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A SYSTEMATIC REVIEW: NURSES AND DIGITAL HEALTH IN COMMUNITY SERVICES

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ABSTRACT

Digital transformation in healthcare has accelerated the use of telemedicine, mobile health (mHealth), and electronic consultation technologies. Nurses, as frontline providers, play a vital role in applying these innovations, especially in community services, home care, and rural areas. However, their specific contributions within digital health ecosystems remain underexplored in systematic reviews. This review aims to identify how nurses implement digital technologies, the professional roles they undertake, and the reported outcomes, barriers, and enabling factors in community and underserved settings. Using the PICo framework and PRISMA 2020 guidelines, literature searches were conducted in ScienceDirect and Wiley Online Library. Inclusion criteria covered English-language empirical studies published between 2019 and 2025. Quality appraisal used the JBI Critical Appraisal Checklist, and thematic synthesis was applied to extract key patterns. Eleven studies met the criteria. Nurses acted as clinical decision-makers, digital health educators, and remote care supervisors. Outcomes included improved service access, communication efficiency, and patient satisfaction. Barriers involved infrastructure gaps, digital literacy, and limited policy support. Enablers included formal training, system interoperability, and organizational leadership. Nurses contribute significantly to digital health implementation in community care. These findings support digital nursing curricula, inclusive policies, and context-driven, sustainable interventions.

Keywords: Community Health Centres, Community Health Nursing, Digital Technology, Rural Health, Telemedicine, Systematic Review.

INTRODUCTION

Digital transformation in healthcare has become one of the most significant developments in the last decade. The integration of technologies such as telemedicine, mobile health (mHealth), artificial intelligence (AI), and electronic consultation (eConsult) has transformed the way healthcare services are designed, accessed, and delivered, particularly in developing countries like Indonesia (Abdillah, 2024). The World Health Organization emphasizes that digitalization is not merely a technical solution, but a global strategy to expand access, improve efficiency, and strengthen sustainable health systems, especially in resource-limited

regions (WHO, 2021). Amidst demographic, epidemiological, and geographical challenges, digital technology serves as a crucial catalyst in bridging service gaps, accelerating clinical responses, and supporting data-driven decision-making, particularly in rural and remote areas (Woods et al., 2024).

In Indonesia, the adoption of digital technology in nursing services still faces complex structural challenges, such as low nurse knowledge, limited digital skills, and suboptimal management support. This condition directly affects the effectiveness of documentation and the quality of nursing care (Arif et al., 2025). Additionally, limitations in digital infrastructure, low levels of technological literacy among healthcare professionals, and the lack of integration of health information systems are major obstacles to the widespread implementation of telemedicine and mHealth (Wulandari et al., 2025). The low involvement of nurses in the technology design process and digital policy decision-making also has the potential to strengthen the dehumanizing effects in nursing practice, making the active contribution of nurses essential to maintaining human values in technology-based services (Hernawati & Hariyati, 2023). In fact, nurses have strategic potential as a link between technological systems and community needs, particularly in the context of promotive and preventive care based on social proximity and local understanding.

Furthermore, Wulandari et al., (2025) emphasize that the successful implementation of digital technology in nursing practice is highly dependent on a contextual and participatory approach, including human resource training, cross-sector collaboration, and policies that are adaptable to local needs. Digital transformation in healthcare—through technologies like telemedicine, artificial intelligence (AI), and blockchain—plays a crucial role in improving access, efficiency, and the sustainability of healthcare systems. However, its success still depends on the quality of design integration, security, and digital leadership relevant to the context (Hameed et al., 2024). In line with this, the International Council of Nursing, (2023) emphasizes that nurses in various countries play a central role in shaping an interoperable digital health ecosystem by actively participating in the design, implementation, and evaluation of digital technologies to ensure safe, inclusive, and patient-centered services. This review is not only academically relevant but also has broad practical implications for the development of health policy, nursing education, and the design of equitable technology-based interventions.

To address the identified challenges and opportunities, this study was designed as a systematic literature review using the PICo (Population, Interest, Context) approach and reporting that follows the PRISMA 2020 guidelines. This review aims to fill the knowledge gap by compiling and analyzing empirical studies on the application of digital technology and telemedicine by nurses working in community services, home care, and rural areas. Specifically, this review addresses the research question: What is the current evidence on the application of digital technology and telemedicine by nurses in community services, home care, and rural areas? The main focus includes the form of technology adoption, the

role of nursing professionals, reported outcomes, and barriers and facilitators to implementation. Through a thematic synthesis approach, this study not only identifies patterns and trends but also critically evaluates the methodological quality of the included studies.

