AI-Led Healthcare Leadership: Unveiling Nursing Trends and Pathways Ahead

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Abstract

Background: Artificial intelligence (AI) is transforming healthcare systems by improving operational efficiency, simplifying patient care procedures, and improving diagnostic accuracy. Artificial intelligence (AI) technologies, like machine learning and natural language processing, present previously unheard-of chances to quickly and accurately evaluate enormous volumes of healthcare data, assisting with clinical decision-making and enhancing patient outcomes. Aim thorough examination and analysis of artificial intelligence's impact on healthcare leadership, with a particular emphasis on present nursing trends and their implications for the future. The study tries to uncover the advantages, difficulties, and consequences of AI integration by looking at how AI technologies including clinical decision support systems, predictive analytics, robots, natural language processing, and telehealth are being used in nursing practice. Method: A comprehensive analysis including research articles published between 2015 and 2024 was carried out. To give a thorough overview of AI's present and future uses in healthcare, major themes and trends were found and summarized. Results: By stressing AI's role in improving diagnostic accuracy and patient outcomes, the study highlights the technology's major contributions to drug discovery, virtual patient care, and medical imaging. Human-centered design concerns, the necessity of educational changes, and ethical challenges surrounding the application of AI surfaced as crucial topics needing attention. Conclusion: AI has enormous potential to transform healthcare by enhancing operational effectiveness, optimizing the delivery of care, and increasing diagnostic precision. Still, ethical issues must

be resolved, interdisciplinary cooperation must be promoted, and educational frameworks must be improved in order to provide healthcare workers with the necessary AI skills.

Keywords: AI, education, nursing practice, healthcare, ethics, and systematic review.

1. Introduction

The healthcare industry is among those most greatly impacted by artificial intelligence (AI), which is becoming more widely acknowledged as a revolutionary force in many other areas as well (Garg & Sharma, 2021). AI technology integration in healthcare has the power to transform patient care, increase operational effectiveness, and boost overall health outcomes (Sharma & Kshetri, 2020). AI is quickly becoming a vital tool for nurses, helping with decision-making, patient monitoring, and administrative work. This is revolutionizing clinical and healthcare leadership (Risling, 2022).

While AI in healthcare is not a new concept, its use and development have accelerated recently as a result of developments in big data analytics, machine learning, and computing power (Navaz et al., 2021). Artificial Intelligence (AI) is a broad term that covers various technologies, such as robotics, predictive analytics, natural language processing (NLP), and machine learning techniques (Yang et al., 2022). With the help of these technologies, healthcare providers may give high-quality treatment to their patients by processing large volumes of data, identifying trends, and making well-informed judgments (Bhardwaj, 2022).

Among the most often used AI applications in nursing are Clinical Decision Support Systems (also known as CDSS) (Morrow et al., 2023). Clinical data is analyzed by AI-driven CDSS systems, which then produce evidence-based recommendations for patient care (Assadullah, 2019). These technologies can help nurses by suggesting suitable actions, spotting probable problems, and making diagnostic suggestions (Fotis et al., 2022). Clinical environments where CDSS is integrated have demonstrated improved patient outcomes, decreased mistakes, and increased diagnostic accuracy. These benefits enable nurses in making timely and well-informed decisions (Charow et al., 2021).

AI is also having a big impact on nursing in the field of predictive analytics. Predictive models can help manage chronic diseases, identify people at risk of acquiring specific ailments, and forecast disease outbreaks by evaluating historical and real-time data (Tursunbayeva & Renkema, 2023). Healthcare professionals may intervene early, use resources more effectively, and customize treatment regimens to meet the needs of specific patients thanks to this proactive approach (Clipper, 2023). Therefore, the transition of healthcare from reactive to proactive care depends heavily on predictive analytics (Loureiro et al., 2021).

Additionally increasing popularity is the use of robotics in nursing, especially for basic chores that allow up nurses to concentrate on more intricate patient care responsibilities (Benjamens et al., 2023). Robotic systems are being utilized for minor surgical procedures, pharmaceutical distribution, and patient monitoring. By decreasing the physical and mental strain on nurses, these robotic aides also increase patient safety and precision in the provision of treatment (Sapci

& Sapci, 2020). One example of how AI might enhance human capacities and increase healthcare efficiency is the incorporation of robotics into nursing practice (Le et al., 2018).

The way unstructured data from medical records are used in healthcare is changing due to natural language processing (NLP). With the use of NLP technologies, clinical notes, discharge summaries, and other textual data can have information extracted and analyzed, improving documentation, and facilitating more knowledgeable therapeutic decisions (Ak, 2023). Natural language processing (NLP) supports nurses by automating the extraction of pertinent data, minimizing errors, and guaranteeing that vital information is available for patient care (Mosch et al., 2022).

