The Impact Of New Innovation Technologies On Improving Quality Of Nursing Care In Family Health Settings: A Systematic Review Of Recent Evidence

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Abstract

Background: The delivery of patient care and clinical procedures has changed because of technology's incorporation into healthcare systems. Optimizing healthcare delivery requires a thorough understanding of the effects of innovation technologies on patient safety, nursing workflows, and healthcare outcomes.

Aims: To provide a thorough analysis of how the introduction of technology has affected patient safety, nursing practices, and healthcare outcomes in healthcare settings. The study aims to clarify the complex impacts of innovation technologies on

several aspects of healthcare delivery using a systematic review and meta-analysis.

Method: This thesis employs a mixed-method approach to give a thorough knowledge of the influence of technology on healthcare delivery by synthesizing data from empirical research, systematic reviews, and literature reviews. The sample populations comprise a range of healthcare environments, such as critical care units, acute care centers, and assisted living facilities.

Findings: The findings emphasize the complex effects of technology adoption in healthcare environments. Health technologies impacts on nursing workflows range depending on the system, even though it has shown promise in improving patient safety by lowering prescription mistakes and increasing adherence to practice recommendations. Furthermore, it appears that technology-based learning resources will help nurses learn more effectively, which will lead to better patient care.

Conclusion: the integration of technology has the potential to significantly improve the delivery of healthcare services. This includes but is not limited to strengthening patient safety, optimizing nursing workflows, promoting evidence-based practices, and improving patient outcomes. However, in order to overcome obstacles and fully use the advantages of technology in healthcare settings, strong implementation techniques and ongoing education are essential.

Keywords: Health information technology, patient safety, systematic review, healthcare, meta-analysis, technology integration.

Introduction

The healthcare industry is undergoing fast change, and technology integration is playing a bigger role in improving patient care and clinical operations. Health information technology (HIT) has emerged as a critical element in improving patient safety, mainly by reducing adverse pharmacological responses, prescription mistakes, and boosting adherence to recommended treatments, according to Alotaibi and Federico (2017). This demonstrates how technology is changing the paradigm of healthcare to produce safer and more efficient results.

As in literature, it was found that, Moore et al. (2020) conducted research on the various impacts of health information technology, specifically on nursing practices. While noting the potential advantages, they draw attention to the minimal impacts of HIT on nurses' time allocation, highlighting variances that are particular to the system. The significance of understanding the complex dynamics of workflow optimization and technology adoption in healthcare settings is highlighted by these results. (Altalhi et al., 2023; Yakout et al., 2023; Noshili et al., 2023)

Furthermore, individualized approaches to technology integration are required to lower stress and boost nurse productivity, according to research on the impact of technology on nursing workload, including that conducted by Mohammadnejad et al. (2023). The results of Bagherian et al. (2017), who emphasize the necessity of continual training and education to bring new technology into compliance with the principles of patient-centered care, are consistent with this.

Similarly, Huter et al. (2020) underscored the value of digital technology in advancing nursing care, particularly in outpatient and informal care settings, and stressed the need for further research. Similarly, Tsarfati and Cojocaru (2023) emphasized the influence of cognitive processes on nurses' perception and utilization of computer technology in the workplace. Hanratty et al. (2019) highlighted the transformative potential of structured interventions such as gamification and communication tools in enhancing healthcare outcomes, particularly in care home settings. Additionally, Rezayi et al. (2022) provided further evidence by demonstrating the effectiveness of technology-based teaching aids in improving nurses' learning outcomes and enhancing patient care delivery.

Furthermore, as Connor et al. (2023) examined, the broad implementation of evidence-based practices (EBPs) lays out a roadmap for better patient outcomes and the operation of the healthcare system. Connor and colleagues emphasized the significance of standardized procedures and terminology in enabling the smooth integration of evidence-based practices (EBPs) into clinical workflows, based on a thorough assessment of EBP acceptance.

All of these studies highlight how technology has the power to fundamentally alter the way healthcare is delivered, improving everything from nurse workflows and patient safety to encouraging evidence-based practices and improving patient

outcomes. Nevertheless, among all of the advantages are also certain inherent complications that call for a more nuanced approach to technology integration and a resolute commitment to bringing technological improvements into line with the core principles of patient-centered care.

