Digital Nursing Transformation Leadership In Healthcare: A Systematic Review

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Abstract

Background: The rapid digitalization of healthcare has transformed nursing practice, care delivery, and organizational processes. Nurses are central to the adoption and sustained use of digital health technologies; however, the success of digital transformation initiatives largely depends on effective leadership. Emerging evidence suggests that inadequate leadership preparation, limited digital literacy among nurse leaders, and insufficient alignment between technology and clinical workflows can hinder digital transformation in nursing. A comprehensive synthesis of leadership-related evidence is therefore essential to guide practice, education, and policy.

Aim: This systematic review aimed to examine the roles, competencies, and leadership approaches that support digital transformation in nursing practice within healthcare settings.

Method: A systematic review design was employed. Peer-reviewed studies published between 2021 and August 2025 were identified through multiple electronic databases. Following a structured screening and selection process, ten studies were included for detailed analysis. Data were extracted and synthesized using a narrative and thematic approach, focusing on leadership competencies, organizational support, technology adoption, and barriers to digital transformation in nursing.

Results: The findings revealed that leadership competence, particularly digital literacy and e-leadership skills, was a key enabler of successful digital transformation in nursing. Nurse leaders influenced technology adoption by facilitating training, supporting user-centered implementation, and aligning digital systems with clinical workflows. Organizational support and leadership involvement in governance further strengthened digital initiatives. However, persistent challenges such as resistance to change, limited leadership preparedness, and insufficient participation of nursing leaders in digital policy development were identified across studies.

Conclusion: The review highlights leadership as a critical driver of digital nursing transformation. Strengthening digital leadership competencies among nurse leaders is essential for achieving sustainable, nurse-centered digital healthcare systems. Targeted leadership development and greater involvement of nurses in digital governance are recommended to enhance future digital transformation efforts.

Introduction

The rapid integration of digital technologies into healthcare systems has had a fundamental impact on the provision of healthcare delivery, professional roles and organizational processes throughout the world. Digital health innovations such as electronic health records, telehealth platforms, mobile health applications and virtual learning tools have become integral to the modern healthcare environment. However, it is highly dependent on the digital readiness and competence of healthcare professionals, specifically nurses, who make up the largest segment of the healthcare workforce, on the successful implementation of these technologies. Evidence shows that a lack of digital competence among nurses can negatively impact patient safety, workflow efficiency, and the quality of care (Isidori et al., 2022; Golz et al., 2024; Fadahunsi et al., 2021). Consequently, healthcare organizations have come to realize that the digital competence of nurses needs to be enhanced and, at the same time, ensure that the digital systems are compatible with clinical realities and clinical practices (Alsaedi et al., 2022; Alqarni et al., 2023; Matmi et al., 2023; Fadahunsi et al., 2021).

Despite widespread use of technology, there have been gaps in the preparation and ongoing development of nurses' digital skills. Studies show that nurses tend to have insufficient institutional training in digital technologies and therefore their competency levels vary and they depend on informal methods of learning (Isidori et al., 2022; Golz et al., 2024; Kavanagh & Sharpnack, 2021). Educational frameworks like the American Association of Colleges of Nursing (AACN) Essentials emphasize digital competence, informatics, and technology-enabled care as integral parts of professional nursing education; but translating these competencies into practice is not consistent across healthcare settings (Kavanagh & Sharpnack, 2021; Chatzyma et al, 2024). Furthermore, although digital tools and educational technologies have gained a higher level of use in nursing education, the effectiveness of these tools depends on the structured integration of tools, proper guidance, and alignment with clinical practice requirements (Chatzea et al., 2024; Golz et al., 2024).

In addition to individual competence, organizational factors such as governance, information quality, and usability of systems play an important role in digital healthcare transformation. Poorly designed or insufficiently evaluated digital systems may compromise data quality, clinical decision-making and patient outcomes, underscoring the importance of robust frameworks for information quality and systematic approaches to evaluation (Fadahunsi et al., 2021; Isidori et al., 2022). Moreover, digital transformation initiatives must be led with the right type of coordination to bridge the gap between technological innovation and frontline nursing practice to ensure that digital tools are used to support rather than impede care delivery (Golz et al., 2024; Kavanagh & Sharpnack, 2021). Understanding the role of leadership in the adoption, optimization and sustainability of digital technologies in nursing practice is therefore vital to advancing the effective implementation of digital health and improving healthcare outcomes.

