

From Substitution to Redefinition: The SAMR Model as a Framework for AI Adoption in Nursing

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Abstract Background: AI is transforming nursing through predictive analytics and simulations, enhancing learning and care. Challenges include ethics, technical issues, and institutional resistance. **Aim:** This study explores how AI strengthens nursing education and clinical workflows, utilizing the SAMR Model. **Method:** A systematic integrative review (2018–2024) used CINAHL, Ovid Medline, and PubMed with PRISMA guidelines. **Results:** AI boosts learning via simulations and adaptive tools; clinically, it aids diagnosis and monitoring. SAMR shows AI's shift from basic tools to intelligent systems, though barriers like privacy and cost remain. **Conclusion:** AI aligns with healthcare goals like Saudi Vision 2030; success requires ethics, partnerships, and training

Keywords: Artificial Intelligence, Nursing Education, Clinical Practice, SAMR Model, Healthcare

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1. Introduction

The healthcare industry is changing because of the incorporation of artificial intelligence (AI) into clinical practice and nursing education [1]. There is a growing expectation to leverage technological innovations to improve patient care, streamline workflows, and achieve better health outcomes. Nurses' roles and responsibilities within the healthcare team are redefined when they use AI tools like machine learning algorithms and predictive analytics to help them make evidence-based decisions [2] (Kaul, Enslin, & Gross, 2020).

AI is being used in educational settings to help develop nursing curricula. Educational institutions are integrating AI technologies into simulation-based learning to help staff members obtain real-world experience in a risk-free setting [3]. Nursing staff, for example, can practice clinical skills while getting real-time feedback through virtual and augmented reality, which makes learning more dynamic and interesting.

Artificial intelligence is also crucial to evaluate

employee performance. By evaluating the strengths and weaknesses of the staff, intelligent tutoring systems can create individualized learning paths that meet each student's needs [3]. In addition to improving learning outcomes, this flexibility in teaching strategies guarantees that aspiring nurses are suitably equipped for any challenging clinical situations they may face.

AI in clinical practice improves data management and analysis, which leads to better patient care. Large volumes of patient data can be swiftly analyzed by AI-driven solutions, which can spot patterns and anticipate possible health declines [4,5]. Through anticipating patient needs and taking proactive measures, nurses can enhance the overall quality of care.

AI-powered clinical decision support systems, for instance, give nurses instant access to evidence-based policies and procedures. Nurses can make well-informed decisions that are in line with the most recent research and best practices by incorporating these systems into their daily practice [1]. In addition to improving clinical results, this integration increases nurses' self-assurance and decision-making skills.

Additionally, the use of AI in nursing has increased due

to the growth of tele-health. No matter where they are, nurses can deliver effective care thanks to AI technologies that improve virtual consultations and remote patient monitoring [6]. This approach ensures that patients receive timely and appropriate interventions, which is especially important in underserved or rural areas where access to healthcare may be limited.

The Significance of the Study

AI integration in nursing education is important for developing individualized learning programs that cater to the various needs of staff members. Through the use of AI-powered platforms, educators can modify instructional materials and offer immediate feedback, promoting both theoretical understanding and practical skills through simulations. This strategy is in line with Saudi Vision 2030's goal of raising educational standards and creating a workforce of highly qualified healthcare professionals [7].

AI also enhances nursing care in hospitals by helping nurses make decisions based on patient data analysis, which helps identify trends, predict problems, and suggest evidence-based interventions. Better patient outcomes result from this integration's increased nursing assessment accuracy and efficiency. Additionally, empowering nursing professionals and students with AI skills promotes innovation and advances research in the healthcare industry, which supports Saudi Vision 2030's objectives to modernize healthcare services and establish Saudi Arabia as a global leader in healthcare excellence [8].

Aim: To explore how artificial intelligence (AI) can enhance nursing education and clinical practice by utilizing the SAMR Model.

2. Objectives

1—Systematically review the existing literature on the use of AI technologies in nursing education and clinical practice, identifying key trends, benefits, and challenges.

2- Analyze applications of the SAMR Model and AI within nursing education and clinical settings, focusing on how these technologies improve learning outcomes and patient care.

3. Method

This integrative review gathered studies by conducting searches on databases such as CINAHL (EBSCO), Ovid Medline, and PubMed, specifically looking for articles published from 2018 to 2024. We employed a systematic search approach, utilizing keywords such as "Artificial Intelligence", "Nursing Education", "Clinical Practice", "SAMR Model", "Healthcare". The identification, screening, exclusion, and inclusion of studies adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, as depicted in Figure 1 (see appendix1).

