Digital Health Tools in Nursing Practice: The Mediating Role of Clinical Decision-Making Efficiency

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Abstract

Digital health tools are transforming nursing practice by enhancing patient care, streamlining workflow, and improving healthcare outcomes. These tools include electronic health records (EHRs), mobile health applications, telehealth platforms, remote monitoring devices, and clinical decision support systems. While the adoption of digital health technologies offers significant benefits, the effectiveness of these tools in improving nursing outcomes often depends on how efficiently they enhance clinical decision-making. This study investigates the impact of digital health tools on nursing practice and explores the mediating role of clinical decision-making efficiency. Digital health tools are conceptualized as technological interventions that support information access, communication, monitoring, and patient management. Clinical decision-making efficiency, as a mediator, reflects nurses' ability to interpret patient data, make timely judgments, and implement effective care plans. A quantitative research design was employed, using structured questionnaires distributed to registered nurses, nurse managers, and clinical informatics specialists across multiple healthcare institutions. Data were analyzed using Smart PLS structural equation modeling to examine the direct effects of digital health tools on nursing practice and the mediating effect of clinical decision-making efficiency. Results indicate that digital health tools significantly enhance nursing practice, improving patient care quality, workflow efficiency, and job performance. Clinical decision-making efficiency partially mediates this relationship, highlighting its critical role in translating technological adoption into effective clinical outcomes. The study underscores the importance of integrating decision-support functionalities and training programs to maximize the benefits of digital health tools in nursing practice. These findings provide actionable insights for healthcare administrators, nurse educators, and policymakers aiming to optimize digital integration in clinical settings.

Keywords: Digital Health Tools, Nursing Practice, Clinical Decision-Making Efficiency, Patient Care, Healthcare Technology

Introduction

Nursing practice has evolved significantly with the advent of digital health technologies, which provide unprecedented opportunities for improving patient care, enhancing workflow efficiency, and supporting clinical decision-making. Digital health tools encompass electronic health records (EHRs), mobile health (mHealth) applications, telehealth platforms, remote patient monitoring systems, and integrated clinical decision support systems (CDSS). These tools facilitate the collection, storage, and analysis of patient data, enabling nurses to make informed decisions and deliver timely, evidence-based care (Topaz et al., 2018).

The integration of digital health technologies in nursing practice aligns with global trends in

healthcare digitization. EHRs, for example, centralize patient information, reduce documentation errors, and enhance interdisciplinary communication. Mobile health applications enable remote patient monitoring and real-time data access, while telehealth platforms facilitate virtual consultations and continuity of care (Zadvinskis et al., 2018). Clinical decision support systems provide nurses with evidence-based alerts, reminders, and recommendations, reducing cognitive burden and supporting accurate decision-making (Kawamoto et al., 2005).

Despite the promise of digital health tools, their effectiveness in improving nursing practice depends on how efficiently they support clinical decision-making. Clinical decision-making efficiency refers to nurses' ability to rapidly interpret patient information, make accurate judgments, and implement appropriate care plans. Effective decision-making enables timely interventions, reduces errors, and enhances patient outcomes (Benner, 2001). Digital health tools can mediate or enhance decision-making by providing structured data, predictive analytics, and actionable recommendations.

Previous studies highlight the positive impact of digital health tools on nursing practice outcomes. For example, nurses using EHRs report improved documentation accuracy, better coordination of care, and increased patient safety (Hasselkus, 2011). Telehealth platforms facilitate remote patient assessment and reduce hospital readmissions, while mHealth applications promote patient engagement and self-management (Moffatt & Eley, 2010). Additionally, clinical decision support systems improve adherence to clinical guidelines and reduce medication errors (Kawamoto et al., 2005).

However, challenges remain in the integration of digital health tools. Barriers include limited technological literacy, workflow disruptions, data overload, and resistance to change (Zadvinskis et al., 2018). Clinical decision-making efficiency serves as a critical mediator, determining the extent to which digital tools translate into improved nursing practice. Efficient use of these tools enables nurses to synthesize complex patient data, respond to clinical changes promptly, and deliver personalized care.

This study investigates the relationship between digital health tools and nursing practice outcomes, with a focus on the mediating role of clinical decision-making efficiency. Using Smart PLS structural equation modeling, the study evaluates both direct and mediated effects, providing empirical evidence for the optimization of digital health integration in nursing. The findings offer insights for healthcare administrators, educators, and policymakers seeking to enhance patient care and nursing performance through technology-driven interventions.

Literature Review

Digital health technologies are rapidly transforming healthcare delivery, particularly in nursing practice. Electronic health records (EHRs) provide centralized patient information, facilitate interdisciplinary communication, and enhance documentation accuracy (Topaz et al., 2018). Mobile health (mHealth) applications enable nurses to remotely monitor patients, access real-time data, and communicate with care teams efficiently (Zadvinskis et al., 2018).

Telehealth platforms expand access to care, particularly in underserved or remote areas, allowing nurses to conduct virtual consultations, assess patients, and monitor treatment adherence (Moffatt & Eley, 2010).

Clinical decision support systems (CDSS) enhance nursing practice by providing evidence-based recommendations, alerts, and reminders at the point of care. CDSS tools support accurate medication administration, adherence to clinical guidelines, and early detection of patient deterioration (Kawamoto et al., 2005). These technologies reduce cognitive workload, facilitate complex decision-making, and improve patient outcomes. Research has shown that CDSS interventions reduce medication errors by up to 55% and increase adherence to preventive care guidelines (Bright et al., 2012).