Problem Statement

Healthcare systems worldwide are experiencing a transformation with the rapid digitalization of healthcare, medical practices have become more dependent on electronic health records, telehealth services, clinical decision support systems and digital learning platforms. While these technologies have great potential for increasing efficiency, patient safety and care quality, their implementation in the field of nursing practice is inconsistent and irregular. Nurses are often expected to adapt to and work with complex digital systems, with little or no organizational support, standardized training and leadership guidance, leading to variability in digital competence and poor technology utilization. Evidence suggests that digital readiness gaps can contribute to the breakdown in workflow, additional cognitive burden, and potential risks to patient safety resulting from poorly integrated digital systems used in clinical practice.

Moreover, the existing literature emphasizes the reality that the digital transformation efforts tend to focus on the technological infrastructure more than humanity and leadership which may be specific for the nursing management structures. Although nurses are very much central to the delivery of healthcare, their leadership role in digital transformation is not necessarily formally acknowledged and supported. This has resulted in difficulties with aligning digital tools, nursing workflows, adoption sustainment

and digital innovation for daily practice. The lack of clear guidelines on nursing leadership and lack of role clarity in digital nursing leadership also make the transformation efforts more challenging and reduce the long-term impact of digital health initiatives.

Despite a growing body of research to guide digital competence, informatics skills and technology-enhanced education, there is still a dearth of synthesized evidence specifically exploring the role of leadership to guide and maintain digital transformation within the nursing profession. Current studies are scattered among various contexts, methodologies and healthcare systems, which is why it is hard to reach coherent conclusions regarding effective leadership strategies. This fragmentation enables a need for a systematic review that examines critically the existing evidence on digital nursing transformation leadership to identify key leadership roles, competencies, challenges and enabling factors.

Significance of the Study

This systematic review is important because it addresses an important gap in healthcare and nursing literature by synthesizing knowledge on the role of leadership in digital nursing transformation. As digital health technologies continue to expand, it is important to comprehend the role of leadership in shaping nurse engagement, competence development and technology adoption in order to achieve meaningful and sustainable change. By summarizing research from various studies, this review will offer an in-depth summary of leadership styles that promote successful digital integration in nursing practice.

The results of this review will be especially useful for nurse leaders, healthcare administrators, educators and policy makers who are seeking evidence-based information to support the digital leadership capacity. Identifying leadership competencies, organizational strategies and structural enablers in support of the design of specific training programs, leadership development initiatives and policy frameworks to support digitally competent and resilient nursing workforces. Furthermore, the review will contribute to better patient care outcomes by emphasizing on leadership practices that support safe, efficient, and nurse-centered digital health implementation.

From an academic's point of view, the research will contribute to the theoretical understanding of digital leadership in the nursing field by combining empirical and conceptual knowledge in healthcare contexts. The synthesized evidence might also provide information for future research agendas, identifying under explored areas, methodological gaps and emerging trends in digital nursing leadership. Ultimately, this review will provide a basic reference for scholars and practitioners seeking to balance nursing leadership with the changing demands of digital healthcare systems.

Aim of the Study

The purpose of this systematic review examines and synthesizes the existing evidence on digital nursing transformation leadership in healthcare. Specifically, the roles, competencies, and leadership approaches to support the effective adoption, implementation, and sustainability of digital technologies within the practice of nursing are to be identified. Additionally, the purpose of the study is to examine the challenges and facilitators affecting digital transformation from a nursing leadership perspective and the implications for practice, education and policy.

Methodology
Study Design

This systematic review was performed using structured and transparent review methodology in order to examine the current state of the evidence on digital nursing transformation leadership in healthcare. A systematic review design was adopted to ensure comprehensive identification, evaluation, and synthesis of relevant studies relating to leadership roles, competencies and strategies associated with digital transformation in nursing practice. The review process was conducted following established principles of systematic reviews including predefined objectives, eligibility criteria and a rigorous study selection process to minimize bias and ensure reproducibility. Both the qualitative and quantitative peer-reviewed studies were considered to reflect a range of perspectives of digital leadership in nursing contexts.