The results of this review are expected to contribute scientifically to the development of technology-based nursing practices, enrich the still-limited academic literature, and support the transformation of healthcare service systems that are more inclusive, adaptive, and sustainable. Additionally, these findings can serve as a basis for developing digital nursing curricula, formulating evidence-based policies, and designing interventions that are locally and globally relevant.

LITERATURE REVIEW

In the digital healthcare ecosystem, the nursing profession plays an increasingly strategic role. As direct service coordinators, healthcare system managers, information workers, and knowledge brokers, nurses are required to understand, appreciate, and enhance their competence in digital health technology (ICN, 2023). Active nurse involvement in the design, implementation, and evaluation of digital systems is crucial to ensure that the technology used truly reflects clinical needs, real-world workflows, and ethical values in nursing practice (Burgess & Honey, 2022). Furthermore, the role of nurses in the digital age includes functions as facilitators of technology education, developers of students' digital competencies, clinical practice mentors, and change agents in technology-based learning transformation across various service contexts (Jobst et al., 2022). Thus, strengthening nurses' digital capacity is not only a technical necessity, but also a key strategy for ensuring the success of an inclusive and sustainable healthcare system transformation.

RESEARCH METHOD

Review Design

This review is a Systematic Literature Review (SLR) compiled and reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines. The review protocol was designed using the PICo framework (Population, Phenomenon of Interest, Context) to ensure focus and accuracy of the research question. The population reviewed includes nurses working in community services, home care, or rural areas. The Phenomenon of Interest encompasses the utilization of digital technology or telemedicine in nursing practice, while the Context includes various community service, home care, and rural settings across different countries. The research questions guiding this review are: what forms of digital technology and telemedicine implementation are used by nurses in community services, home care, or rural settings, and what outcomes are reported?

The literature search process was conducted systematically to ensure transparency and replicability of the findings. The article search was conducted on two major online databases, ScienceDirect (n = 1,227) and Wiley Online Library (n = 976), which were selected for their extensive coverage of nursing and health publications. The search strategy was developed based on a

combination of keywords representing the Population, Phenomenon of Interest, and Context components of the PICo framework, which were then combined using Boolean operators. The predetermined keywords "Community Health Nursing, Community Health Centers, Rural Health, Telemedicine, and digital technology" were used in the literature search.

The search string is customized for each database while maintaining the same meaning and scope. The search was conducted on September 13, 2025, and was limited to research articles published between January 2020 and September 2025, in English, and available in full-text.

Inclusion and Exclusion Criteria

The study selection criteria were formulated to ensure that only relevant literature meeting methodological standards was included. A summary of the criteria is presented in the following table 1.

Table 1. Inclusion and Exclusion Criteria

Aspect	Inclusion Criteria	Exclusion Criteria
Type of Study	Primary studies (quantitative, qualitative, or mixed-methods)	Non-primary studies (literature reviews, conceptual frameworks, guidelines, or methodological instrument studies without empirical nursing practice data)
Professional Focus	Main focus on nursing practice or nurses' roles	Main focus not on nursing (e.g., physicians, patients, or interprofessional studies without specific nurse-focused analysis)
Intervention / Phenomenon	Utilization of digital technology or telemedicine in nursing practice	Digital health approaches unrelated to community, home care, or rural nursing practice
Context	Community, home care, or rural healthcare settings	Tertiary urban hospital settings without community/home care/rural components
Publication Period	January 2020 – September 2025	Outside the specified publication period
Language	English or Indonesian	Languages other than English or Indonesian
Accessibility	Full-text article available	Full-text unavailable or inaccessible