Study Selection

To determine the relevance of the studies, authors independently screened the titles and abstracts of the identified studies. Afterwards, the full text of the chosen articles was scrutinized to confirm adherence to the

inclusion criteria. These criteria were strictly followed to make sure that only studies that matched the objective of the review were included. Similarly, we used exclusion criteria to eliminate articles unrelated to the review's objective. (Table 1, see appendix 2)

The Importance of Addressing Gaps in Education and Skills

Despite the promising integration of AI in nursing, significant gaps remain in education and skills. Many nursing programs may not adequately prepare staff to utilize AI technologies effectively. Identifying and addressing these gaps is crucial to ensure that future nurses are proficient in using AI tools and understand their implications in patient care [6].

Investments in skill development programs for nursing staff and practicing nurses are essential for healthcare organizations. Opportunities for ongoing professional development, like training courses and workshops centered on AI applications in nursing, can help close the skills gap. Healthcare workers can maintain their proficiency in a constantly changing technological environment by cultivating a culture of lifelong learning. Multidisciplinary cooperation is also required to close educational gaps. To create curricula that integrate the most recent developments in artificial intelligence, nursing educators should collaborate with technology experts [9].

Overview of the SAMR Model

Dr. Ruben Puentedura created the framework to assist teachers in successfully incorporating technology into instruction [10]. The acronym SAMR, which stands for Substitution, Augmentation, Modification, and Redefinition, represents various degrees of technological integration.

A clear framework for incorporating technology into nursing curricula is offered by the SAMR Model. Teachers can evaluate how well they are integrating technology into their lessons by classifying it into four levels: substitution, augmentation, modification, and redefinition [11,12]. This methodical approach assists teachers in selecting technologies that improve learning outcomes and meaningfully engage students in nursing education, where clinical judgment and practical skills are critical.

Substitution and Augmentation During the Substitution stage, technology directly replaces conventional teaching techniques without causing any functional changes. This scenario could entail substituting online resources for textbooks in nursing education [10]. Enhancements like using mobile apps for clinical guidelines are introduced during the augmentation phase, which improves information access while preserving conventional teaching methods.

Redefinition and Modification: The Modification phase involves transforming learning experiences through the use of technology and a substantial task redesign. For example, staff members' practical skills can be significantly improved by simulating complex clinical scenarios using simulation software. In the Redefinition phase, technology allows for previously unthinkable tasks, like working with peers globally on case studies or using telehealth platforms to conduct virtual patient assessments [11].

Enhancing Clinical Simulations

Improving Clinical Simulations Nursing programs can

make traditional clinical simulations more dynamic learning experiences by implementing the SAMR Model's Modification and Redefinition phases. For instance, rather than depending exclusively on mannequin-filled simulation labs, educators can use virtual reality scenarios that immerse students in authentic patient interactions, enabling them to practice critical thinking and decision-making in a secure setting [10]. The SAMR Model promotes a creative and immersive approach that equips students for the complexity of contemporary healthcare by rethinking the way clinical skills are taught and evaluated.

Because it stresses the value of combining different pedagogical approaches and technological tools, the SAMR Model also promotes interdisciplinary collaboration, which is essential for nursing education. This model facilitates the creation of comprehensive curricula that address the variety of skills needed in the nursing profession by promoting collaboration between nursing educators and educators from other disciplines, such as information technology and healthcare management. As a result, nursing students are better prepared for practice in the real world by learning how to use cutting-edge technologies and comprehending the collaborative nature of healthcare delivery.

Overview of AI Technologies Applicable to Nursing Education

Health professionals are using technology more and more, with several authors aiming to determine the factors influencing nurses' opinions and degree of satisfaction with it.

Technology has a big impact on education. When combined with a successful teaching strategy, it enables nursing students to take charge of their education and transforms processes of instruction and learning [13]. Strategic curriculum reforms, creative teaching approaches, and the successful integration of nursing informatics are all necessary to completely transform nursing education considering the swift technological advancements in healthcare [14].

The goal of this all-encompassing strategy is to equip nursing professionals to handle the increasingly complicated and technologically advanced healthcare environment. Nursing programs need to focus on building digital skills along with traditional clinical skills by updating their teaching methods to include things like simulation, virtual reality, and blended learning environments [8].

