

A Vision for the Role of Artificial Intelligence in Improving Nursing Performance "Opportunities and Challenges"

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Abstract:

The current study aimed to review the role of artificial intelligence (AI) in improving nursing performance in light of opportunities and challenges. It addressed aspects of AI interventions in nursing performance, including enhancing diagnostic and care efficiency, developing personalized care and remote monitoring, accelerating diagnoses and improving the accuracy of results, improving administrative efficiency and communication, educating and training nurses using AI, and supporting decision-making. The role of AI in improving nursing performance was also addressed through its use in healthcare, assisting nurses in making clinical decisions, improving communication between patients and nurses, and AI in healthcare robots: challenges and opportunities in integrating AI into nursing, the future and expected improvements, enhancing personalized care, improving work efficiency, lack of technical knowledge among nurses, and concerns about privacy and security.

The study also addressed the functions of artificial intelligence (AI) in nursing care, including disease diagnosis, treatment personalization, drug discovery and development, predictive analytics, robot-assisted surgery, virtual health assistants and chatbots, administrative workflow assistance, clinical trial research, remote monitoring and wearable devices, radiology and pathology, mental health, ethical and privacy considerations, and learning. Continuous improvement, interoperability and data integration, 24/7 patient engagement, personalized patient interaction, efficient appointment scheduling, symptom screening and initial diagnosis, medication management and adherence, reducing workload for healthcare professionals, data collection and analysis, improving access to healthcare information, cost efficiency, mental health support, enhancing patient satisfaction and loyalty, language and accessibility, Yellow.ai automation, and final thoughts.

The role of AI in improving nursing performance was highlighted by shedding light on the role of AI and its applications in healthcare, improving nursing performance, improving medical diagnosis accuracy, and improving nursing performance by: improving diagnostic accuracy, improving patient follow-up, improving patient communication using smart robots, improving patient interaction, enhancing clinical decision-making by helping determine treatment plans, and improving nursing work efficiency.

Challenges facing the use of AI in nursing were reviewed by assisting in clinical decision-making, improving communication between nurses and patients using AI using smart robots in nursing care, improving healthcare quality, accelerating patient response, and personalizing healthcare, technical challenges, privacy concerns, and the future landscape. A proposed program was also proposed. Artificial intelligence (AI) in improving nursing performance is represented in the first phase: medical data analysis. The second phase: developing a smart nursing system to monitor health conditions. The third phase: training nurses to use the smart nursing system to enhance medical diagnosis. The fourth phase: evaluating the effectiveness of the smart nursing system. The fifth phase: improving the efficiency of the smart nursing system by developing nursing training skills. The sixth phase: predicting clinical developments.

Keywords: Artificial Intelligence - Nursing Performance - Opportunities and Challenges.

Introduction:

The healthcare industry is witnessing a remarkable convergence between medicine and artificial intelligence (AI), from accurate disease diagnosis to innovations in drug discovery and beyond. This review explores the role of AI in predictive analytics, robotic surgeries, virtual health assistants, and the pivotal role of healthcare chatbots. Artificial intelligence (AI) is an advanced technical field concerned with developing systems and programs capable of mimicking human reasoning and making decisions based on available data. In the field of nursing, AI can significantly contribute to improving nursing performance by enhancing the ability of nurses to provide healthcare faster and more accurately. Nursing Performance Concepts: Nursing performance refers to how nurses deliver high-quality healthcare. It is linked to several concepts such as professional competence, clinical decision-making, communication with patients and medical team members, and the ability to respond to various healthcare needs.