Study Selection Process

At the identification stage, a literature search in two major databases yielded a total of 2,203 articles, consisting of 1,227 articles from ScienceDirect and 976 articles from Wiley Online Library. All search results were exported to the reference management software Mendeley for deduplication based on Digital Object Identifier (DOI), so 11 duplicate articles were removed before the screening stage. After deduplication, a total of 2,147 articles entered the screening stage. At this stage, 876 articles were excluded because they were outside the 2020–2025 publication year range, and 493 articles were excluded because they were not

classified as research articles. From this screening process, 834 articles were obtained and advanced to the reports sought for retrieval stage. However, 489 articles were inaccessible because they were not available in open access format. A total of 345 articles that were successfully accessed full-text then underwent an eligibility assessment. At this stage, 267 articles were excluded because they were outside the nursing domain, 51 articles were excluded because they used irrelevant digital health approaches, and 16 articles were excluded because they did not meet the criteria for community or rural context. The final result of this selection process is 11 studies that met all inclusion criteria and were included in the final synthesis. The study selection process is visualized in the PRISMA diagram (Figure 1).

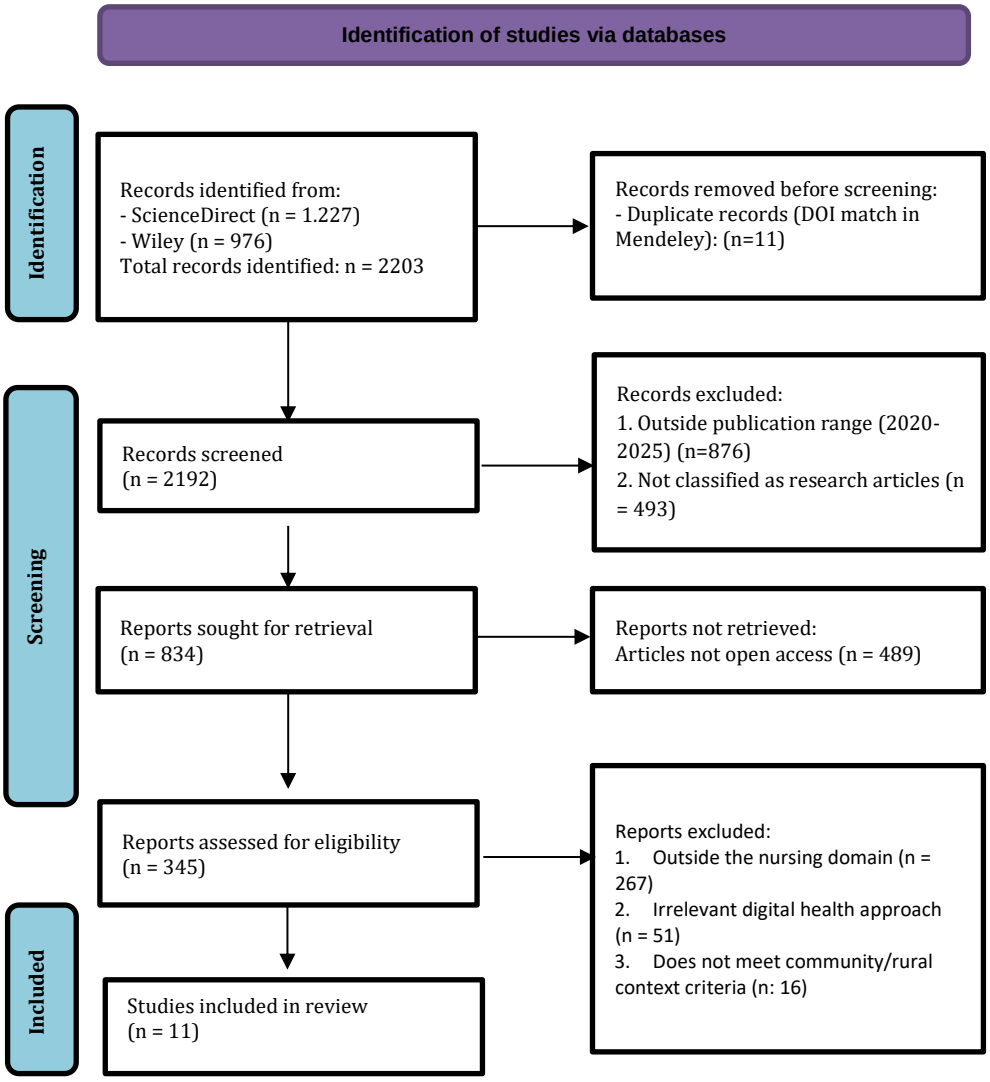

Figure 1. Flowchart of the Literature Search Strategy for This Systematic Review

Study Quality Assessment

The methodological quality assessment was conducted using the

JBI Critical Appraisal Checklist, adapted to each study design. Three reviewers independently assessed the studies and then discussed any differences until consensus was reached. The results of the methodological quality assessment are presented in Table 2