Nursing Simulation Education

Artificial Intelligence (AI) in nursing education has the potential to improve educational outcomes, expedite procedures, and enrich learning experiences. In nursing education, simulation is an essential technique that helps close the gap between theoretical understanding and real-world application, allowing nursing students to acquire crucial Employing simulation-based learning, which incorporates cutting-edge technologies like virtual reality (VR), allows educators to create realistic, immersive scenarios that replicate real-life patient interactions while fostering clinical skills in a risk-free setting. This method improves students' critical thinking, decision-making, and psychomotor control [15].

In addition to offering a secure setting for students to

hone their abilities, these experiences also help students overcome the difficulties brought on by a lack of clinical placements and instructor availability. Many students believe that manikins aren't realistic enough, which affects their capacity to develop their affective abilities, including empathy. Even though manikins offer a secure practice environment, there is a need for simulations to provide more realistic experiences. Research shows that pupils want more realism, including intricate patient care and ambient noise scenarios, to better prepare for the complex issues that arise in real-world nursing practice [11].

Additionally, as the use of simulated experiences grows, difficulties in securing such instructional strategies are thought to be crucial for preparing for high-quality clinical placements. Getting nursing students ready for professional practice in a competitive healthcare environment is crucial for future employment, as it depends on their ability to independently apply the skills they have learned in practical situations [15].

AI's Advantages for Improving Staff Engagement and Learning Outcomes

Incorporating AI into educational settings greatly improves learning outcomes and staff performance. involvement. AI analyzes each student to enable personalized learning experiences. AI uses data to adjust the pace and content to meet specific needs. Intelligent tutoring programs offer real-time feedback, allowing for interactive exercises to facilitate mastery. Furthermore, AI empowers Teachers with data-driven insights to comprehend performance patterns and modify tactics According to Mohammed (2018).

AI efficiently fosters professional growth by making customized training courses and uses cutting-edge communication tools to promote improved teamwork. Simplifying administrative procedures improves work-life balance by lowering the burden of repetitive tasks. This leads to a state of equilibrium and contentment in the workplace. All things considered, AI encourages an innovative culture, inspiring employees to investigate and use innovative teaching strategies and technologies, which will eventually result in a more efficient and satisfying learning environment for teachers and students.

The Role of AI in Clinical Practice

Artificial intelligence (AI) in clinical practice greatly improves decision-making and enhances the results for patients. AI-powered clinical decision support systems are important as they analyze patient information, such as lab results and medical records, to provide doctors with evidence-based recommendations and tailored treatment options [3]. Nurses can create personalized care plans and make more accurate diagnoses thanks to this technology, which eventually improves patient outcomes [7].

Additionally, the ability of AI to identify patterns in patient data enables prompt interventions by spotting early warning indicators of patient decline. As AI systems efficiently process large volumes of data, they support nurses' clinical judgment, enabling them to provide more precise, effective, and patient-centered care [7]. However, effective execution greatly depends on the caliber and representativeness of the data utilized, in addition to addressing data ethics, security, and privacy.

The Impact of AI on Patient Care, Safety, and Efficiency in Nursing Practice

AI is changing the way nurses provide care by providing them with access to resources that improve Decision-making, enhancing patient observation, and optimizing processes are the key objectives. For example, AI-powered clinical decision support systems examine enormous volumes of patient data to provide evidence-based guidelines, assisting nurses in making knowledgeable diagnoses and strategies for treatment [3]. Higher accuracy in patient care is encouraged by this capability since AI can recognize patterns and forecast patient results, allowing for prompt actions that enhance security and lower the chance of negative occurrences. Additionally, AI enhances patient safety through continuous monitoring systems that track vital signs and detect early signs of a patient's decline.

These forecast Analytics give nurses the ability to be proactive, which improves patient outcomes and decreases readmissions to hospitals (Mohammed, 2018).

AI systems can continuously monitor patients and alert nurses to any changes in vital signs or illnesses that require immediate treatment. This feature improves patient safety by allowing AI can forecast possible health issues by examining patterns, allowing for prompt interventions. This feature enables proactive actions by nurses and care teams by leveraging patterns in patient data. Such information improves overall patient safety and lowers the possibility of adverse events [13].

Comprehensive Description of the SAMR Model

Technology is now a vital component of contemporary education, changing conventional teaching strategies and creating new learning opportunities. The SAMR Model, developed by Dr. Ruben Puentedura, offers an organized method for evaluating and directing the incorporation of technology into learning settings [21]. The four levels of this framework—Substitution, Augmentation, Modification, and Redefinition—can be divided into two primary sections: Transformation (Modification and Redefinition) and Enhancement (Substitution and Augmentation).