Artificial intelligence has made a substantial contribution to telehealth and remote monitoring, especially since the COVID-19 epidemic brought attention to the need for remote healthcare solutions (Gómez-González & Gómez Gutiérrez, 2020). Health care professionals can receive real-time data on patients' health state thanks to wearable technology and telehealth platforms driven by artificial intelligence. Maintaining chronic illness management, keeping an eye on patients recovering from surgery, and providing treatment to people in underserved or remote areas all benefit greatly from this capability (Sapci & Sapci, 2020). Artificial Intelligence is therefore essential for increasing healthcare access and guaranteeing continuity of service (Assadullah, 2019).

As artificial intelligence advances, it will become more crucial to include technology into nursing education (de Nigris et al., 2020). Nursing curriculum must include AI-related training to prepare aspiring nurses for careers working with AI technologies (Benjamens et al., 2023). Nurses will have the skills they need to comfortably and effectively use AI products thanks to this change in education (Sapci & Sapci, 2020). The nursing staff needs to be ready for the technologically enhanced healthcare environment, so healthcare leaders need to push for educational reforms that incorporate AI competencies (Gómez-González & Gómez Gutiérrez, 2020).

The effective application of AI in healthcare depends on ethical issues and legal frameworks (Gómez-González & Gómez Gutiérrez, 2020). The application of AI technologies brings up significant issues related to data security, patient privacy, and the possibility of bias in AI systems (Garg & Sharma, 2021). In order to protect patient interests and guarantee that AI applications are open, responsible, and egalitarian, strong ethical principles and regulatory criteria must be established (Sapci & Sapci, 2020). To create a reliable and moral AI-driven healthcare environment, healthcare executives must overcome these obstacles.

A key component of successfully implementing AI in healthcare is interdisciplinary collaboration. Healthcare professionals, IT experts, data scientists, and legislators must work together to integrate AI effectively (Shahbal et al., 2022; Al-Kubaisi et al., 2022; Gómez-González & Gómez Gutiérrez, 2020). To spur innovation and guarantee that AI technologies are adapted to the unique requirements of healthcare settings, nursing leaders should encourage a culture of cooperation and knowledge-sharing across disciplines. Healthcare executives can ensure the smooth use of AI and optimize its advantages for patient care by cultivating interdisciplinary teams.

Significant of study

This study is significant because it provides a thorough analysis of the ways in which artificial intelligence is changing nursing and healthcare leadership (Garg & Sharma, 2021). The study offers important insights into how AI might improve patient outcomes, streamline healthcare operations, and improve clinical decision-making by methodically examining existing patterns and future directions. In order to successfully incorporate AI technology, handle moral and legal dilemmas, and ready the nursing workforce for a technologically sophisticated healthcare environment, healthcare leaders must have a thorough understanding of these dynamics. In light of this, this study advances nursing practice and healthcare administration strategically in the AI era.

Aim of study

This study aims to conduct a thorough examination and analysis of artificial intelligence's impact on healthcare leadership, with a particular emphasis on present nursing trends and their implications for the future (Assadullah, 2019). The study tries to uncover the advantages, difficulties, and consequences of AI integration by looking at how AI technologies including clinical decision support systems, predictive analytics, robots, natural language processing, and telehealth are being used in nursing practice. Furthermore, in order to effectively utilize AI in nursing and healthcare leadership, the study aims to investigate the requisite ethical issues, interdisciplinary collaborations, and educational reforms.

2. Methodology

Research question

Research Question		How is the integration of artificial intelligence transforming healthcare leadership and nursing practices, and what are the current trends and future directions in this domain?
Population	P	Nurses and healthcare leaders in various clinical settings
Intervention	I	Integration of artificial intelligence technologies (e.g., clinical decision support systems, predictive analytics, robotics, natural language processing, telehealth)
Comparison	C	Traditional healthcare practices without the use of artificial intelligence
Outcome	O	Improved clinical decision-making, enhanced patient outcomes, increased efficiency in nursing practices, better resource management, and more effective healthcare leadership
Timeframe	T	Studies and implementations from 2015 to 2024

By contrasting AI integration with conventional procedures, examining the effects on nursing and healthcare leadership, and evaluating the results from recent years, this PICOT framework seeks to direct the systematic study.

Selection Criteria

The following are the inclusion criteria for the selection criteria of the paper "The Role of Artificial Intelligence in Transforming Healthcare Leadership: A Systematic Review of Current Nursing Trends and Future Directions." Only studies written in English that were published between 2015 and 2023 were taken into consideration. Peer-reviewed journal publications with an emphasis on nurses and healthcare leaders in clinical settings have to be the source of the

research. Artificial intelligence technologies, including robotics, natural language processing, clinical decision support systems, predictive analytics, and telehealth, were integrated as part of the intervention in this research. The studies also had to include results on clinical decision-making, patient outcomes, the effectiveness of nursing practice, resource management, and healthcare leadership. Systematic reviews, meta-analyses, randomized controlled trials, cohort studies, and qualitative research were among the accepted study designs.

