psychologically internalize such shifts. Consequently, the human side of technological adaptation remains insufficiently understood.

To fully grasp these subjective experiences, a phenomenological approach is essential. It allows researchers to uncover how individuals make sense of transformative processes in their professional lives. Such an approach moves beyond evaluating what nurses do and instead explores how they feel and what meanings they attach to their actions. This is especially important for novice nurses, whose sense of professional identity is still in formation.

Although some qualitative studies have examined emotional responses to digital tools, few delve deeply into the lived experience and meaning-making processes of novice nurses adapting to AI. Existing research often bypasses questions like: How does AI influence the core values of care? How do nurses reconcile human presence with algorithmic systems? These are critical questions that a phenomenological lens can address.

This study therefore focuses on understanding how novice nurses experience and interpret their adaptation to AI-based nursing systems. By foregrounding their voices and centering the emotional and interpretive dimensions of adaptation, this research contributes to a more empathetic, person-centered understanding of technological transformation in healthcare.

RESEARCH METHODS

Study Design

This study employed an interpretative phenomenological approach to explore the lived experiences of novice nurses adapting to artificial intelligence (AI)-based nursing systems in outpatient care settings. Interpretative Phenomenological Analysis (IPA) was selected as it focuses on how individuals make sense of their personal and professional experiences within a specific context. This approach aligns with the study's aim to understand the subjective and nuanced meanings embedded in nurses' adaptation processes, particularly in relation to evolving technological demands. IPA emphasizes the interpretation of participants' perspectives and acknowledges the complexity of emotional, cognitive, and existential dimensions, making it suitable for exploring the transformation of professional identity in a digitally mediated healthcare environment.

Participants

Participants were purposefully selected from a single institutional setting, which may limit cultural and organizational diversity. While this provides depth in contextual understanding, future research may benefit from including a more diverse sample across various institutional and regional backgrounds to enhance transferability.

To ensure qualitative rigor, inter-coder reliability was addressed through independent coding by two researchers who later discussed discrepancies and reached consensus on emerging themes.

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Additionally, reflexivity was maintained throughout the research process via reflective journaling and regular peer debriefing sessions, allowing the researchers to critically examine their own assumptions and potential biases.

Data Collection

Data were collected through in-depth, semi-structured interviews conducted in person over a three-month period. Each interview lasted between 45 and 75 minutes and was conducted in a quiet, private room within the hospital premises to ensure comfort and confidentiality. An interview guide was developed to facilitate open-ended discussions around participants' perceptions, emotions, and reflections on using AI systems in daily practice. All interviews were audio-recorded with participant consent and transcribed verbatim. The interview guide was piloted with two non-participating nurses to ensure clarity and relevance, with minor adjustments made to enhance question flow. Field notes were also taken to capture contextual cues and non-verbal expressions during the interviews.

Data Analysis

Data were analyzed using Interpretative Phenomenological Analysis (IPA), which involves a stepwise examination of each transcript to identify emerging patterns of meaning. The process began with repeated readings of the transcripts to gain familiarity with the content, followed by initial noting and coding of significant statements. Emergent themes were developed by grouping related codes and examining the interconnections between them. Themes were then clustered into higher-order categories that captured the essence of participants' experiences. NVivo 12 software was utilized to facilitate data organization and coding, although the interpretation remained grounded in manual thematic development. The final themes reflected shared patterns as well as individual variations in how nurses experienced adaptation, identity formation, and emotional responses to AI integration in their clinical practice.

Ethical Considerations

Ethical approval was obtained from the institutional research ethics committee prior to data collection. Written informed consent was obtained from all participants, who were assured of their right to withdraw at any stage without penalty. Participant anonymity was maintained by assigning pseudonyms, and all identifying information was removed from transcripts. Data were stored securely and accessed only by authorized personnel. The study adhered to ethical principles outlined in the Declaration of Helsinki and followed local institutional guidelines for research involving human subjects.

RESULTS

Initial Tension Between Professional Expectations and Technological Realities

Most novice nurses reported a significant emotional tension when first encountering the AI-based nursing system in outpatient care. They initially expected to apply their clinical knowledge through direct patient interaction. However, the reality demanded swift adaptation to an unfamiliar, technology-driven workflow that altered their traditional perception of nursing.

"I thought I would spend most of my time interacting with patients, but instead, I find myself in front of a screen for hours… I feel like I'm working for the system, not for the patient." (Participant 3)

The fear of making errors in data input, uncertainty about decisions made by the AI, and pressure to appear technologically competent were among the dominant early experiences. The AI system was perceived not only as a tool but as a presence that reshaped their working rhythm and professional identity.