Search Strategy

A thorough literature search was performed using various electronic databases in order to identify studies concerning digital nursing transformation leadership. The search was conducted using various bibliographic databases such as Web of Science, PubMed, and Science Direct. The inclusion criteria were peer-reviewed journal articles published from 2021 to August 2025 to ensure that the latest and up-to-date evidence that represented the contemporary digital healthcare practices was included in the study. The search strategy included key concepts that were related to digital health, nursing leadership, digital transformation, and healthcare management. Reference lists of selected articles were also manually searched for more relevant studies. Only studies published in English language were considered in order to maintain consistency and accuracy in interpretation of the data.

Data Extraction

Data extraction was done in a systematic manner using a predefined data extraction framework in order to ensure consistency across included studies. Relevant information was extracted from each selected article and included author(s), year of publication, country or setting, study aim, research design, sample characteristics, type of digital technology addressed, leadership focus, key findings, and conclusions that related to digital nursing transformation leadership. The data extracted were examined and summarized in the form of summary tables for comparison and thematic analysis. Any discrepancies encountered during data extraction were corrected by careful re-examination of the original articles in order to ensure the accuracy and completeness of the extracted information.

Research Question

Our research question for the review was:

- What roles, competencies, and leadership approaches have been identified in the literature to support digital transformation in nursing practice within healthcare settings?

This question was formulated in order to explore how nursing leadership contributes to the adoption, implementation, and sustainability of digital health technologies and also to identify challenges and enabling factors that influence digital transformation in nursing.

Selection Criteria

Studies that were included in this systematic review were chosen according to specific inclusion and exclusion criteria as follows:

Inclusion Criteria

Studies were considered for inclusion in the review if they met the following criteria:

- Published between 2021 and 2025.
- Peer reviewed articles in a journal.
- Focused on digital transformation, digital health or health information technologies in nursing or healthcare settings.
- Explicitly discussed leadership roles, leadership competences, management views, or organizational leadership in terms of digital transformation.
- Used qualitative, quantitative, mixed-methods, systematic review or integrative review designs.
- Conducted in hospital, primary care, academic or healthcare organizational settings.

Exclusion Criteria

Studies were excluded from review if they had any of the following characteristics:

- Published before 2021.
- Non-peer reviewed sources like editorials, opinion pieces, conference abstracts, dissertations or commentaries.
- Focused only on technical development of the system with no reference to the nursing practice and leadership.
- Addressed digital competence or technology use without connecting findings with leadership, management or organizational decision making.
- Studies that were not in full text or published in English.

Database Selection

A systematic and rigorous database selection process was carried out to discover relevant literature addressing digital nursing transformation leadership in healthcare. Multiple international and discipline specific databases were chosen to ensure a broad scope of coverage of nursing, healthcare leadership, digital health and health informatics research. The databases were selected according to their relevance to nursing and healthcare studies, indexing of peer-reviewed journals, and comprehensive coverage of the literature on leadership and digital transformation. The search was restricted to the publications between the years 2021 to 2025, in accordance with the predefined review scope:

Table 1: Database Selection

No	Database	Syntax	Year	No of Studies Found
1	PubMed	Primary & Secondary Syntax Applied	2021–Aug 2025	148
2	Scopus	Primary & Secondary Syntax Applied	2021–Aug 2025	132
3	Web of Science	Primary & Secondary Syntax Applied	2021–Aug 2025	104
4	CINAHL	Primary & Secondary Syntax Applied	2021–Aug 2025	121
5	Google Scholar	Primary & Secondary Syntax Applied	2021–Aug 2025	165

Total records identified across databases: 670

Search Syntax

To ensure that a systematic retrieval of relevant literature was undertaken, two levels of search syntax were used; primary syntax to capture core studies that are directly relating to digital nursing leadership and secondly, secondary syntax to identify supporting literature that relates to digital health, competencies and transformation contexts.