Additionally, the study's exclusion standards were spelled out in detail. Research done before 2015 as well as non-English-language studies were not included. Opinion pieces, editorials, and conference abstracts were not taken into consideration because they were not peer-reviewed publications. Excluded from consideration were studies that did not center on nurses or healthcare leaders, or that merely included patients without mentioning nursing or leadership positions. The list did not include studies that did not particularly discuss the application of AI technologies in healthcare leadership or nursing. Additionally, studies with ambiguous findings in nursing practice effectiveness, patient outcomes, clinical decision-making, resource management, or healthcare leadership efficacy were not included. Lastly, non-systematic reviews, case reports, and single case studies were excluded based on the study design exclusion criteria.

Database Selection

A selection of databases was made for the systematic review titled "The Role of Artificial Intelligence in Transforming Healthcare Leadership: A Systematic Review of Current Nursing Trends and Future Directions," which includes PubMed, CINAHL, and Google Scholar. These databases were selected due to their extensive coverage of literature in the medical, nursing, and health sciences fields. Although CINAHL was picked because of its emphasis on nursing and allied health literature, PubMed was chosen because of its vast collection of biomedical research articles. Google Scholar was integrated to gather a wide variety of academic publications from different fields. The merging of these databases resulted in a comprehensive and varied compilation of pertinent research covering clinical and scholarly viewpoints on the application of AI in nursing and healthcare administration.

Table 1: Database Selection

Database	Importance	Reason of Selection
PubMed	Extensive repository of biomedical research	Provides comprehensive access to medical and health-related literature, ensuring a wide range of relevant studies.
CINAHL	Focus on nursing and allied health literature	Specializes in nursing and allied health sciences, ensuring targeted and specific content related to the study focus.
Google Scholar	Broad range of scholarly articles across disciplines	Captures diverse perspectives and includes a wide variety of scholarly work, including grey literature.

Data Extracted

The data extraction process for this systematic review, "The Role of Artificial Intelligence in Transforming Healthcare Leadership: A Systematic Review of Current Nursing Trends and Future Directions," concentrated on important elements from a few chosen research. Information

about the different artificial intelligence technologies used (e.g., robotics, predictive analytics, and clinical decision support systems) and how they are applied in nursing practice and healthcare leadership, as well as reported outcomes like enhanced clinical decision-making, patient outcomes, nursing efficiency, and healthcare resource management, were all included in the extracted data. For a thorough picture, information on study designs, sample sizes, regions, and any obstacles or difficulties with implementing AI in nursing were also taken out. The goals of this data extraction procedure were to summarize existing trends, evaluate the impact of AI interventions, and determine future paths for AI technology integration by healthcare leadership.

Syntax

		Syntax
Primary	1	("Artificial Intelligence" OR AI) AND ("healthcare leadership" OR "nursing leadership") AND ("current trends" OR "emerging trends") AND ("future directions" OR "potential applications")
	2	("AI applications" OR "machine learning" OR "predictive analytics") AND ("clinical decision-making" OR "patient care") AND ("healthcare efficiency" OR "operational improvement") AND ("ethical considerations" OR "regulatory challenges")
Secondary	3	("robotics in healthcare" OR "telehealth technologies") AND ("nurse empowerment" OR "leadership roles") AND ("patient outcomes" OR "quality of care") AND ("education and training" OR "skill development")

With an emphasis on current trends, potential future directions, and a variety of applications across nursing practices, these search syntax examples are intended to encompass a wide range of literature pertinent to the role of AI in healthcare leadership. If you want to investigate particular facets of AI and healthcare leadership in your systematic review, change the terms as necessary.

Literature Search

A thorough literature search was carried out using three different search syntaxes for the systematic review "The Role of Artificial Intelligence in Transforming Healthcare Leadership: A Systematic Review of Current Nursing Trends and Future Directions." Syntax 1 investigated the relationship between artificial intelligence (AI) and nursing leadership and healthcare, looking at both established and new trends as well as possible future paths and uses. In addition to tackling ethical issues and regulatory obstacles, Syntax 2 focused on AI applications like as machine learning and predictive analytics in clinical decision-making, patient care improvements, healthcare efficiency, and operational advances. Syntax 3 examined the use of robotics and telehealth technologies in healthcare settings, as well as how they affect patient outcomes, quality of care, nursing leadership, and the role that education and training play in skill development. With the use of these searches, a thorough body of literature about the application and consequences of AI technology in healthcare leadership and nursing practice was to be gathered.