"I worry that if I enter the wrong data, the AI might make a wrong decision. And sometimes, I wonder—am I a nurse, or just a system operator?" (Participant 1)

How to adapt to AI-based nursing systems?

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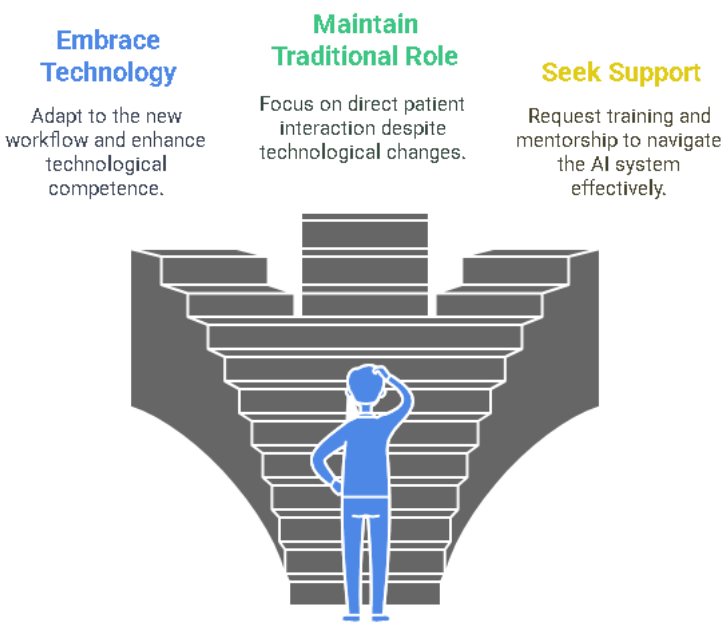

Cognitive and Emotional Navigation of Technological Adaptation

As the nurses progressed in their roles, they began to develop both cognitive and emotional strategies for adapting to the AI system. These included self-directed learning, seeking guidance from senior colleagues, and forming informal peer groups to exchange knowledge and coping mechanisms.

"We formed a small group to help each other. Sometimes I record the screen when a senior explains something, and then I replay it at home to practice." (Participant 5)

Despite these efforts, ambivalence persisted. Some nurses expressed discomfort with how the AI system seemed to enforce linear decision-making processes that did not always align with their clinical intuition. This tension led to ethical and professional dilemmas, particularly around autonomy in patient care.

"I start to doubt my own judgment. Sometimes the AI suggests one thing, but my gut feeling says another. I'm afraid to make independent decisions." (Participant 2)

Professional Identity Transformation in the Digital Nursing Era

Despite initial resistance, several participants eventually began to internalize the presence of AI as an integral part of the evolving nursing profession. Over time, they embraced a new identity as tech-literate nurses, although the transition was slow and marked by personal negotiation and reflection.

"At first, I felt insecure. But now I realize that being a nurse today means understanding the system. I feel proud that I can adapt quickly." (Participant 6)

This transformation extended beyond technical skills to a deeper existential redefinition of nursing. Participants gradually reinterpreted the act of caregiving in a digital context—not merely as physical presence, but as data management, algorithm comprehension, and safeguarding patient care through technological precision.

"Maybe caring isn't just about physical touch… sometimes, I feel like I'm helping the patient by ensuring the input is accurate too." (Participant 4)

The findings reveal that novice nurses' adaptation to AI-based nursing systems in outpatient care is a multidimensional experience involving emotional tension, cognitive restructuring, and a transformation of professional identity. The process is nonlinear and shaped by the interplay of personal expectations, systemic demands, and evolving meanings of nursing in a digital healthcare environment.

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AI is no longer perceived as a mere tool but as a defining force in how nurses interpret their roles and presence in modern care delivery.

DISCUSSION

These themes reflect the essential meaning behind the phenomenon: adapting to AI is not merely a technical adjustment but a profound reorientation of what it means to be a nurse in a digital era.

The psychological transitions described by participants align with theories of role adaptation and identity work in technologically mediated environments.

This study answers the central research question by uncovering how novice nurses interpret their early encounters with AI—not as passive learners, but as active meaning-makers navigating uncertainty, ethical dilemmas, and evolving role expectations.

Unlike prior studies that focus solely on performance or skill acquisition, the present research offers a human-centered narrative that emphasizes internal processes such as anxiety, identity shifts, and moral hesitation.