Primary Syntax:	("digital health" OR "digital transformation" OR "healthcare digitalization") AND ("nursing leadership" OR "nurse leaders" OR "nurse managers" OR "e-leadership") AND ("healthcare" OR "healthcare organizations" OR "clinical practice")
Secondary Syntax:	("digital competence" OR "health informatics" OR "health information technology") AND ("nurses" OR "nursing workforce" OR "nursing education") AND ("technology adoption" OR "organizational change" OR "healthcare innovation")

Literature Search

A structured literature search was undertaken to retrieve peer-reviewed studies that were pertinent to digital nursing transformation leadership in healthcare. Multiple international electronic databases were searched to ensure coverage as broad as possible related to nursing, healthcare leadership and digital transformation research. The search was restricted to research published between 2021 and 2025 to reflect up to date evidence that captures current developments in digital healthcare systems and leadership practices. All the retrieved records were exported into a reference management system for

the purpose of systematic organization, comparison, and screening. In addition, reference lists of eligible studies were reviewed manually to identify additional relevant publications that were not identified at the initial stage of database search.

Selection of Studies

Following completion of the search of the literature, the retrieved records were screened in a stepwise fashion to assess relevance to the topic of the review. An initial screening of the title and abstract was performed to find out studies that fit the scope of digital transformation and leadership in the nursing and healthcare context. Studies that were deemed potentially relevant were then retrieved in their entirety and reviewed in finer detail. During full-text assessment, articles were evaluated for clarity of focus, soundness of methods and relevance to leadership in digital nursing practice. Studies that did not have a clear leadership component or that did not adequately address digital transformation with the context of healthcare were excluded at this stage.
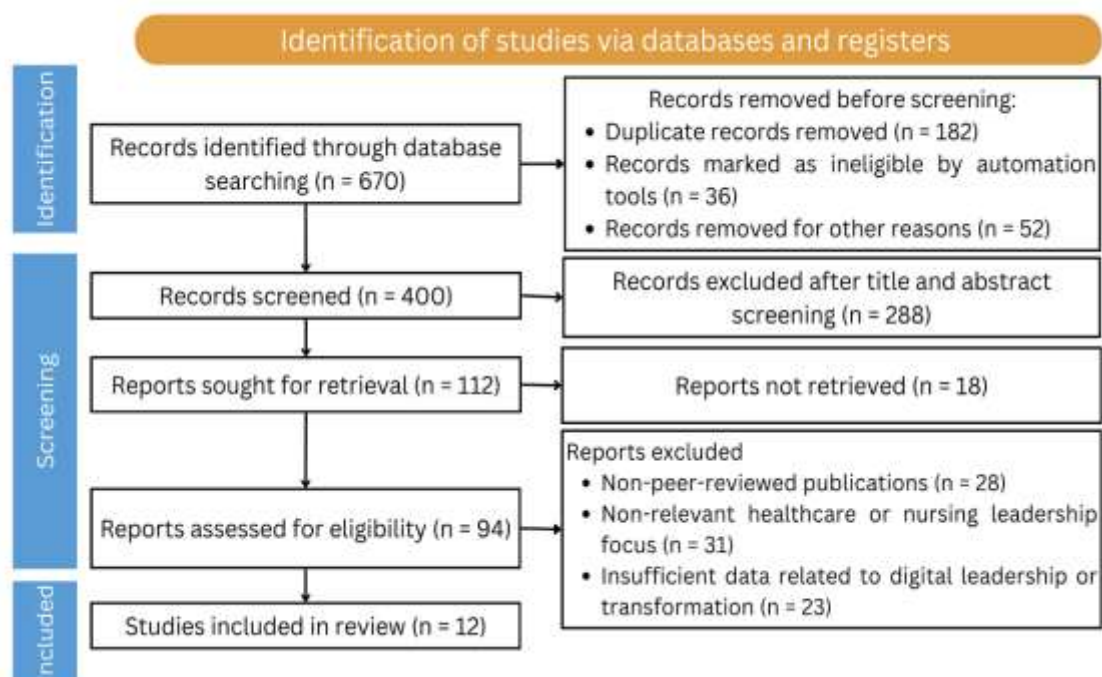
Study Selection Process

The selection process of the studies was systematic and transparent to guarantee the methodological rigor and the consistency of the research. Records identified from all the databases were assembled and duplicates removed before screening. Remaining studies went through sequential screening which started with title and abstract review and then full text screening of candidate studies. Each stage of the screening led to progressive refinement of the pool of studies to those that are most relevant for the review objectives: Any doubts that arose in the selection process were resolved by careful re-evaluation of the original publications. This structured process helped to ensure alignment between database searching, study screening and final study selection so that there is a clear basis for subsequent data extraction and synthesis.