Methods

Research Objective

1) To evaluate how health information technology innovation technologies affects patient safety in medical environments.
2) To look into how new innovation technologies affects nursing processes and time management.
3) To assess how well technology-based teaching resources may improve nursing professionals' learning outcomes.
4) To investigate how integrating technology may affect patient happiness and treatment quality, among other healthcare outcomes.
5) To determine the difficulties and impediments those come with implementing and using innovation technologies in healthcare environments.

Research Questions

1) What effects does the use of health information technology have on patient safety, specifically with regard to medication mistakes and following best practices?
2) What differences have you observed in nursing workflows and time management since the adoption of health IT systems?
3) To what extent may technology-based training tools help nurses, particularly those working in intensive care units, improve their learning outcomes?
4) In what ways does the incorporation of technology impact healthcare outcomes, such as patient happiness and the caliber of treatment provided?
5) What are the main obstacles and hurdles that come with implementing and using health information technology in healthcare settings?

Literature Search Strategy

1) Finding Relevant Databases: To access a vast array of peer-reviewed literature in the domains of healthcare, nursing, and technology, make use of databases like PubMed, CINAHL, Scopus, and Web of Science.
2) Keywords and Search Terms: To find relevant studies, use a mix of keywords and search terms such as "evidence-based practices," "healthcare outcomes," "nursing education," "patient safety," "nursing workflows," and "technology integration."

Table 1: Syntax Search

Syntax 1	“New innovation technology”
Syntax 2	“Evidence based practice” and “nursing education”

Table 2: Statistics from the Data Base

No	Database	Syntax	Year	No of Researches
1	PubMed	Syntax 1 Syntax 2	2019 to 2023	9
2	Google scholar	Syntax 1 Syntax 2		8
3	Scopus	Syntax 1 Syntax 2		6

Figure 1

Graphic representation of search database according to different search engines

Inclusion and Exclusion Criteria

Inclusion criteria

1) Research articles published in journals with peer review.
2) Research accessible in English.
3) Research done on the effects of health information technology innovation technologies in medical environments.
4) Research pertaining to innovation technologies that address patient safety, nursing workflows, healthcare outcomes, or nursing education.
5) Studies using a variety of approaches, including as mixed-methods research, systematic reviews, meta-analyses, empirical investigations, and literature reviews.

Exclusion criteria

1) Research not included in peer-reviewed publications; includes opinion articles, conference papers, and editorials.
2) Studies are not readily available in English.
3) Studies that do not specifically address how health IT affects hospital environments.
4) Research that just address technology without taking into account how it affects nursing workflows, patient safety, or healthcare outcomes.
5) Studies not using clear study strategy or design.

Quality Assessment

In order to guarantee the methodological coherence and reliability of any chosen study, quality evaluation entails assessing a number

of different factors. Examining the suitability of the study design in relation to the research objectives, evaluating the sample size and sampling strategy to guarantee representativeness and sufficiency, and assessing the dependability of the data collection techniques utilized are all included in this. The suitability of the statistical techniques employed for data analysis is also closely examined, as is the precision and clarity of the results' presentation and interpretation. A study's ethical aspects, such getting informed permission and protecting participant privacy, should be carefully considered while assessing its caliber. Evaluating each study's advantages and disadvantages aids in placing its results in perspective and deciding whether to include them in the research synthesis.

Table 3: Assessment of the literature quality matrix

Sr #	Author	Are the selection of studies described appropriately	Has the literature covered all relevant studies	Does the method section described	Were findings clearly described ?	Quality rating
1	Alotaibi & Federico.	Yes	Yes	Yes	Yes	High
2	Moore, et al.	Yes	Yes	Yes	Yes	high
3	Mohammad et al.,	Yes	Yes	Yes	Yes	High
4	Huter et al.	Yes	Yes	Yes	Yes	High
5	Bagherian et al	Yes	Yes	Yes	Yes	High
6	Tsarfati et al.	Yes	Yes	Yes	Yes	High
7	Hanratty et al.	Yes	Yes	Yes	Yes	High
8	Rezayie et al.	Yes	Yes	Yes	Yes	High
9	Connor et al.	Yes	Yes	Yes	Yes	High
10	Al Baalharith, et al.	Yes	Yes	Yes	Yes	High