Table 2. Summary of Methodological Quality Appraisal (JBI)

No	Citacion	Study Design	JBI Checklist	Score (%)	Category
1	(Cimini et al., 2022)	Quasi-Experimental	Quasi-Experimental	89%	High
2	(Marcolino et al., 2022)	Descriptive observational	Cross-Sectional	75%	Moderate
3	(Soares-Pinto et al., 2023)	Qualitative (focus group)	Qualitative	80%	High
4	(Tso, 2022)	Qualitative (interview, ethnography)	Qualitative	75%	Moderate
5	(Chen et al., 2025)	Case series / Descriptive	Case Series	80%	High
6	(Currie et al., 2024)	Qualitative (interview, COREQ)	Qualitative	88%	High
7	(Ju et al., 2023)	Quasi-Experimental (pre-post)	Quasi-Experimental	90%	High
8	(Rodríguez-Ortega et al., 2025)	Descriptive observational	Cross-Sectional	75%	Moderate
9	(Emmett et al., 2024)	Cross-sectional survey	Cross-Sectional	80%	High
10	(Melanie et al., 2025)	Qualitative (interview, thematic)	Qualitative	90%	High
11	(Hakimjavadi et al., 2023)	Retrospective descriptive	Cross-Sectional	88%	High

Most of the studies (8 out of 11) were of high quality (score ≥80%), while three studies were in the moderate category (70–79%). There are no low-quality studies. These findings suggest that the available evidence is strong enough for further analysis, although interpretations of studies with moderate quality need to be made with caution.

Overall, the variety of research designs (quasi-experimental, qualitative, survey, and descriptive) enriches the perspective in the synthesis. High-quality studies provide a strong foundation for key themes such as service access, the role of nurses in decision support, and sustainability. Meanwhile, studies of moderate quality still contribute, especially in describing systemic barriers and implementation contexts, but their interpretation should be approached with more caution.

Synthesis Method

The synthesis process in this study was conducted using a thematic synthesis approach, which was chosen because it is suitable for integrating findings from various research designs, including quantitative, qualitative, and mixed methods. The first stage began with extracting data from each included article into characteristic tables and study outcome tables, including information on country, setting, type of nurse, digital technology used, study design, and primary outcomes. The extraction was done independently by three researchers and then compared to ensure consistency. Next, the findings from each study were read repeatedly and open-coded to capture key concepts, such as the role of nurses, the type of technology, the implementation context, barriers, and outcomes. Similar codes were then grouped into initial categories, which were further compared across studies to identify similarities and differences. From this process, the initial categories were synthesized into the main themes representing cross-study patterns, namely service access, the role of nurses in decision support, systemic barriers, and service sustainability.

In the next stage, the weight of interpretation for each theme considered the methodological quality of the studies based on the JBI appraisal results. High-quality studies served as the primary basis for drawing conclusions, while medium-quality studies were used as supporting or illustrative material. The final results were then presented in the form of thematic narratives supported by summary tables and data quotes from the studies, with an emphasis on the interconnections between the setting, type of nurse, digital technology, and outcomes. This approach allows the synthesis to not only describe the results of each study but also connect findings across contexts to generate a more comprehensive understanding.

RESULT

Study Results

Eleven articles that have undergone a systematic selection process show that the use of digital technology has driven significant changes in nursing practices and roles across various healthcare settings. This transformation is evident in primary care, community, and homecare services, where nurses are not only performing clinical functions but are also actively involved in the development and implementation of digital innovations (Booth et al., 2021). The use of digital technologies such as telemedicine, remote patient monitoring, mobile health apps, and electronic health records has been proven to expand access to healthcare services, improve efficiency, and strengthen coordination between service providers, particularly in rural and underserved areas. This technology integration not only reduces the need for physical visits but also enables continuous monitoring of chronic conditions and remote specialist consultations (Chandrakar, 2024). The findings from these studies are summarized in Table 3, which illustrates the strategic role of nurses in the digital healthcare ecosystem.