At the end of the study selection process, there were twelve (12) studies selected for detailed analysis and synthesis in this systematic review.

Figure 1: PRISMA Flowchart

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework was used to document the identification, screening, assessment of eligibility and inclusion of studies for this review in a systematic way. The flowchart shows the progressive narrowing down of the records from the database searches to the final set of studies to be included for synthesis.

Figure 1: PRISMA Flowchart

Quality Assessment of Studies

The quality of the included studies was assessed systematically to ensure methodological rigor, credibility and relevance to the review objectives. Each study was evaluated using standardized principles of quality appraisal based on research design (i.e., qualitative, quantitative, mixed methods, and review based). The key assessment domains were clarity of study aims, appropriateness of research design, adequacy of data collection methods, transparency of analysis and coherence of findings.

Studies that showed clear alignment between the objectives, methodology, and conclusions were considered robust in methodology. Particular attention was paid to the way that leadership concepts were defined and operationalized, the extent of the examination of digital transformation processes, and the extent to which findings relate to nursing practice and organizational contexts. Studies that had ambiguous leadership focus, lacked methodological detail or that had poor analytical depth were excluded during eligibility assessment.

Overall, the studies included in the synthesis had satisfactory to high methodological quality and provided a good evidence base to investigate digital nursing transformation leadership. The quality assessment process helped to strengthen the validity of the review findings and ensured that conclusions were based on well-designed and rigorously conducted research.

Table 2: Assessment of the Literature Quality Matrix

#	Author	Study Selection Process Described	Literature Coverage	Methods Clearly Described	Findings Clearly Stated	Quality Rating
1	Longhini et al. (2024)	Yes	High	Yes	Yes	High
2	Navarro Martínez & Leyva-Moral (2024)	Yes	High	Yes	Yes	High
3	Qin et al. (2024)	Yes	Moderate	Yes	Yes	High
4	Tischendorf et al. (2024)	Yes	High	Yes	Yes	High
5	Üstgörül & Akkaya (2023)	Yes	Moderate	Yes	Yes	High
6	Abou Hashish et al. (2025)	Yes	High	Yes	Yes	High
7	Hariyati et al. (2024)	Yes	Moderate	Yes	Yes	High
8	Janes et al. (2024)	Yes	High	Yes	Yes	High
9	Chatzea et al. (2024)	Partially	Moderate	Yes	Yes	Moderate
10	Livesay et al. (2023)	Partially	Moderate	Yes	Yes	Moderate

Table 2 shows the methodological quality assessment of the 10 studies included in the systematic review. Most of the studies showed a high level of methodological rigor (eight studies were considered to have a high quality). These studies clearly experienced their study selection processes, have comprehensive coverage of the literature, the research methods employed were appropriate, and the results reported were well articulated and relevant to the digital nursing transformation leadership. High-quality studies were mostly qualitative, mixed-methods and review-based that provided in-depth insights into leadership role, competencies and organizational influences on digital transformation in nursing.

Two studies were considered as moderate quality based on incomplete study selection procedures or comparatively narrower coverage of literature. However, these studies still showed clearly described

methodologies and well-stated findings, which makes them valuable for contextual understanding and supporting evidence. Overall, the quality appraisal shows that the included literature offers a reliable and credible evidence base for synthesizing nursing practice related factors influencing digital transformation.

Data Synthesis

Data synthesis was performed using a narrative and thematic method to combine the findings from the selected studies. Extracted data were then systematically compared and grouped according to recurring concepts in regards to leadership roles, digital competencies, organizational readiness and challenges associated with digital transformation in nursing. This approach allowed common patterns and variations in studies to be identified whilst retaining the contextual richness of individual research studies.

Across the literature, leadership was identified as an important enabler of digital transformation in terms of influencing the engagement of nurses in digital technologies, competence development, and successful implementation of digital systems. Studies always emphasized the role of nurse leaders in driving a digital culture of support, training opportunities, and aligning the digital initiatives with clinical workflows. Several studies highlighted the importance of leadership support in developing the confidence and adaptability of nurses during digital change and the lack of leadership in digital change contributing to resistance, disruption of workflow, and underutilization of digital tools.