Study Selection

The chosen papers shed light on how nursing practices and healthcare delivery are affected by health information technology. The review by Alotaibi and Federico (2017) emphasizes how innovation technologies might improve patient safety by lowering prescription mistakes. The complexity of innovation technologies systems and how it affects nurses' time management is covered by Moore et al. (2020). Huter et al. (2020) recommend conducting more study on digital technologies that aid in nursing care. Tsarfati

and Cojocaru (2023) investigate the variables affecting nurses' opinions towards computer technology. In a similar vein, Connor et al. (2023) show how adopting evidence-based practices improves patient outcomes. The significance of incorporating tele-health into nursing practice in Saudi Arabia is emphasized by Al Baalharith et al. (2022). The combined body of research from these studies informs how nursing practices are changing in response to technology breakthroughs.

Table 4: Selected Studies for SR (Systematic Review

No	Author	Research	Year
1	Alotaibi, & Federico	The impact of health information technology on patient safety	2017
2	Moore, et al.	A systematic review of the impact of health information technology on nurses' time	2020
3	Mohammadnejad, et al.	Impacts of Technology Use on the Workload of Registered Nurses: A Scoping Review	2023
4	Bagherian, et al.	Effects of technology on nursing care and caring attributes of a sample of Iranian critical care nurses	2017
5	Huter, et al.	Effectiveness of Digital Technologies to Support Nursing Care: Results of a Scoping Review	2022
6	Tsarfati, & Cojocaru,	Introducing Computerized Technology to Nurses: A Model Based on Cognitive Instrumental and Social Influence Processes	2023
7	Hanratty, et al	Innovation to enhance health in care homes and evaluation of tools for measuring outcomes of care: rapid evidence synthesis	2019
8	Rezayi, et al.	Effects of technology-based educational tools on nursing learning	2022

No	Author	Research	Year
		outcomes in intensive care units: a systematic review and meta-analysis	
9	Connor, et al	Evidence-based practice improves patient outcomes and healthcare system return on investment: Findings from a scoping review	2023
10	Al Baalharith, et al	Telehealth and Transformation of Nursing Care in Saudi Arabia: A Systematic Review	2022

Result

Study Database: Researcher searched databases like PubMed, Scopus, and Google Scholar for pertinent research. These databases were selected due to their extensive coverage of academic literature in the nursing and healthcare domains.

Title and Abstract Screening: After retrieving the initial set of articles was pulled from the databases, a careful screening procedure was carried out using the article titles and abstracts. Relevant papers were eliminated from the research, and those that seemed to fit the inclusion criteria were chosen for additional evaluation.