Table 3. Nurses In the Digital Healthcare Ecosystem

No	Author & Year	Article Title	Focus on Nurses	Main Findings Related to Nurses	Specific Context
1	(Cimini et al., 2022)	Pandemic-Related Impairment in the Monitoring of Patients With Hypertension and Diabetes and the Development of a Digital Solution for the Community Health Worker: Quasi-experimental and Implementation Study	CHWs supervised by nurses	Nurses guided CHWs in using a DSS app; the application was feasible and offline-capable; strengthened nurses' supervisory role in chronic disease monitoring	Nurses supervising CHWs; DSS app; primary care
2	(Marcolino et al., 2022)	Synchronous Teleconsultation and Monitoring Service Targeting COVID-19: Leveraging Insights for Post-pandemic Health Care	Nurses and other healthcare professionals	54% of respondents were nurses; 83% rated teleconsultation usability as satisfactory; nurses played roles in triage and follow-up during COVID-19	Nurses + multidisciplinary; teleconsultation platform
3	(Soares-Pinto et al., 2023)	eHealth Promoting Stoma Self-care for People With an Elimination Ostomy: Focus Group Study	Stomatherapy nurses	Consensus among nurses regarding eHealth platform needs; emphasized educational, self-monitoring, and	Stomatherapy nurses; eHealth self-care platform

				communication features; barriers included limited technology access among elderly patients	
4	(Tso, 2022)	Use of Social Media for Implementing Diagnoses, Consultation, Training, and Case Reporting Among Medical Professionals to Improve Patient Care: Case Study of WeChat Groups Across Health Care Settings	Community and multidisciplinary nurses	Nurses utilized WeChat groups for professional networking, complex procedure training, and timely diagnosis; enhanced collaboration	Community nurses; WeChat groups
5	(Chen et al., 2025)	Developing an Intelligent Mobile Clinic—A Medical Vehicle for Improving Access to Healthcare in Remote Areas: Evidence From China	Community nurses in mobile clinics	Nurses participated in village services and emergency response; integrated telehealth with direct visits; expanded practice reach	Community nurses; Intelligent Mobile Clinic (5G)
6	(Currie et al., 2024)	A Qualitative Approach to Exploring Nurse Practitioners' Provision of Telehealth Services During the COVID-19	Nurse Practitioners	NPs adapted effectively to telehealth; themes included challenges, creativity, and access impact;	NPs; telehealth (video/phone); COVID-19 period

		Pandemic in Australia		highlighted need for formal telehealth education (technology, assessment, cultural safety)	
7	(Ju et al., 2023)	A Nurse-Led Telehealth Program for Diabetes Foot Care: Feasibility and Usability Study	Nurse practitioners (educators and facilitators)	NPs led telehealth-based diabetes foot care education; demonstrated feasibility, acceptability, and the NP's role as digital educator	NPs; telehealth foot care; primary care
8	(Rodrígue z-Ortega et al., 2025)	Telemedicine as a Counselling Tool for Nurses in Central Africa	Community nurses	68% of telecounselling requests initiated by nurses; used as a clinical decision-support tool; barriers included internet costs, quality, and time constraints	Nurses in rural health centres; telemedicine counselling tool
9	(Emmett et al., 2024)	Evaluating the Use of the Mobile Electrocardiogram Technology KardiaMobile™ in Community Settings: An Online Survey	Community nurses	78.8% of respondents were nurses; 97% found KardiaMobile ™ useful; 73% believed it would become routine practice; barriers related to	Community nurses; mobile ECG (KardiaMobile ™)

				EHR data integration	
10	(Melanie et al., 2025)	Telehomecare as a Catalyst for a Multifaceted Transformation Towards Sustainable Practices: A Qualitative Study From a Practical Nurses' Perspective	Practical nurses in home care	Telehomecare transformed workflows, work environments, and resource allocation; required adaptive practice and transformative leadership	Practical nurses; telehomecare services
11	(Hakimjavadi et al., 2023)	Electronic Consultation Use by Advanced Practice Nurses in Older Adult Care—A Descriptive Study of Service Utilization Data	Advanced Practice Nurses (NPs, CNSs)	97.9% of eConsults initiated by NPs; APNs found eConsults helpful and educational (90%); strengthened inter-APN and interprofessional collaboration	APNs in primary care and LTC; eConsult platform

In Canada, advanced practice nurses (APNs) dominate the use of eConsult, with almost all cases initiated by nurse practitioners (Hakimjavadi et al., 2023). This confirms the capacity of APNs to lead interprofessional collaboration and expand access to specialist services. In Cameroon, community nurses initiate most tele-counseling, demonstrating their central role in clinical decision-making in areas with limited medical personnel (Rodríguez-Ortega et al., 2025).