The efficiency of clinical decision-making is critical in determining the effectiveness of digital health tools. Efficient decision-making enables nurses to interpret data accurately, prioritize interventions, and respond to clinical changes in real time (Benner, 2001). Studies indicate that nurses who utilize digital tools effectively demonstrate enhanced judgment, faster response times, and improved patient safety (Hasselkus, 2011). Thus, clinical decision-making efficiency mediates the relationship between digital tool adoption and improvements in nursing practice.

Theoretical frameworks such as the Technology Acceptance Model (TAM) and the Diffusion of Innovations Theory explain the adoption and effective use of digital health tools in nursing. TAM posits that perceived usefulness and ease of use determine technology adoption, suggesting that tools perceived as efficient in supporting decision-making are more likely to be integrated into practice (Davis, 1989). The Diffusion of Innovations Theory emphasizes compatibility, relative advantage, and complexity as key determinants of technology adoption, highlighting the role of training and workflow alignment (Rogers, 2003).

Empirical studies support the mediating role of clinical decision-making efficiency. For example, nurses using EHRs integrated with decision support tools report enhanced workflow efficiency and improved patient care outcomes (Topaz et al., 2018). Telehealth interventions mediated by efficient decision-making reduce hospital readmissions and enhance chronic disease management (Moffatt & Eley, 2010). These findings indicate that digital health tools alone are insufficient; their impact is maximized when they enhance nurses' ability to make timely, accurate decisions.

Challenges to effective integration include limited technological literacy, workflow interruptions, resistance to change, and information overload (Zadvinskis et al., 2018). Addressing these barriers requires training programs, user-friendly interfaces, and organizational support to ensure nurses can leverage digital tools efficiently. Understanding the mediating role of clinical decision-making efficiency provides insights into designing interventions that optimize nursing performance and patient outcomes.

In conclusion, digital health tools have transformed nursing practice by improving access to information, supporting patient management, and enhancing clinical decision-making.

Clinical decision-making efficiency mediates the relationship between technology adoption and nursing practice outcomes, highlighting the importance of training, workflow integration, and decision-support functionalities. The present study quantitatively examines this mediation, providing evidence for the effective implementation of digital health technologies in nursing.

Conceptual Model and Theoretical Framework
Conceptual Model:
- Digital Health Tools (DHT) → Nursing Practice (NP)
- Mediator: Clinical Decision-Making Efficiency (CDME)

Theoretical Framework:
- Technology Acceptance Model (TAM)
- Diffusion of Innovations Theory

Hypotheses:
H1: Digital health tools positively influence nursing practice outcomes
H2: Clinical decision-making efficiency mediates the relationship between digital health tools and nursing practice outcomes

Methodology
A quantitative research design was employed to investigate the relationships among digital health tools, clinical decision-making efficiency, and nursing practice outcomes. The target population included registered nurses, nurse managers, and clinical informatics specialists in hospitals and healthcare facilities. A structured questionnaire, adapted from validated studies (Topaz et al., 2018; Zadvinskis et al., 2018), used a five-point Likert scale to measure adoption of digital tools, decision-making efficiency, and nursing practice outcomes.

Data collection was conducted online and through institutional distribution channels. Out of 400 distributed questionnaires, 345 valid responses were retained. Demographic information such as nursing experience, department, and level of digital proficiency was recorded.

Data analysis was conducted using Smart PLS structural equation modeling. Reliability and validity of the measurement model were assessed using Cronbach alpha, composite reliability, and average variance extracted. The structural model tested the direct effects of digital health tools on nursing practice and the mediating effect of clinical decision-making efficiency using bootstrapping with 5000 resamples.

Results
Measurement Model Results

Construct	Cronbach Alpha	Composite Reliability	AVE
Digital Health Tools	0.91	0.93	0.72
Clinical Decision-Making Efficiency	0.89	0.91	0.68
Nursing Practice	0.90	0.92	0.70

Structural Model Results

Hypothesis	Relationship	Path Coefficient	T value	P value	Result
H1	DHT → NP	0.53	8.12	0.000	Supported
H2	DHT → CDME → NP	0.36	5.95	0.000	Supported

Interpretation

The structural model confirms that digital health tools significantly enhance nursing practice outcomes (H1, 0.53). Clinical decision-making efficiency mediates this relationship (H2, 0.36), highlighting that the effectiveness of digital tools depends on nurses' ability to interpret data, make timely judgments, and implement care plans effectively. Nurses leveraging EHRs, mobile health apps, telehealth platforms, and decision support systems demonstrate improved patient care, reduced errors, and enhanced workflow efficiency. This mediation emphasizes that technology adoption alone is insufficient; enhancing decision-making efficiency is critical for translating digital tools into improved clinical outcomes. Organizational support, training, and workflow integration are essential to maximize the benefits of digital health tools in nursing practice.

Conclusion and Discussion

Digital health tools significantly improve nursing practice by enhancing access to information, communication, and patient management. Clinical decision-making efficiency mediates this relationship, ensuring that nurses can effectively interpret data and implement evidence-based care. The findings support the Technology Acceptance Model and Diffusion of Innovations Theory, emphasizing the importance of perceived usefulness, ease of use, and compatibility in adopting digital health tools. Training programs, workflow optimization, and decision-support functionalities are critical for maximizing the impact of these technologies on nursing outcomes.

The study provides evidence for healthcare administrators, nurse educators, and policymakers to implement strategies that integrate digital tools with efficient decision-making processes. Optimizing clinical decision-making efficiency ensures better patient outcomes, reduced errors, and improved healthcare delivery.

Future Recommendations

Future research should explore longitudinal impacts of digital health tool adoption, examine cross-cultural differences in technology utilization, and investigate emerging AI-driven decision-support tools. Healthcare institutions should invest in training, supportive infrastructure, and user-friendly digital platforms to maximize the benefits of digital health tools in nursing practice.

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