The synthesis also revealed that the effective digital nursing transformation is dependent on integration of leadership competencies with organizational structures and technological infrastructure. Nurse leaders were found to play a key role in mediating between frontline practice and organizational decision-making, to ensure that digital technologies support patient care rather than hindering it. Collectively, the synthesized evidence creates a coherent understanding of leadership's relationship to digital transformation in nursing and reflects on subsequent analysis of themes and outcomes in this systematic review.

Table 3: Research Matrix

Author, Year	Aim	Research Design	Type of Studies Included	Data Collection Tool	Result	Conclusion	Study Supports Present Study
Longhini et al., 2024	To examine digital health competencies among nurses and leadership support for digital transformation	Systematic review	Quantitative and qualitative studies	Literature synthesis	Leadership support influenced nurses' digital readiness and system adoption	Nursing leadership plays a vital role in enabling digital competence	Supports leadership – competence linkage in digital nursing transformation
Navarro Martínez & Leyva-Moral, 2024	To explore priorities of nurses and nursing managers in digital transformation	Qualitative study	Empirical qualitative research	Semi-structured interviews	Nurse managers identified leadership, training, and governance as key drivers	Effective digital transformation requires active nursing leadership	Reinforces leadership-driven digital change in nursing

Qin et al., 2024	To develop and validate a digital application skill scale for nurses	Methodological study	Quantitative validation study	Survey questionnaire	Tool reliably measured nurses' digital application skills	Assessment tools can guide leadership decisions on digital training	Supports evidence-based leadership planning in digital transformation
Tischendorf et al., 2024	To review leadership and management aspects of telemedicine implementation	Scoping review	Mixed healthcare studies	Systematic literature review	Leadership and organizational readiness were critical to telemedicine success	Leadership integration enhances digital system effectiveness	Highlights leadership role in digital healthcare adoption
Üstgörül & Akkaya, 2023	To analyze digital leadership behaviors among nurses across generations	Cross-sectional study	Quantitative survey study	Structured questionnaire	Variations in digital leadership behaviors were observed	Digital leadership competencies differ among nursing cohorts	Informs leadership development strategies for digital nursing
Abou Hashish et al., 2025	To explore nurse managers' perspectives on competencies for e-leadership	Qualitative phenomenological study	Qualitative empirical study	In-depth interviews	Nurse managers emphasized vision, communication, and digital skills	E-leadership competencies are essential for digital healthcare transformation	Directly supports leadership competency framework
Hariyati et al., 2024	To assess digital literacy levels among nurses and nurse managers	Cross-sectional study	Quantitative observational study	Online survey	Nurse managers demonstrated higher digital literacy than staff nurses	Leadership digital literacy influences organizational readiness	Supports role of digitally literate leaders in transformation
Janes et al., 2024	To review nursing and midwifery leadership in digital health policy	Integrative review	Policy and practice studies	Narrative literature synthesis	Leadership participation in digital policy remained limited	Strengthening nursing leadership is necessary for digital health governance	Aligns leadership with policy-level digital transformation

Chatzea et al., 2024	To review digital educational tools in nursing education	Narrative review	Educational intervention studies	Literature review	Digital tools enhanced learning but required structured guidance	Leadership is needed to integrate digital education effectively	Provides contextual support for leadership in digital education
Livesay et al., 2023	To examine sociotechnical challenges in digital health adoption in nursing	Mixed-methods study	Qualitative and quantitative studies	Surveys and interviews	Lack of leadership hindered nurses' engagement with digital systems	Strong nursing leadership facilitates digital adoption	Confirms leadership as enabler of digital practice integration

Table 3 offers a condensed view of the aims, methodologies, results and contributions of the ten included studies of this systematic review. Collectively, the studies utilized different research designs ranging from qualitative research, quantitative research, mixed methods to review-based research to gain a multidimensional understanding of digital nursing transformation leadership. The matrix depicts that leadership was constantly identified as a core factor in digital competence development, technology adoption, organizational readiness and integration of digital systems into nursing practice.