The educational role of nurses is also prominent. Nurse practitioners in the United States are leading diabetes foot education telehealth programs, demonstrating the role of nurses as digital educators capable of facilitating patient behavioral changes (Ju et al., 2023). In Portugal, stomatherapy nurses emphasize the need for an eHealth platform to support self-care for ostomy patients, while also demonstrating nurses' involvement in the design of digital educational content (Soares-Pinto et al., 2023).

Some studies highlight the new challenges faced by nurses. Nurse practitioners in Australia reported the need for formal telehealth education to provide safe and culturally appropriate services (Currie et al., 2024). Community

nurses in England recognize the benefits of KardiaMobile™ for atrial fibrillation detection, but identify barriers to data integration into electronic medical records as a constraint to adoption (Emmett et al., 2024). In Nordic countries, practical nurses assess that telehomecare is changing work patterns and requires transformational leadership and continuous education to ensure the sustainability of practice (Melanie et al., 2025).

Additionally, studies in Brazil and China have shown the role of nurses in supervising and expanding the reach of services (Chen et al., 2025; Cimini et al., 2022). Nurses in Brazil guided community health workers (CHWs) using a decision support system (DSS) application, strengthening the supervision and monitoring functions for chronic diseases (Cimini et al., 2022). In China, community nurses are becoming an integral part of 5G-based intelligent mobile clinics, which are expanding service coverage to remote villages and accelerating emergency response (Chen et al., 2025).

Overall, the study results confirm that digital technology serves as a catalyst for transformation in nursing practice. Nurses not only demonstrate adaptability to new technologies but also proactively utilize them to expand professional roles, enhance clinical capacity, and strengthen the sustainability of healthcare systems. However, the successful implementation of digital innovations is highly dependent on a number of supporting factors, including the availability of formal education and continuous training, effective information system integration, transformative organizational leadership, and policies that explicitly recognize and support the strategic role of nurses in the healthcare service innovation ecosystem.

DISCUSSION

The findings from this systematic literature review indicate that digital technology and telemedicine have transformed nursing practices in various community settings, home care, and rural areas. Research (Navarro Martínez & Leyva-Moral, 2024) shows that nurse-led digital transformation positions nurses as key players in health technology innovation. They are not only using technology but also leading system changes, educating patients and staff thru digital media, and developing app-based solutions to improve service quality and operational efficiency. The paradigm shift toward modern nursing places nurses as strategic actors in the design, analysis, and application of data to support multi-sectoral collaboration and local context-based interventions (Bakken & Dreisbach, 2022). Integrating nursing with data science and informatics allows nurses to lead the transformation of healthcare systems that are responsive to social determinants and health inequities (Burgess & Honey, 2022).

To gain a deeper understanding of how nurses contribute to the technology-based healthcare ecosystem, a thematic analysis was conducted on eleven reviewed studies. The results of this analysis reveal five key contribution patterns that reflect the strategic role of nurses in digital transformation, encompassing

clinical practice, education, supervision, and adaptation to systemic challenges. The following discussion will elaborate on each subtheme in a structured manner, emphasizing the context of implementation, forms of intervention, and the implications for nursing practice in various service settings.

Expanding Professional Roles and Access to Services

The strategic role of nurses in expanding access to services thru digital technology is reflected in various cross-context studies. In Canada, advanced practice nurses (APNs) dominate the use of the eConsult platform, with almost all cases initiated by nurse practitioners, confirming their capacity to lead interprofessional collaboration and expand access to specialist services (Hakimjavadi et al., 2023). In Cameroon, community nurses initiate most telecounseling sessions, demonstrating their central role in clinical decision-making in regions with limited medical personnel (Rodríguez-Ortega et al., 2025). Studies from China and Brazil reinforce these findings, where nurses act as a bridge between technology and the community thru 5G-based intelligent mobile clinics (Chen et al., 2025) and the supervision of CHWs using a decision support system application (Cimini et al., 2022).