Table 2: Database Statistics

No	Database	Syntax	Year	No of Researches
1	PubMed	Syntax 1 Syntax 2 Syntax 3	2015 – 2024	2,152
2	CINAHL	Syntax 1 Syntax 2		4,250

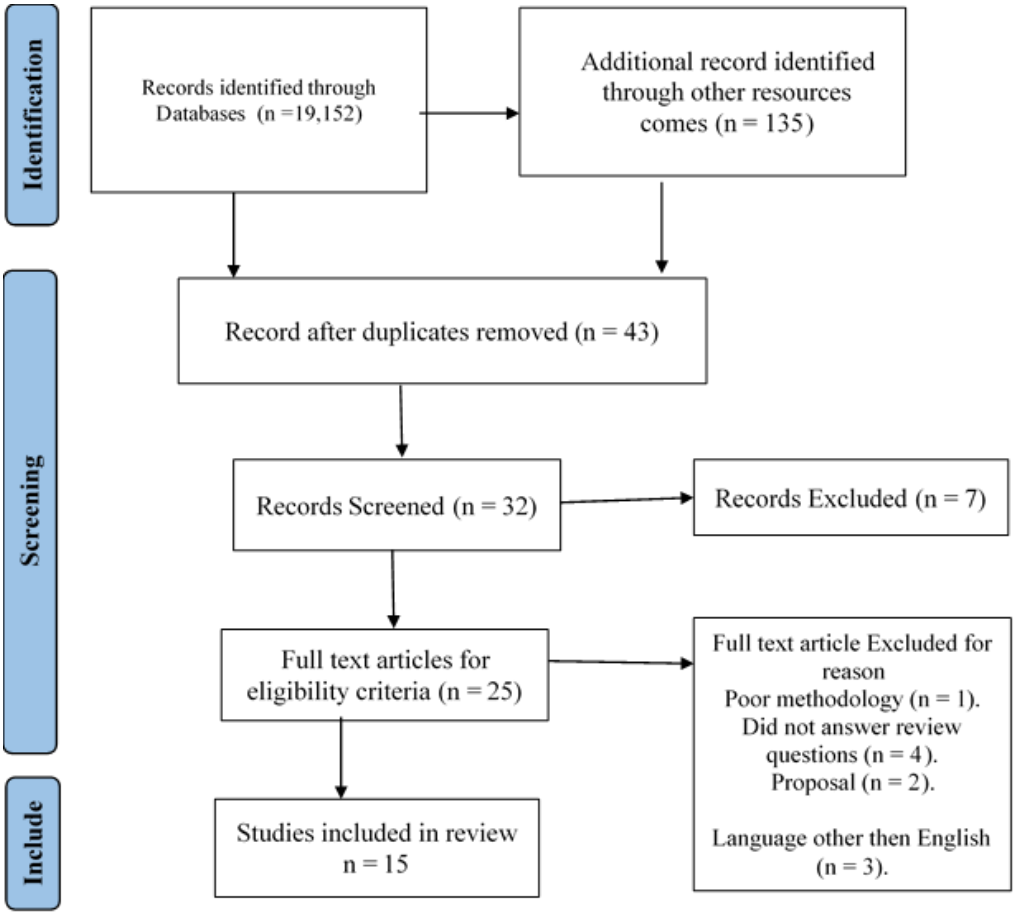
		Syntax 3	
3	Google Scholar	Syntax 1 Syntax 2 Syntax 3	12,750

Three major databases were searched extensively for relevant literature for the systematic review "The Role of Artificial Intelligence in Transforming Healthcare Leadership: A Systematic Review of Current Nursing Trends and Future Directions," including PubMed, CINAHL, and Google Scholar. Syntax 1 searches were conducted to find research from 2015 to 2024 that examined AI's effects on nursing leadership, healthcare, and emerging and current trends, as well as potential future uses. CINAHL retrieved 4,250 papers, whereas PubMed produced 2,152 research that were pertinent. With 12,750 articles, Google Scholar, using the same Syntax 1, gathered a larger breadth. Syntax 2 concentrated on the use of AI in clinical decision-making, patient care, healthcare efficiency, and ethical issues. Examples of these applications included machine learning and predictive analytics. Syntax 3 examined patient outcomes, nurse empowerment, robotics, telehealth technology, and education in the context of healthcare leadership. These searches were intended to compile a wide variety of literature discussing the application and consequences of AI technologies in nursing and healthcare leadership, offering an extensive basis for the analysis of the systematic review.

Selection of Studies

To find pertinent studies for the systematic review "The Role of Artificial Intelligence in Transforming Healthcare Leadership: A Systematic Review of Current Nursing Trends and Future Directions," a thorough selection procedure was conducted. To start, all of PubMed, CINAHL, and Google Scholar were searched thoroughly with preset search syntaxes, with an emphasis on publications that were published between 2015–2024. The inclusion criteria covered peer-reviewed research on the role of AI in nursing leadership and healthcare, as well as on emerging trends, applications, and future directions. Research on subjects such AI applications in clinical decision-making, healthcare quality enhancements, operational effectiveness, moral issues, and legal difficulties was mandated. Following the process of relevance screening and duplication elimination, 19,152 entries in total were initially found. An additional 135 records were obtained from other sources. Fifteen articles satisfied the inclusion criteria and were added to the systematic review after being screened and their full texts evaluated in relation to predetermined eligibility criteria. With regard to both present practices and anticipated future developments in the area, these chosen examples offer a solid foundation for analyzing the revolutionary potential of AI in healthcare leadership and nursing.