At the substitution level, such as when reading an online textbook rather than a physical one, technology merely takes the place of conventional tools without changing the task. During the augmentation stage, technology adds features to the learning process, such as searchable and annotated e-books. Going on to Modification, technology radically reimagines the educational process by allowing students to work together on projects via online platforms, which promotes increased engagement. At the Redefinition level, technology allows for entirely new educational experiences that were previously unthinkable, like students making videos, conducting virtual interviews, or using online platforms to share their work with a global audience (Boateng & Kalonde, 2024).

Application of the SAMR Model to AI in Nursing Education

By providing immersive, individualized learning experiences for remote patient monitoring, artificial intelligence (AI) applications in nursing education, such as

ChatGPT and Metaverse technologies, improve abilities and confidence. By providing nurses with the necessary skills, this integration enhances the general standard of nursing practice and helps improve patient outcomes.

Furthermore, a recent study demonstrated possible uses in nursing by simulating student tests and scientific writing assignments using an open-source AI platform. It demonstrates how artificial intelligence is transforming nursing education by offering individualized learning through tutoring, as demonstrated by AI chatbots like ChatGPT [16]. One of the interactive learning approaches used in nursing education is simulation, which offers students a safe and dynamic digital learning environment, relevant feedback, and the chance to experience real-life scenarios without taking any risks. Many nations, including Australia, are depending more on educational institutions to provide realistic simulated learning experiences that adequately prepare nursing students for professional practice as the demand for high-quality clinical placements rises.

Paradoxically, the healthcare industry is putting pressure on recently graduated nurses to be prepared for the workforce, which means they need to be able to use the skills they acquired in their degree programs on their own in demanding and changing healthcare settings. [15].

Using the SAMR Model to Analyze AI Initiatives in Nursing Education

A framework for assessing how AI initiatives improve or change nursing education is offered by the SAMR Model, which stands for Substitution, Augmentation, Modification, and Redefinition. As demonstrated by AI chatbots answering administrative questions [14] and AI-based eBooks permitting speedy information retrieval (Hao et al., 2021), artificial intelligence (AI) replaces conventional approaches at the substitution level without altering their fundamental functionality.

By including features like automated grading tools like Grammarly that offer real-time feedback and personalized learning recommendations from AI platforms like Elsevier's Clinical Key (Gagnon & Young, 2020), the Augmentation stage improves these approaches (Grainger et al., 2024). AI-powered virtual labs that simulate clinical situations and provide practical experience [17] and learning platforms that adjust the material based on how students are doing in real-time [11] are two ways AI tools change educational activities during the Modification phase.

AI improves critical thinking and clinical decision-making by enabling students to interact with virtual patients and handle intricate medical situations at the Redefinition level [17] Cook et al., 2019). Additionally, AI makes it easier for people all over the world to access sophisticated simulations, which supports nursing education throughout one's life and encourages continuous learning [11].

By transforming instruction from static methods to interactive, adaptive environments, artificial intelligence (AI) in nursing education greatly increases students' competence and confidence in real-world healthcare settings.

The Application of The SAMR Model in Clinical Practices

Clinical practice can use the SAMR model to improve patient care and safety by integrating technology across its four hierarchical levels. At the substitution level, electronic health records (EHRs) can take the place of more conventional tools like paper-based patient records, facilitating faster data access and lowering transcription errors. Moving on to augmentation, technology can provide useful enhancements that improve proactive care and diagnostic accuracy, like automated alerts for drug interactions or remote patient monitoring systems.

Workflows are improved by using technologies like telemedicine platforms, which allow for remote consultations and better communication between patients and providers, reducing mistakes caused by miscommunication or delays in treatment.

Lastly, at the Redefinition level, entirely new methods appear, like using virtual reality simulations to train medical personnel in high-risk situations or AI-driven predictive analytics to prevent disease. In addition to increasing productivity, these applications develop novel methods for clinical decision-making and patient safety. Ensuring fair access to technology, giving healthcare professionals proper training, and handling moral dilemmas like data privacy are among the difficulties (Blundell et al., 2022). Healthcare settings can significantly improve patient safety and the standard of care provided by implementing the SAMR model effectively.