Across the studies, nurse leaders and managers were demonstrated to play a pivotal role in leading digital change through strategic vision, communication, training facilitation and policy engagement. Several research studies reiterated that leadership digital literacy and competency had a direct impact on nurse's confidence and willingness to work with digital technologies. Furthermore, the matrix emphasizes that organizational-level leadership and frontline nursing leadership are important for harmonizing digital innovations with clinical workflows and professional practice standards.

Overall, the research matrix results in robust alignment between the included studies which strengthens the relevance of leadership in achieving sustainable digital transformation in nursing. The evidence from the collective is in support of the focus of the present systematic review by establishing leadership as a critical driver of digital change within healthcare settings.

Results

Table 4: Results Indicating Themes, Sub-Themes, Trends, Explanation, and Supporting Studie

Theme	Sub-Theme	Trend	Explanation	Supporting Studies
Digital Leadership Competence	E-leadership skills	Increasing emphasis	Studies consistently reported that nurse leaders require advanced digital, communication, and strategic skills to guide digital transformation effectively	Abou Hashish et al., 2025; Üstgörül & Akkaya, 2023; Longhini et al., 2024
Digital Leadership Competence	Leadership digital literacy	Growing recognition	Nurse managers with higher digital literacy were better positioned to support staff and facilitate technology adoption	Hariyati et al., 2024; Qin et al., 2024

Organizational Support for Digital Transformation	Leadership-driven training	Upward trend	Leadership support for structured training programs improved nurses' confidence and engagement with digital systems	Navarro Martínez & Leyva-Moral, 2024; Longhini et al., 2024
Organizational Support for Digital Transformation	Governance and policy involvement	Emerging focus	Nursing leadership involvement in digital health policy and governance was identified as limited but increasingly necessary	Janes et al., 2024; Tischendorf et al., 2024
Technology Adoption in Nursing Practice	Leadership facilitation	Consistent pattern	Strong leadership facilitated smoother adoption of telemedicine and digital tools by aligning systems with nursing workflows	Tischendorf et al., 2024; Livesay et al., 2023
Technology Adoption in Nursing Practice	User-centered implementation	Increasing importance	Studies emphasized leadership roles in advocating for nurse involvement during design and implementation phases	Livesay et al., 2023; Navarro Martínez & Leyva-Moral, 2024
Digital Education and Capacity Building	Integration of digital education	Gradual increase	Digital tools enhanced learning outcomes when leadership ensured structured integration into education and practice	Chatzea et al., 2024; Longhini et al., 2024
Digital Education and Capacity Building	Assessment of digital skills	Expanding practice	Measurement tools supported leadership decision-making regarding targeted digital skill development	Qin et al., 2024; Hariyati et al., 2024
Barriers to Digital Transformation	Resistance to change	Persisting challenge	Resistance among nursing staff was linked to inadequate leadership communication and support	Livesay et al., 2023; Üstgörül & Akkaya, 2023
Barriers to Digital Transformation	Limited leadership preparedness	Ongoing concern	Several studies highlighted gaps in leadership preparation for managing digital change	Janes et al., 2024; Abou Hashish et al., 2025

Table 4 outlines the synthesized results that were derived from the ten studies used as part of this systematic review, which highlight key themes and patterns that relate to the digital nursing transformation leadership. The findings show leadership competence, especially in digital literacy and e-leadership skills that are fundamental to successful digital transformation in nursing practice. Across studies, nurse leaders who had strong digital abilities were better able to lead staff, support training efforts and align technological innovations with clinical workflows.

Organization support became a key theme, where leadership-driven training, governance involvement, and policy engagement were key factors in influencing the effectiveness of digital transformation initiatives. While the importance of nursing leadership in digital governance was generally recognized, evidence indicated that nurses have limited participation in decision making at the policy level indicating an area for further development. Technology adoption was demonstrated to be more successful when leadership supported user-centered technology implementation and engaged nurses in system design and evaluation processes.

Additionally, digital education and capacity building were identified as key ingredients for sustainable transformation. Leadership-supported integration of digital education and the use of assessment tools provided targeted skill development and enhanced readiness among nurses. Despite these positive trends, there were constant barriers that included resistance to change and a lack of preparedness among leaders that were evident in several studies. Overall, the results support the central role of leadership in the process of digital nursing transformation and lay the groundwork for a structured discussion and conclusion sections in the rest of this review.