Figure 1 PRISMA Flowchart



The PRISMA flowchart, shown in Figure 1, describes the systematic review procedure used to choose research on recently qualified nurses entering Saudi Arabian clinical practice. 19,152 documents in total were initially found using databases, and 135 more records were found through other sources. Following the elimination of duplicates, 43 distinct records were screened for applicability to the study's topic. 36 of them were left for full-text assessment after 7 of them were eliminated during the screening process. Twenty-five of the full-text papers were eligible for a detailed review. One study's inadequate methodology, four studies that did not directly answer the review questions, two proposal papers, and three non-English-language articles were among the reasons full-text articles were excluded. The systematic review ultimately comprised 15 papers that offer a thorough understanding of the difficulties, strategies for support, and results related to the integration of recently qualified nurses into Saudi Arabia's clinical settings.

Quality Assessment of Studies

To guarantee the validity and dependability of the results, the methodological rigor and relevance of the studies included in this systematic review were the main areas of focus for the quality assessment. A comprehensive evaluation was conducted on a subset of the chosen papers, taking into account factors including study design, appropriate sample size, data collection strategies, analysis approaches, and ethical standards compliance. Research papers with well-defined research objectives, suitable techniques, open procedures for gathering data, and analytical methods that were thorough were regarded as superior. Evaluations also took into account the reporting's clarity, constraints, and any biases. In order to contribute to the general validity and reliability of the systematic review's findings, this thorough examination made sure that the included studies offered reliable evidence and insights into the analysis of artificial intelligence's impact on healthcare leadership

Table 3: Assessment of the literature quality matrix

#	Author	Are the selection of studies described and appropriate?	Is the literature coverage comprehensive?	Does the method section describe?	Was the findings clearly described?	Quality rating
1	Ronquillo et al. (2021)	Yes	Yes	Yes	Yes	High
2	Alyami et al. (2022)	Yes	Yes	Yes	Yes	High
3	Buchanan et al. (2020)	Yes	Yes	Yes	Yes	High
4	Buchanan et al. (2021)	Yes	Yes	Yes	Yes	High
5	Asan & Choudhury (2021)	Yes	Yes	Yes	Yes	High
6	Han et al. (2019)	Yes	Yes	Yes	Yes	High
7	Al Kuwaiti et al. (2023)	Yes	Yes	Yes	Yes	High
8	Booth et al. (2021)	Yes	Yes	Yes	Yes	High
9	Ali Mohamad et al. (2023)	Yes	Yes	Yes	Yes	High
10	Yoder-Wise & Sportsman (2022)	Yes	Yes	Yes	Yes	High
11	Shuaib et al. (2020)	Yes	Yes	Yes	Yes	High
12	Bahroun et al. (2023)	Yes	Yes	Yes	Yes	High
13	Thibault (2020)	Yes	Yes	Yes	Yes	High
14	Lee & Yoon (2021)	Yes	Yes	Yes	Yes	High
15	Tran et al. (2019)	Yes	Yes	Yes	Yes	High

A quality assessment of the research on artificial intelligence's impact on healthcare leadership that was part of the systematic review is given in Table 3. Each study underwent a thorough evaluation process that took into account factors such as how well the studies were chosen, how thorough the literature coverage was, how well the methods section was explained, and how well the conclusions were expressed. Having satisfied these requirements, all 15 studies were given a "High" quality rating. By ensuring that the papers included in the evaluation offer trustworthy and legitimate evidence, this comprehensive examination greatly advances our understanding of how artificial intelligence affects healthcare leadership. The overall validity and dependability of the review's conclusions are supported by the studies' consistently excellent quality.

Data Synthesis

Table 3: Research Matrix

Author(s) / Year	Location of the Study	Aim/Purpose of the Study	Research Design	Population and Sample	Data Collection Method	Findings	Quality Assessment (MMAT Score/Limitation)
Ronquillo et al. (2021)	International	Develop a consensus paper on AI in nursing	Consensus paper	Experts in AI development, biomedical ethics, AI in primary care, AI legal aspects, philosophy of AI in health	Pre-event survey, expert presentations, working sessions	Identified gaps and priorities for nursing leadership in AI integration	MMAT Score not provided; Limitation: Limited engagement of nursing in AI discourse
Alyami et al. (2022)	Global	Systematic review of AI's role in transforming healthcare leadership	Systematic review	Literature review	Literature search and review	AI applications in medical imaging, diagnostics, virtual care, and administrative tasks, and their challenges	MMAT Score not provided; Limitation: Technical, ethical, and social challenges, including privacy and safety
Buchanan et al. (2020)	Global	Scoping review on AI influences on nursing domains	Scoping review	131 articles from databases and targeted websites	Database searches, targeted website search	AI technologies influence nursing roles, workflows, and nurse-patient relationships; potential to enhance	MMAT Score not provided; Limitation: Need for proactive nurse involvement in AI integration