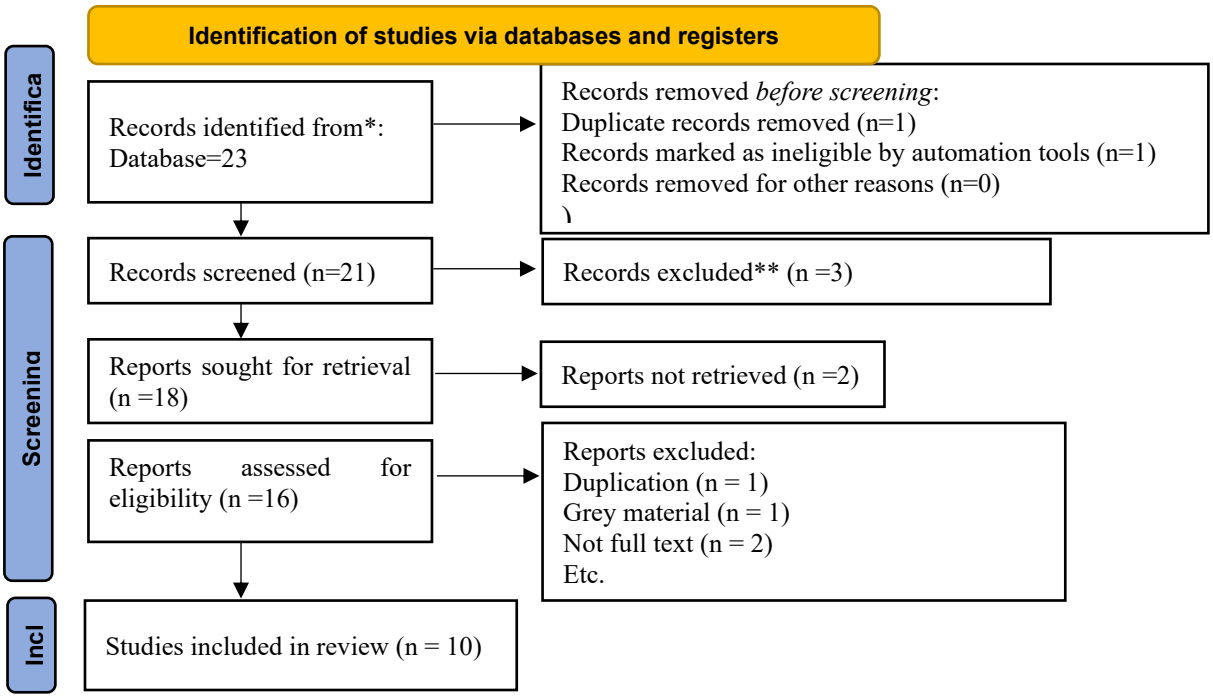
Full-Text Assessment: The entire texts of the chosen papers from the title and abstract screening stages were thoroughly evaluated. This required a thorough analysis of each article's methodology, findings, and discussion sections to ascertain whether they should be included in the research synthesis. The final analysis contained just the articles that satisfied the predetermined inclusion criteria; those that did not were eliminated.

PRISMA Flowchart: The method of selecting studies was demonstrated using a flowchart based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). The number of studies that were found, vetted, evaluated for eligibility, and included in the final analysis is shown visually in the flowchart. The legitimacy and repeatability of the research selection procedure are guaranteed by this open reporting.

Identification of studies via databases and registers: Extensive database searches as well as registration and database searches were used to find pertinent research. The key databases that were

used were PubMed, Scopus, and Google Scholar because of their broad coverage of academic literature in the fields of nursing and healthcare. Additionally, to find ongoing or unpublished studies pertinent to the research issue, particular registers like the Cochrane Library and clinicaltrials.gov were searched. A mix of keywords and search phrases pertaining to nursing practices, patient outcomes, health information technology, and healthcare innovations were used in the search approach. Additionally, in order to find any other research that could have gone unnoticed during the original database searches, citation tracking and reference list scanning of the obtained papers were carried out.

Table 5: Identification of Studies via Database



Data Extraction

In order to make analysis and synthesis easier, data extraction required methodically obtaining pertinent information from each study that was chosen. To properly acknowledge the source, the author(s)' names and the year of publication were noted. To comprehend the setting and research emphasis, the main goal or purpose of each study was retrieved. To evaluate the research technique, the methodology used in each study such as the literature review, cross-sectional study, systematic review, or

mixed methods was recorded. Conclusions were identified by extracting the major findings or results from each study.

Table 6: Research Matrix

S. No	Author, Year	Aims of the study	Methodology	Sample	Setting	Results
1	Alotaibi, Y. K., & Federico, F. (2017).	The impact of health information technology on patient safety.	Literature review	Literature review	Not applicable	Health information technology improves patient safety by reducing prescription errors, adverse medication reactions, and increased adherence to practice recommendations.
2	Moore, E. C., Tolley, C. L., Bates, D. W., & Slight, S. P. (2020).	To find the the impact of health information technology on nurses' time.	Literature review	33 articles were included in this study	Literature review	They concluded that While time for drug administration decreased with BCMA, most innovation technologies systems resulted in an increase in nurse documentation time. A significant number of innovation technologies systems also resulted in nurses spending more time on "value-adding" and direct care duties.