Challenges in Applying Artificial Intelligence to Clinical Practice and Nursing Education

Several issues need to be resolved for the integration of artificial intelligence (AI) into nursing education and clinical practice to be successful. These issues could hinder the uptake and efficacy of AI-driven systems, encompassing social, ethical, technological, and institutional components. Al-Bakri (2021) points out that a major disadvantage is the possible decline in one-on-one interaction between teachers and students, which can cause social isolation and impede the development of critical interpersonal skills.

Furthermore, AI systems handle sensitive data, which raises ethical and legal questions about security and privacy; data breaches can damage confidence and cause legal issues [18] (Al-Ghamidi, 2021). Significant obstacles may arise from the high expenses of deploying AI technologies, including infrastructure and training (Guan et al., 2020), which also call for intensive training for clinicians and educators (Kovanović & Gašević, 2019).

Additionally, especially in developing nations, technological constraints like device limitations and connectivity problems can impede productivity and irritate users [19]. Another significant barrier is resistance to change, which is exacerbated by generational differences and long-standing customs (Luckin & Çukurova, 2019). Furthermore, the over-reliance on AI technologies may stifle critical thinking in patient care, and clinicians may feel a loss of autonomy and creativity as a result (Al-Bakri, 2021). Additionally, ethical quandaries may be introduced by AI systems into clinical decision-making, making it more difficult to strike a balance between efficiency and the humanistic aspects of care (Dignum, 2021). Because successful implementation necessitates precise guidelines

and interdisciplinary collaboration, policy inconsistencies and a lack of cohesive strategies can impede AI integration at the institutional level (Pedro et al., 2019).

Finally, although AI may make it possible to provide individualized patient care and education, Guan et al. (2020) point out that real personalization is still difficult to achieve because different learning styles and cultural contexts must be considered.

4. Discussion

A revolutionary change in healthcare delivery and nursing professional preparation is represented by the incorporation of artificial intelligence (AI) into nursing education and clinical practice. Nevertheless, this shift is not without its difficulties, which include institutional, technological, ethical, and social aspects.

By improving learning outcomes through individualized and interactive experiences, artificial intelligence is revolutionizing nursing education. Intelligent tutoring systems, for example, offer nursing students individualized learning paths that consider their particular strengths and weaknesses [3]. This customization supports the objectives of Saudi Vision 2030, which include raising the standard of education and creating a workforce with the necessary skills (Rony, Parvin, & Ferdousi, 2024). Furthermore, virtual reality (VR) and other simulation technologies enable hands-on training in risk-free settings, which is crucial for developing nursing students' clinical and critical thinking abilities (Oyekunle et al., 2024).

AI improves patient care in clinical settings by managing data and offering evidence-based recommendations through clinical decision support systems. To spot patterns and forecast results, these systems examine enormous volumes of patient data, enabling nurses to take proactive measures [5]. Another example of how technology can enhance healthcare delivery is the use of AI-driven telehealth tools, especially in underserved areas with limited access to resources [6].

Notwithstanding its potential, there are many barriers to AI integration. One significant issue is the decline in human interaction, which can affect nursing students' development of critical interpersonal skills and cause social isolation (Al-Bakri, 2021). This difficulty emphasizes the necessity of striking a balance between opportunities for active participation and collaboration among peers and instructors and reliance on technology.

AI-related privacy and ethical issues also pose significant challenges. Healthcare disparities may worsen because of handling sensitive data, which brings up issues with privacy, security, and the possibility of bias in AI algorithms [18] (Al-Ghamidi, 2021). These problems emphasize how crucial it is to create strong ethical frameworks that direct the application of AI in clinical settings (Dignum, 2021). AI technologies can be expensive and resource-demanding, which can be a problem for organizations with tight budgets. The effective implementation of AI systems requires a large investment in maintenance, training, and infrastructure (Guan et al., 2020). Additionally, nursing is a field that frequently

exhibits resistance to change due to deeply ingrained established practices, which makes adopting modern technologies difficult (Luckin & Çukurova, 2019). Generational differences may exacerbate this resistance, as "digital immigrants" may find it difficult to adjust to tools intended for "digital natives." Addressing educational gaps in nursing programs is essential to enabling successful AI integration. Many curricula do not adequately prepare students to use AI technologies [6].

As a result, healthcare institutions ought to fund opportunities for ongoing professional development, like training courses and workshops centered on AI applications. To ensure that nursing graduates are proficient with these tools, nursing educators and technology specialists must work together to create curricula that incorporate the most recent developments in AI.