However, the success of this role expansion is highly dependent on systemic and contextual support. Differences in digital infrastructure, professional regulations, and organizational capacity are determining factors in optimizing the role of nurses in service innovation (Bakken & Dreisbach, 2022). In countries with decentralized healthcare systems and adequate digital infrastructure, nurses have greater opportunities to lead innovation and technology-based interventions. Conversely, in regions with limited resources, optimizing the role of nurses still relies on cross-sectoral collaboration and global support to bridge the digital divide (ICN, 2023). These findings underscore the urgency of investing in context-based training, interoperable information system integration, and policies that strengthen the professional autonomy of nurses as operational architects in an increasingly digitalized healthcare system (Tischendorf et al., 2024). This strategic role is also reflected in the educational dimension, where nurses utilize technology to facilitate behavioral change and improve health literacy.

Educational Role and Digital Content Design

Nurses play a central role as digital educators within the technology-based healthcare service ecosystem. In the United States, nurse practitioners led a telehealth program for diabetes foot education, demonstrating that technology-based interventions are not only operationally feasible but also accepted by patients as an effective approach for behavioral change (Ju et al., 2023). In Portugal, stomatherapy nurses emphasize the importance of eHealth platforms to support ostomy patients' self-care, while also demonstrating nurses' active involvement in the design of contextual and patient-needs-based digital educational content (Soares-Pinto et al., 2023). This finding strengthens the literature stating that nurses possess the pedagogical and technological competencies necessary to support the

transformation of healthcare services (Currie et al., 2024).

These studies show that the success of digital interventions is not only determined by the platform used, but also by the nurse's ability to create educational materials that are adaptive, evidence-based, and easily accessible to the target population. The current nursing curriculum still shows sporadic and unsystematic integration of digital technology, necessitating training strategies that strengthen nurses' pedagogical competencies in digital content design, including the use of interactive modules, simulations, and case-based approaches (Kleib et al., 2023). A study by Fitzpatrick, (2023) showed that using digital health applications designed to be interactive and educational can improve health literacy, strengthen patients' self-management abilities, and promote adherence to therapy. However, the effectiveness of this educational role is also influenced by implementation challenges and systemic barriers, which will be discussed in the next subtopic.

Implementation Challenges and Systemic Barriers

Despite the immense potential of digital technology in nursing practice, various studies highlight systemic and contextual implementation challenges. In Australia, nurse practitioners reported the need for formal telehealth education to ensure the services provided remain safe and culturally appropriate (Currie et al., 2024). In England, community nurses acknowledged the benefits of KardiaMobile™ in the early detection of atrial fibrillation, but identified barriers to data integration into electronic medical record systems as a major constraint to technology adoption (Emmett et al., 2024). Meanwhile, in Nordic countries, practical nurses believe that telehomecare significantly changes work patterns and requires transformational leadership and continuous education to maintain service quality (Melanie et al., 2025). This finding indicates that the successful implementation of technology depends not only on the devices used, but also on the readiness of human resources and adequate support systems.

Furthermore, a study by Galazzi et al., (2025) confirms that the success of digitalizing clinical practices heavily relies on the active involvement of healthcare professionals throughout all phases of the transformation, the development of comprehensive educational pathways from basic levels to lifelong learning, and sustained technical and organizational support. A study by Ibrahim et al., (2024) emphasizes that organizational support and adaptive policies are key prerequisites for ensuring the sustainability of digital innovation in nursing services. Maizie, (2025) emphasizes that without a clear regulatory framework and interoperable information systems, digital technology risks increasing nurses' workloads, raising the risk of documentation errors, and hindering service efficiency. Therefore, digital transformation in nursing must be accompanied by a holistic implementation strategy that encompasses technical, educational, and structural aspects in order to address local challenges while strengthening the resilience of the global healthcare system.

Supervision and Strengthening of Monitoring

Nurses in rural and regional areas play a central role in the implementation and supervision of Remote Patient Monitoring (RPM) programs. They are not only responsible for the collection and interpretation of technology-based health data, but also serve as the primary link between digital systems and the needs of community patients (Tagne et al., 2025). In Brazil, nurses guide community health workers (CHWs) through the use of a decision support system (DSS) application, which has proven effective in strengthening the supervision and monitoring of chronic diseases in primary care (Cimini et al., 2022). Meanwhile, in China, community nurses are an integral part of 5G-based intelligent mobile clinics, which not only expand service reach to remote villages but also accelerate responses to emergencies (Chen et al., 2025). These findings suggest that digital technology can strengthen surveillance functions, data-driven decision-making, and cross-role coordination in community nursing practice.