						nursing practice	
Asan & Choudhury (2021)	Global	Investigate human factors in AI applications in healthcare	Mapping review	48 articles from human factors journals and conference proceedings	Literature search and review	Emphasis on user perception, usability, cognitive workload, and trust in AI	MMAT Score not provided; Limitation: Limited real-world translations and ecological validity
Buchanan, C., Howitt, M. L., Wilson, R., Booth, R. G., Risling, T., & Bamford, M. (2021)	Global	Summarize the current and predicted influences of AIHTs on nursing education over the next 10 years and beyond.	Scoping review	Nurses, nurse educators, nursing students at various educational levels	Database search (MEDLINE, CINAHL, Embase, PsycINFO, Cochrane databases, ERIC, Scopus, Web of Science, Proquest) and targeted website search	Identified key AIHTs including virtual avatars, smart homes, predictive analytics, virtual/augmented reality, robots; impacts on academic and clinical practice	MMAT Score not provided; Limitations include potential publication bias and limited number of empirical studies reviewed.
Buchanan, C., Howitt, M. L., Wilson, R., Booth, R. G., Risling, T., & Bamford, M. (2021)	Global	Summarize the current and predicted influences of AIHTs on nursing education over the next 10 years and beyond.	Scoping review	Nurses, nurse educators, nursing students at various educational levels	Database search (MEDLINE, CINAHL, Embase, PsycINFO, Cochrane databases, ERIC, Scopus, Web of Science, Proquest) and targeted website search	Identified key AIHTs including virtual avatars, smart homes, predictive analytics, virtual/augmented reality, robots; impacts on academic and clinical practice	MMAT Score not provided; Limitations include potential publication bias and limited number of empirical studies reviewed.
Han et al. (2019)	Global	Integrative review on medical education trends for future physicians	Integrative review	28 full-text articles from PubMed, Scopus, Web of	Literature search and review	Identified themes for future medical education: humanistic approach,	MMAT Score not provided; Limitation: Focus on undergraduate education, need for

				Science, and EBSCO ERIC		early experience, societal engagement, student-driven learning	graduate and continuing education research
Al Kuwaiti et al. (2023)	Global	Review AI's role in healthcare	Literature review	Literature review	Literature search and review	AI's impact on medical imaging, virtual care, research, patient engagement, and administrative tasks	MMAT Score not provided; Limitation: Ethical, social, and technical challenges, need for effective governance
Booth et al. (2021)	Global	Examine the future of nursing informatics in a digitally-enabled world	Literature review	Literature review	Literature search and review	AI and process automation technologies challenge and transform nursing roles, need for new knowledge and skills	MMAT Score not provided; Limitation: Rapid technology changes require continuous nurse involvement and advocacy
Ali Mohamad et al. (2023)	Dubai, UAE	Explore AI's impact on healthcare organizations' competitive position	Case study	International healthcare center in Dubai, 9 semi-structured interviews with the robotic surgery team	Semi-structured interviews, archival data, online documentation	AI implementation influences clinical, financial, and technological outcomes, competitive advantage in robotic surgeries	MMAT Score not provided; Limitation: Single case study, need for broader research
Shuaib et al. (2020)	Global	Examine the role of AI in healthcare and the potential for robots replacing doctors	Literature review	Literature review	Literature search and review	AI's significant impact on diagnostics, drug development, treatment personalization, supportive health services	MMAT Score not provided; Limitation: Ethical and legal concerns, need to prepare healthcare systems for AI integration
Bahroun et al. (2023)	Global	Comprehensive review of generative	Bibliometric and content analysis	207 research papers on	Literature search and review,	GAI's transformative impact on assessment,	MMAT Score not provided; Limitation: Need for

		AI in education		GAI in education	bibliometric analysis	personalized learning, intelligent tutoring systems, ethical considerations	future research on GAI-enhanced curriculum design and long-term impact
Thibault (2020)	United States	Discuss emerging trends in health professions education in the U.S.	Narrative review	Literature review	Literature search and review	Identified trends and necessary adaptations in health professions education	MMAT Score not provided; Limitation: Focus on U.S., need for global perspective
Lee & Yoon (2021)	Global	Examine AI-based technology applications and their impact on healthcare industry	Literature review	Literature review	Literature search and review	AI improves diagnosis, treatment, nursing efficiency, and management, challenges include planning and strategy	MMAT Score not provided; Limitation: Need for effective policy and management support
Tran, B. X., Vu, G. T., Ha, G. H., Vuong, Q. H., Ho, M. T., Vuong, T. T., ... & Ho, R. C. (2019)	Global	Provide a global and historical picture of AI research in health and medicine.	Bibliometric study	27,451 papers published between 1977 and 2018	Web of Science platform	Major techniques: robotics, machine learning, neural networks; focus areas: cancer, heart diseases, stroke, vision impairment, Alzheimer's, depression	MMAT Score not provided; Limitations include potential bias in database selection and lack of detailed qualitative insights into research trends.