By helping students learn digital skills along with regular clinical skills, working together on curriculum design can make AI more useful and applicable in nursing education [20]. The nursing profession can adjust to the rapidly changing technological landscape by encouraging a culture of lifelong learning, which will guarantee that practitioners stay proficient in using AI to enhance patient outcomes.

Recommendation and Future Direction

A number of recommendations and future directions should be considered to fully utilize artificial intelligence's (AI) potential in nursing education and clinical practice. AI technologies must be methodically incorporated into the curricula of nursing education programs. This process involves creating classes that address both the theoretical underpinnings and real-world uses of AI tools in healthcare environments [22]. To guarantee that the curriculum incorporates the most recent developments in artificial intelligence and tackles real-world healthcare issues, interdisciplinary cooperation between nursing educators and technology experts is essential [5].

Nursing staff and educators should have access to opportunities for ongoing professional development. Online courses, training sessions, and workshops centered on AI applications in nursing can improve competency and close the skills gap. This investment in human capital is crucial to providing nursing professionals with the information and abilities they need to successfully apply AI technologies in their practice [6]. In an ever-changing technological environment, nurses can maintain their adaptability by cultivating a culture of lifelong learning. Promoting continuous education will help nurses stay up to date on new developments in technology, best practices, and evidence-based recommendations, which will ultimately improve patient outcomes.

For AI to be used responsibly in clinical settings, strong ethical frameworks and guidelines must be established. To guarantee the equitable and efficient use of AI systems, these frameworks ought to cover privacy, data security, and algorithmic bias. Nursing education and practice should incorporate ongoing conversations and training regarding ethical issues in the use of AI.

Increasing the use of simulation technologies, like augmented reality (AR) and virtual reality (VR), can produce immersive learning environments that equip nursing students for challenges they may face in the real

world. Teachers can improve critical thinking, decision-making, and psychomotor skills in a risk-free environment by incorporating complex clinical scenarios into simulation experiences [15].

Nursing programs should train students to incorporate AI tools that improve virtual consultations and remote patient monitoring as the demand for telehealth services keeps rising. Regardless of geographic constraints, nurses who receive effective training in these technologies are guaranteed to deliver high-quality care [6].

Evaluating the effects of AI integration on clinical outcomes and nursing education should be the main goal of future research. To identify best practices and possible areas for improvement, the process involves carrying out systematic reviews and studies that evaluate the efficacy of AI tools in diverse clinical and educational contexts.

Nursing education and practice can successfully use AI technologies by heeding these suggestions and embracing future directions. The results will improve patient care and aid in the creation of a skilled and adaptable healthcare workforce.

5. Conclusion

The delivery of patient care and learning opportunities could be greatly improved by incorporating AI into clinical practice and nursing education. However, we need to take proactive measures to tackle the inherent challenges posed by social interaction, ethical issues, resource demands, and resistance to change. The nursing profession can prepare its workforce to meet the demands of modern healthcare by encouraging collaboration between educational institutions and healthcare organizations and implementing a structured approach to technology integration. Such collaboration will ultimately improve patient care and educational outcomes.

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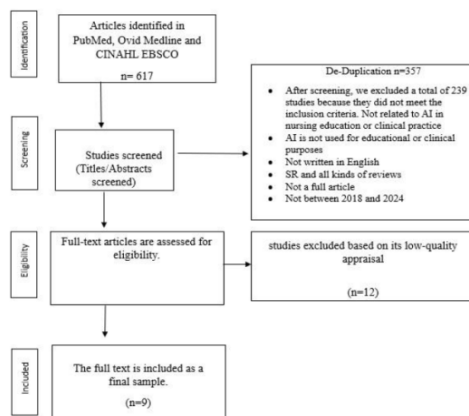
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Appendices

Appendix 1. PRISMA Guidelines



Adapted from Page MJ, McKenzie JE, Bossuyt PM, Boutron I, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*. 2021;372: n71.

Appendix 2. Inclusion and Exclusion criteria

Inclusion Criteria
Articles cover primary studies (quantitative studies, qualitative studies, mixed methods). Studies seeking to identify both the benefits and challenges of artificial intelligence in nursing education and clinical practice. Research conducted in healthcare settings. Articles published in the English language. Studies published between 2018 and 2024
Exclusion Criteria
Research that don't focus on the desired objectives. Articles consisting of abstracts alone or not written in English. Systematic reviews or any kind of reviews, or editorials, or letters to the editor or discussion papers or viewpoints. Articles unrelated to artificial intelligence in nursing education or clinical practice. Studies that were not published between 2018 and 2024