While this study supports earlier findings that AI integration influences clinical behavior (e.g., Zhang et al., 2021), it also diverges by focusing on the emotional labor involved, which remains underexplored in existing literature. Contrary perspectives, such as those by Liu and Chen (2020), suggest that AI adoption is primarily procedural and easily standardized. However, the present findings critique this reductionist view by illustrating the nuanced, subjective experience of adaptation. This highlights the psychological and professional costs often hidden beneath surface-level success metrics.

The interpretation of these findings aligns with and extends previous phenomenological research. Nowell et al. (2019) noted similar emotional turbulence among senior nurses transitioning to digital systems, but this study demonstrates how those tensions are intensified in novice nurses, whose clinical foundations are still being established. Moreover, the results support Braun et al.'s (2022) claim that technology can both empower and alienate nurses, particularly when systems dictate rather than assist decision-making. However, this study adds a unique perspective by illuminating the internal negotiation that novice nurses engage in as they redefine caregiving through an AI lens. These findings confirm that successful adaptation is not a function of technical competence alone but is deeply rooted in subjective meaning, identity, and relational dynamics—dimensions often overlooked in mainstream nursing technology research.

The findings of this study carry important implications for nursing education, organizational policy, and digital health implementation. From a professional standpoint, the emotional and identity-based challenges experienced by novice nurses suggest that AI integration should be approached not merely as a technological upgrade, but as a cultural shift requiring empathetic support and reflective spaces. Culturally and socially, the adaptation process reveals how healthcare systems are transforming the role of human care, with AI not only reshaping workflows but also influencing how nurses construct meaning in their work. These findings point to the need for mentorship models, onboarding programs, and reflective practices that address not only technical competence but also psychological readiness and ethical awareness. In a broader context, the study calls for a redefinition of nursing professionalism in the age of AI—grounded in both clinical expertise and adaptive meaning-making.

Like many qualitative studies, this research is subject to certain limitations. The focus on a small group of novice nurses within urban, technologically advanced hospital settings may limit the transferability of findings to rural areas or less digitized institutions. Additionally, while interpretative phenomenological analysis offers depth and richness, it does not aim for generalization, and the findings should be understood as context-specific narratives rather than universally applicable truths. The subjective nature of the data, though valuable in its depth, also depends on participants' ability and willingness to articulate their experiences, which may have shaped the scope of insights uncovered.

Future research could build upon these findings by exploring longitudinal trajectories of adaptation among novice nurses, examining how initial perceptions evolve over time with continued

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exposure to AI systems. Comparative studies involving different nursing generations or healthcare systems across cultural settings may also reveal how adaptation is shaped by broader sociotechnical environments. Additionally, integrating phenomenological insights with interdisciplinary frameworks—from psychology, ethics, and organizational studies—could deepen our understanding of how emerging technologies are redefining care, professionalism, and identity within the healthcare landscape.

CONCLUSION

This study explored how novice nurses experience their adaptation to AI-based nursing systems in outpatient care, focusing on the emotional, cognitive, and professional dimensions of this transition. The findings revealed that adaptation is a complex process shaped by initial tension, active negotiation, and a gradual transformation of professional identity. Unlike previous studies that emphasized technical skills or system efficiency, this research illuminated the subjective meanings nurses assign to their roles within digitally mediated environments. These insights address the gap in understanding how AI impacts nurses' sense of self, confidence, and caregiving values during their early career phase. The study contributes to a more human-centered approach to digital health implementation by emphasizing the importance of reflective and empathetic support systems. To translate these insights into practice, nursing educators and administrators are encouraged to implement structured mentorship programs that pair novice nurses with experienced peers familiar with AI tools. Additionally, regular reflective debriefing sessions could help nurses process emotional responses and ethical uncertainties that arise in AI-integrated settings. Training modules should go beyond technical instruction to include discussions on professional identity, autonomy, and value alignment in the context of AI use.

While this study provides valuable perspectives, it is limited by its focus on a single outpatient setting and a relatively small sample of participants. These constraints may affect the generalizability of the findings. Including these limitations in the interpretation of results underscores the need for cautious application and further validation.

Future research can extend this work through longitudinal studies or cross-cultural comparisons to explore how adaptation evolves and differs in various healthcare contexts. Future research can extend this work through longitudinal studies or cross-cultural comparisons to explore how adaptation evolves and differs in various healthcare contexts.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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