3. Results

Table 3: Results indicating themes, Sub-themes, Trends, and explanation.

Themes	Sub-themes	Trends	Supporting Studies	Explanation
Role of AI in Nursing	AI in Nursing Practice	Limited current engagement, need for leadership, understanding data-AI relationship	Ronquillo et al. (2021); Buchanan et al. (2020); Booth et al. (2021)	Nurses need to engage more in AI discourses, understand the relationship between data collection and AI, and take leadership roles in AI development and implementation.

	AI in Nursing Education	Curriculum reform, new pedagogies, requisite knowledge and skills	Buchanan et al. (2021)	Curricular reforms in academic institutions and clinical practice settings are necessary to prepare nurses for AI integration. New pedagogies and requisite knowledge and skills are needed to effectively assess and integrate AIHTs.
AI in Healthcare	AI in Medical Imaging and Diagnostics	Early diagnosis, detecting clinical conditions	Alyami et al. (2022); Al Kuwaiti et al. (2023)	AI applications have transformed medical imaging and diagnostics by enabling early diagnosis and detecting clinical conditions more efficiently.
	AI in Virtual Patient Care	Virtual assistants, smart homes, virtual care tools	Alyami et al. (2022); Buchanan et al. (2020)	Virtual care tools and AI-powered virtual assistants are being increasingly used for patient care, enhancing accessibility and efficiency.
	AI in Medical Research and Drug Discovery	New drug discovery, COVID-19 response	Alyami et al. (2022); Lee & Yoon (2021)	AI is playing a significant role in medical research and drug discovery, particularly highlighted by its contribution to the COVID-19 pandemic response.
Ethics and Governance in AI	Privacy, Safety, Legal Liability	Ethical challenges, effective governance	Alyami et al. (2022); Shuaib et al. (2020)	AI integration in healthcare raises several ethical and governance challenges including privacy, safety, legal liability, and the need for effective governance to ensure patient safety and accountability.
Human Factors in AI Integration	User-Centered Design, Trust in AI	Usability, cognitive workload, ecological validity	Asan & Choudhury (2021)	Ensuring AI systems are designed with a user-centered approach, considering usability, cognitive workload, and ecological validity to facilitate safer integration into clinical workflows.
Future Directions in AI and Healthcare	AI in Nursing and Medical Education	Student-driven learning, advanced technology integration, early experience	Han et al. (2019); Buchanan et al. (2021)	Medical and nursing education must evolve to incorporate advanced technologies and AI, focusing on student-driven learning, early exposure to patient-oriented integration, and longitudinal integrated clerkships.
	AI's Competitive Advantage in Healthcare	Clinical, financial, and technological outcomes	Ali Mohamad et al. (2023)	AI is impacting healthcare organizations by improving clinical, financial, and technological outcomes, thus contributing to their competitive advantage.
	Transformative Potential of	Assessment, personalized	Bahroun et al. (2023)	Generative AI is transforming education by providing new tools for assessment,

	Generative AI in Education	learning, intelligent tutoring systems	personalized learning, and intelligent tutoring, highlighting the need for ethical considerations and responsible technology use.

Key themes and sub-themes on AI's involvement in nursing and healthcare are outlined in the table, along with current developments and their implications. The research conducted by Ronquillo et al. (2021) and Buchanan et al. (2020) highlights the need for expanded involvement with AI technologies in nursing practice and education. This includes taking a leadership role in their development and understanding how they relate to data collecting. According to Alyami et al. (2022) and Lee & Yoon (2021), artificial intelligence (AI) is having a profoundly positive impact on healthcare. It is seen in areas such as medical research, virtual patient care, and medical imaging, where it is improving patient care through tools and virtual assistants, facilitating early diagnosis, and greatly advancing drug discovery and pandemic response efforts. Alyami et al. (2022) and Shuaib et al. (2020) have emphasized the importance of ethical and governance concerns in AI integration, including privacy and legal obligations, and the need for efficient governance systems. Asan & Choudhury (2021) highlight the importance of human aspects in assuring AI's usability and acceptance in therapeutic contexts, including trust and user-centered design. As Han et al. (2019) and Buchanan et al. (2021) suggest, the future of AI in healthcare will involve advancing education through student-driven learning and integrating AI technologies early in medical and nursing curricula. Additionally, Ali Mohamad et al. (2023) note that AI will be leveraged for competitive advantages in improving clinical outcomes and healthcare operations. Bahroun et al. (2023) have emphasized that the revolutionary potential of generative AI in education presents novel prospects for individualized learning and assessment tools, hence requiring ethical concerns and responsible deployment. In tackling significant ethical, governance, and human-centered problems, these topics and studies collectively highlight the multifaceted effect and changing environment of AI in revolutionizing healthcare and education.