3	Mohammadnejad, F., Freeman, S., Klassen-Ross, T., Hemingway, D., & Banner, D. (2023).	Impacts of Technology Use on the Workload of Registered Nurses:	Literature review	Literature review	Not applicable	Although not all technologies have the same impact, they may all be extremely beneficial to nurses working in distant areas. Although certain technologies appeared to reduce the stress on nurses, this was not true for all of them.
4	Bagherian, B., Sabzevari, S., Mirzaei, T., & Ravari, A. (2017)	Effects of technology on nursing care and caring attributes of a sample	Cross sectional study	200 sample	Iran	In order to ensure that they are providing patient-centered care in a technologically advanced setting, nursing students and registered nurses must pursue lifelong learning and continuing education on the application of new technology equipment in nursing care and balancing their utilization with caring ideals.
5	Huter, K., Krick, T., Domhoff, D., Seibert, K., Wolf-Ostermann, K., & Rothgang, H. (2020).	To determine the Effectiveness of digital technologies to support nursing care	Review article	Review article	Review article	Future research should focus on areas of technology that require more exploration. To properly utilize digital technology and promote care recipient

						independence while relieving official and informal careers, further study on outpatient, informal, and cross-sectoral care is required.
6	Tsarfati, B., & Cojocaru, D. (2023, June).	Studied the instrumental and social factors that shape nurses' perceptions of computer technology and will offer a model for the best way to integrate it into the working environment for nurses.	Mixed method	224 sample	Romania	Despite nursing being a social profession, it was shown that cognitive instrumental processes were the primary factor encouraging the use of computer technology.
7	Hanratty, B., Craig, D., Brittain, K., Spilsbury, K., Vines, J., & Wilson, P. (2019).	To elaborate the Innovation to enhance health in care homes and evaluation of tools for measuring outcomes of care: rapid evidence synthesis.	Systematic review	Not applicable	Systematic review	Games that boost physical activity and improve mental health and well-being seem to be among the most beneficial therapies. (2) Communication and engagement: US research have demonstrated that the use of structured communication tools improves resident outcomes and communication with health care

8	Rezayi, S., Amanollahi, A., Shahmoradi, L., Rezaei, N., Katigari, M. R., Zolfaghari, M., & Manafi, B. (2022).	To find the Effects of technology-based educational tools on nursing learning outcomes in intensive care units	Systematic review and meta-analysis	Not applicable	Systematic review	One argument in support of this is that if the new technology-based teaching style outperforms old ones, learning results should increase significantly. The newly developed tools also show great potential for improving patient satisfaction and quality of life while also assisting nurses and nursing students in providing better healthcare.
9	Gorsuch, P. F., & Gallagher-Ford, L. (2023).	The goal of this scoping review was to offer a comprehensive assessment of the current research on the impact of EBP adoption on patient outcomes in healthcare settings.	Scoping reviewed	Scoping review	Scoping review	The findings show that ebps increase patient outcomes and ROI for healthcare systems. To successfully improve EBP growth and impact across care settings, defined terminology and techniques for evaluating EBP and patient outcomes must be used in a coordinated and consistent manner.

10	Al Baalharith, I., Al Sherim, M., Almutairi, S. H. G., & Albaqami, A. S. A. (2022	Examining the technological impact on nursing in Saudi Arabia.	Literature review	Not applicable	Not applicable	The necessity of include telehealth in the nursing curriculum, providing telehealth training, reskilling healthcare workers (hcws) in the Kingdom of Saudi Arabia, and doing further primary research with a primary focus on telenursing. Overall, telehealth continues to be a major paradigm shift in nursing practice and a key component of modern nursing practice.

Data Synthesis

Data synthesis entails the integration and interpretation of information from individual investigations. Depending on the goals and nature of the data, a variety of methods, including narrative synthesis, theme analysis, and meta-analysis, may be used. By use of data synthesis, investigators seek to condense the combined information from several investigations into logical and significant conclusions that enhance comprehension of the research subject. Iteratively evaluating each study's quality and applicability, looking for patterns or contradictions, and formulating broad conclusions or ramifications are all part of this process.

Table 7: The following sub-themes have been observed among the studies, including in the systematic review.

No	Themes	Sub-themes
1	Impact of Health Information Technology (new innovation technologies)	Patient safety
		Nursing workflows
		Workload management
		Technologies integration in nursing practice
2	Nursing Care in Technologically Advanced Settings	Patient centered care
		Lifelong learning for nursing profession

Discussion

The delivery of patient care and nursing practices have changed as a result of the integration of health information technology new innovation technologies into healthcare systems (Alotaibi & Federico, 2017). The influence of innovation technologies on patient safety, nursing workflows, technology integration in nursing practice, and the potential and problems associated with innovation technologies adoption are among the major issues that are explored in this debate, which is based on the research.