The effectiveness of digital technology implementation in nursing practice is significantly influenced by the technical readiness of healthcare professionals, the clarity of communication flow, and sustained organizational support (Alotaibi et al., 2025). The use of DSS and mobile clinic systems requires nurses to have competence in data interpretation, risk management, and interprofessional training (Abi Khalil et al., 2025). Additionally, the success of digital monitoring is also influenced by the interoperability of information systems and the clarity of roles between nurses and other healthcare professionals (Tagne et al., 2025). Therefore, strengthening the supervisory function in the digital age requires a systemic approach that includes data-driven training, integrating technology into clinical workflows, and policies that support sustainable interprofessional collaboration.

Implications of Thematic Synthesis and Study Quality

Thematic synthesis of the eleven reviewed studies reveals diversity in methodology, implementation context, and the focus of nurses' roles in digital transformation. Most studies use qualitative and quasi-experimental approaches, with fairly strong internal validity but limitations in cross-population generalizability. Studies such as Cimini et al., (2022) and Ju et al., (2023) demonstrate contextual and feasible implementation designs, while other studies like Melanie et al., (2025) and Rodríguez-Ortega et al., (2025) highlight systemic challenges that have not been fully addressed. The overall quality of the studies supports a meaningful synthesis, but caution is still needed when drawing universal conclusions, especially since most of the studies were conducted in countries with very different healthcare systems.

The implications of this synthesis confirm that nurses possess strategic capacity across various dimensions of digital transformation—from education and supervision to systemic leadership. However, to strengthen this contribution globally, it is necessary to strengthen technology-based nursing research methodologies, including the use of evaluation frameworks such as JBI and PRISMA to improve transparency and replicability. Additionally, future studies need to broaden their focus to include long-term impact, cross-cultural effectiveness, and the

integration of technology into the nursing curriculum. This synthesis also opens up space for the development of indicators of nurses' contribution to digital innovation, which can be used as a basis for more responsive and sustainable health system policies, training, and development.

CONCLUSION

This systematic review indicates that the integration of digital technology and telemedicine has significantly transformed nursing practice in community services, home care, and rural areas. Nurses are not only users of technology, but also clinical decision-makers, digital educators, supervisors, and system innovators. Across various contexts—from eConsult leadership in Canada to the implementation of 5G-based mobile clinics in China—nurses are leveraging technology to expand service reach, improve care coordination, and strengthen patient engagement.

Thematic synthesis identified four main domains: access to services, clinical decision support, systemic barriers, and sustainability. High-quality studies (JBI score ≥80%) provide strong evidence to support these themes, while studies of moderate quality enrich contextual understanding. Although the results are promising, successful implementation is highly dependent on formal telehealth education, interoperable health information systems, organizational leadership, and policies that support the strategic role of nurses in digital innovation.

These findings underscore the urgency of integrating digital competencies into nursing education, investing in infrastructure that supports frontline adaptation, and formulating inclusive policies that empower nurses as agents of digital transformation. Further research needs to explore the long-term impact of digital-based nursing interventions, particularly in underserved areas, and evaluate interprofessional collaboration models mediated by technology. Thus, this review not only strengthens the evidence of nurses' contribution to the digital ecosystem but also provides a strategic foundation for developing more adaptive and sustainable nursing policies and practices.

SUGGESTIONS

Future research is recommended to broaden the scope of literature searches by including additional databases and gray literature sources to obtain more comprehensive evidence. Longitudinal and experimental studies are needed to evaluate the long-term impact of digital-based nursing interventions, particularly in resource-limited areas. Additionally, it is important to explore the relationship between digital literacy, cultural competence, and organizational readiness in determining the successful implementation of telehealth. Developing a standardized evaluation framework for nurse-led digital innovations will also improve cross-context comparability and support evidence-based policy formulation.

CONFLICT OF INTEREST

The author states that there are no conflicts of interest in the preparation, analysis, and publication of this systematic review. The entire process was conducted independently without influence from third parties,

sponsors, or institutional affiliations that could affect the interpretation of the results.

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