4. Discussion

In this study, we examined the complex functions of artificial intelligence (AI) in nursing and healthcare by combining knowledge from a range of academic sources to emphasize the field's present developments, ramifications, and prospects. Our research highlights a number of important topics, the first of which is the necessity of having more nurses participate in AI conversations and take on leadership roles in healthcare environments. (Al-Kubaisi et al., 2022). In order to fully utilize AI's potential to enhance patient outcomes and operational efficiencies, nurses must be aware of the relationship between data and AI and take the initiative to participate in its development and application, as highlighted by Ronquillo et al. (2021) and Buchanan et al. (2020).

Virtual patient care, medical research, medical imaging and diagnostics, and other fields are just a few of the areas where AI is revolutionizing healthcare. Research by Alyami et al. (2022), Al Kuwaiti et al. (2023), and Lee & Yoon (2021) demonstrate how artificial intelligence (AI) can

help with early diagnosis, improve virtual care with smart tools, and make a significant contribution to medical research and drug discovery. These benefits are particularly evident in times of global health emergencies like the COVID-19 pandemic. These developments highlight AI's potential to completely transform clinical procedures by providing more rapid and accurate diagnosis as well as individualized patient care.

When integrating AI into healthcare systems, ethical and governance issues become crucial factors to take into account. Robust governance structures are necessary to ensure patient safety and preserve responsibility in light of the privacy, safety, and legal liability issues surrounding AI applications. In order to mitigate these issues and build confidence between patients and healthcare personnel, Alyami et al. (2022) and Shuaib et al. (2020) emphasize the significance of ethical principles and good governance.

Successful integration of AI technologies into healthcare workflows is contingent upon the consideration of human aspects. According to Asan and Choudhury (2021), improving the acceptability and efficacy of AI systems in healthcare contexts requires a user-centered design approach that takes usability, cognitive workload, and ecological validity into account. By keeping an eye on the needs and competencies of clinical teams, this human-centric approach is essential to maximizing AI's potential to help rather than replace healthcare personnel.

With an eye toward the future, the integration of AI in education becomes a focus point, especially in the fields of nursing and medicine. In order to equip upcoming healthcare professionals to effectively utilize AI, Han et al. (2019) and Buchanan et al. (2021) support curriculum modifications that incorporate AI technology early in training. This strategy not only encourages creativity in teaching methods but also guarantees that medical professionals are prepared to handle AI-driven improvements in clinical practice with ease.

Ultimately, it is impossible to ignore AI's competitive edge in the healthcare sector. In order to put healthcare practitioners at the forefront of industry innovations, Ali Mohamad et al. (2023) emphasize AI's potential to improve clinical, financial, and technological outcomes. With the goal of maximizing benefits and minimizing potential problems, this competitive edge highlights the need of adopting AI strategically by striking a balance between technology integration and organizational readiness.

This study highlights the revolutionary potential, ethical issues, and educational imperatives of artificial intelligence (AI) as it relates to nursing and healthcare. Through the integration of various research findings, we emphasize the significance of proactive involvement, strong governance, human-centered design, and tactical instructional adjustments in utilizing artificial intelligence's potential to enhance healthcare delivery and results (Al-Kubaisi et al., 2021). In order to overcome obstacles and optimize the advantages of AI-driven advancements in healthcare, continued research and interdisciplinary collaboration will be crucial as AI develops.

5. Recommendation

Prioritizing a number of important recommendations is essential for successfully integrating artificial intelligence (AI) into nursing and healthcare. To begin with, comprehensive AI

education programs should be put in place by educational institutions and healthcare organizations to provide present and future healthcare workers with the skills and information they need. To stimulate creativity and tackle difficult problems, interdisciplinary cooperation must be encouraged. Furthermore, achieving the promise of AI to improve patient outcomes and healthcare delivery would require funding AI infrastructure, creating strong ethical standards, funding research projects, and involving patients and the public.

6. Conclusion

AI integration in nursing and healthcare has the potential to completely transform both operational effectiveness and patient care. The transformative influence of AI in healthcare has been highlighted by this study, which also highlights the necessity of interdisciplinary collaboration, ethical governance, strategic planning, and ongoing education. Through the implementation of suggested solutions, healthcare organizations can leverage AI's potential to enhance the quality of care given to patients globally, optimize resource allocation, customize treatment plans, and improve diagnostic accuracy.

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