The literature indicates that there is a noteworthy influence of innovation technologies on patient safety (Alotaibi & Federico, 2017). According to studies, innovation technologies help improve adherence to practice guidelines, decrease medication mistakes, and adverse drug responses (Alotaibi & Federico, 2017). Additionally, according to Moore et al. (2020), new innovation technologies is essential for improving efficiency, optimizing patient care procedures, and expediting nursing workflows.

The advantages and difficulties of using innovation technologies in nursing practice are also covered in detail (Moore et al., 2020). While there are many benefits to innovation technologies, such as better patient outcomes, increased efficiency, and improved communication between healthcare professionals, there are drawbacks as well, like the need for ongoing education and training to ensure effective utilization and an increase in documentation burden (Moore et al., 2020). A comprehensive strategy that takes into account technological and human elements is needed to address these issues (Alotaibi & Federico, 2017). This emphasizes the need of striking a balance between the advantages of innovation technologies and the

requirements of nursing professionals and the standard of patient care.

The development of nursing care in technologically sophisticated settings is another important topic covered (Bagherian et al., 2017). Patient-centered care and the value of preserving a humanistic approach in the face of technical breakthroughs are becoming increasingly important with the incorporation of innovation technologies (Bagherian et al., 2017). According to Bagherian et al. (2017), nursing practitioners must pursue ongoing education and lifetime learning in order to utilize innovation technologies efficiently while maintaining the patient-provider interaction and keeping caring beliefs. Furthermore, as noted by Bagherian et al. (2017), efforts must be made to guarantee that innovation technologies are customized to fit the particular requirements of various patient groups and healthcare environments.

Nursing practitioners may use technology to improve patient care delivery, improve outcomes, and advance the nursing profession overall by tackling the difficulties and seizing the possibilities given by Health Information Technology innovation technologies (Moore et al., 2020).

Limitation & Implications

Limitations

- The analysis was based on studies available up to a certain date, which may have overlooked recent advancements or changes in the field of health information technology and nursing practices.
- The included studies encompassed varying methodologies and quality levels, which could affect the reliability and validity of synthesized findings.

Implications

- To guarantee thorough coverage and reduce selection bias, future study should draw from a larger range of databases, such as foreign databases and grey literature sources.
- The reliability and comparability of synthesized findings across studies with different quality levels can be improved by implementing standardized techniques for quality evaluation and data extraction.

- To guarantee the application and relevance of findings to a wider range of healthcare settings and individuals, researchers should make an effort to incorporate studies from varied geographic locations and cultural contexts.

Recommendations

To ensure thorough planning, implementation, and evaluation of health information technology innovation technologies in nursing practice, interdisciplinary collaboration between nursing professionals, healthcare administrators, information technology specialists, and policymakers is encouraged. To improve nursing professionals' competency in using new innovation technologies systems, ongoing education and training programs should be developed and implemented. These programs should emphasize.

What this article is adding in existing literature?

By offering a thorough synthesis of study findings on the effects of health information technology new innovation technologies on nursing practice and patient care outcomes, this article adds to the body of current literature. Through a methodical examination of research findings from many databases and registers, this paper provides insightful information about the advantages, difficulties, and potential paths of innovation technologies adoption in nursing environments. It specifically emphasizes major issues such how these affects patient safety, nursing processes, and how technology is incorporated into nursing practice. This article adds depth and clarity to our knowledge of how these systems and technologies shapes modern nursing practice and its implications for enhancing patient care quality and safety by combining and synthesizing various viewpoints and data from the literature.

Conclusion

Research shows that health information technology in nursing practice has a complex impact on patient care outcomes and healthcare delivery. Collaborative and comprehensive strategies prioritizing user-centered design, interoperability, data security, and continuous assessment are essential to maximize benefits and minimize hazards. Adoption of these suggestions can promote nursing practice, raise patient care standards, and spur innovation in healthcare delivery.

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