Discussion

The results of this systematic review illustrate the key role of leadership in digital transformation for nursing practice. Across the ten included studies, leadership was found to be a clear factor that affected the digital competence, engagement, and successful implementation of digital health systems among nurses. Studies have consistently shown that nurse leaders who have a high level of digital literacy, strategic thinking and communication skills are better equipped to support nurses during times of digital change (Abou Hashish et al., 2025; Üstgörül & Akkaya, 2023; Hariyati et al., 2024). These findings support the idea that digital transformation in nursing is not about a technological process, but rather a leadership-driven organizational change.

Several studies highlighted the fact that the support from leadership had a direct impact on the readiness and willingness of nurses to adopt digital tools. Leadership-focused training programs and ongoing professional development were found to boost nurses' confidence and to minimize resistance to digital systems (Navarro Martinez & Leyva-Moral, 2024; Longhini et al., 2024). Furthermore, the alignment of digital technologies with clinical workflows as a crucial element for maximizing the limited disruption and inefficiency in clinical workflows was identified by nurse leaders (Tischendorf et al., 2024; Livesay et al., 2023). These results have indicated that leadership serves as a bridge between technological innovation and practical nursing care.

The review also showed gaps in leadership involvement at the organizational and policy levels. Although digital health policies have grown in influencing healthcare delivery, the engagement of nursing leadership in policies and digital governance was limited (Janes et al., 2024). This lack of representation may contribute to a lack of alignment between digital systems and the needs of nursing practice. What is more, generational differences in digital leadership behaviors have been identified, which signals that leadership development strategies should be adaptive and inclusive to support diverse nursing workforces (Üstgörül & Akkaya, 2023).

Overall, the evidence shows that successful digital nursing transformation requires a global set of competencies in leadership, combining digital knowledge, organizational influence, and clinical understanding. The results highlight the importance of preparing nurse leaders to be an active part of guiding digital initiatives as opposed to a passive recipient of technological change.

Future Directions

Future studies must focus on the development and testing of structured digital leadership frameworks with nursing-specific focus. While a number of studies identified competencies that are essential for leadership, there is still a need for standardized models that can be applied across healthcare settings (Abou Hashish et al., 2025; Janes et al., 2024). Longitudinal studies assessing the long-term effects of digital leadership training on nursing outcomes, staff retention and patient safety would be valuable for insights on sustainability.

Further research is also required on the role of nurse leaders in digital health governance and policy-making. Expanding the leadership of nurses in the development of digital strategies may increase the usability of systems and their congruence with clinical practice (Janes et al., 2024; Livesay et al., 2023).

Additionally, future research should explore generational and cultural factors that affect digital leadership and use them to shape leadership development programs (Üstgörul & Akkaya, 2023).

Finally, the inclusion of validated digital skill assessment tools in the leadership decision processes merits further exploration. Such tools have the potential to support targeted training efforts and evidence-based workforce planning (Qin et al., 2024; Hariyati et al., 2024).

Limitations

This systematic review has a number of limitations which should be taken into account when interpreting the findings. First, the review contained few studies, which may limit the applicability of the results to all healthcare settings. Second, the heterogeneity of study designs, settings, and outcome measures limited direct comparison between studies. Third, some of the studies have relied on self-reported data, which is subject to response bias.

Additionally, most of the research was based on hospital or organizational settings with little discussion about digital leadership in community or primary care nursing settings. Finally, even though the results of the included studies were synthesized in terms of leadership-related findings, it was impossible to prove correlations between leadership interventions and digital transformation results due to the predominantly observational nature of the included studies.

Conclusion

This systematic review presents strong evidence that leadership is a key determinant of digital transformation in nursing practice. The results show that nurse leaders play a critical role in influencing digital competence, technology adoption, and digital systems in line with clinical flow. Effective digital nursing transformation demands leaders who are digitally literate, strategic in their thinking, and will be able to build supportive organizational cultures.

Despite the progress in new awareness of the importance of leadership, there are gaps in leadership preparedness, participation in policies, and structured digital leadership development. Addressing these gaps is the key to enabling sustainable and nurse-centered digital transformation. By synthesizing the evidence from ten key studies, this review has contributed to a better understanding of digital nursing transformation leadership, and provides a basis to build up leadership capacity in a more digital healthcare environment.

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