The basic concepts related to nursing performance are as follows:

- 1- Professional Competence: Professional competency is the ability to perform the required tasks in the nursing field to the best of their ability, including the technical and clinical knowledge and interpersonal skills necessary to provide safe and effective healthcare. It refers to a nurse's good performance, which requires mastery of knowledge and skills and the ability to apply

them effectively in clinical contexts. (Crisp & Taylor, 2016)

- 2- **Clinical Decision Making:** Clinical decision making is the process of using clinical knowledge to determine the most appropriate treatment for patients. It relies on assessments made by the nurse based on clinical signs and symptoms. This concept includes the ability to make effective decisions during nursing care and to interact with changing clinical situations. (Schneider & Day, 2008; Simmons, 2007)

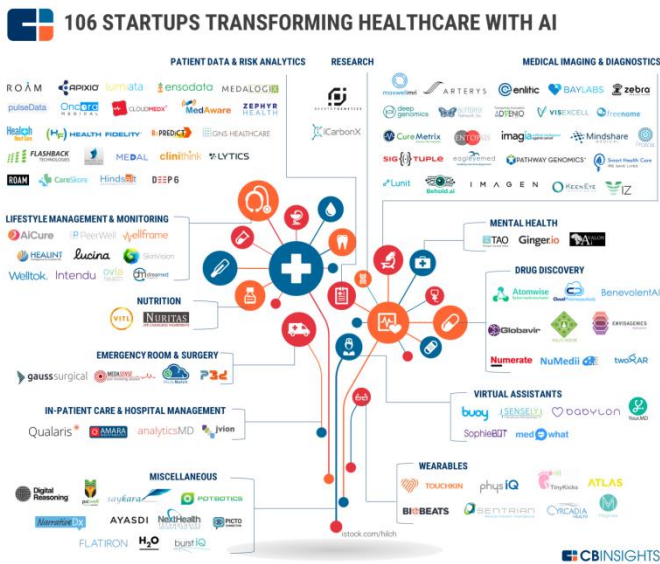


Figure (1)

- 3- **Communication in Nursing Care:** Effective communication between nurses and patients is an essential part of providing good nursing care. It includes verbal and nonverbal communication with patients and their families, as well as communication with medical team members to ensure proper care is provided. Good communication contributes to positive health outcomes and includes providing information, listening effectively, and offering emotional support to patients (Riley, 2010) (Schoenhofer, 2012).
- 4- **Safety and Quality of Care:** Safety and quality of care are two essential factors in nursing performance. This includes implementing clinical best practices to reduce medical errors and improve patient health outcomes. This concept includes following clinical guidelines and protocols to provide safe and effective care (Hughes, 2008).
- 5- **Nursing Leadership:** Nursing leadership is characterized by the nurse's ability to lead and guide the medical and nursing team to achieve healthcare goals and improve nursing practices. Support, inspiration, and advice are provided to team members, ensuring coordination

among all involved to provide effective nursing care (Kouzes & Posner, 2017; Wong & Cummings, 2007).



Figure (2)

- 6- **Evaluation and Follow-up in Nursing Performance:** Evaluation and follow-up in nursing care is the process of measuring the effectiveness of care provided to patients, analyzing care outcomes, and taking the necessary actions to improve performance. This includes using appropriate tools and standards to evaluate care and revising treatment plans according to the patient's condition and progress (Bennett, 2007; Blaine, 2012).
- 7- **Evidence-Based Nursing Practice:** Evidence-based nursing practice refers to the use of scientific evidence and research in clinical decision-making, with the goal of improving the quality of care provided to patients. Good nursing performance relies on the application of available research and data to support clinical decision-making (Melnyk & Fineout-Overholt, 2011).
- 8- **Holistic Nursing Care:** Holistic nursing care refers to an approach that addresses all aspects of a patient's health, including physical, emotional, social, and spiritual aspects. This care focuses on caring for the patient as a whole, not just physical factors. Dossey & Keegan, 2016).

The researcher Barnes & Dossey (2006) believes that the multiple concepts of nursing performance include professional competence, clinical decision-making, communication, leadership, and other concepts that contribute to the provision of effective and safe healthcare. Through these concepts, nurses seek to develop their skills and capabilities in providing comprehensive, high-quality healthcare.

Artificial Intelligence (AI) Concepts:

Artificial intelligence (AI), as a branch of computer science, aims to create systems that can simulate human intelligence to perform complex tasks similarly to humans, or even surpass them in some aspects.

The following are some basic concepts in AI, along with foreign references that document these concepts:

1- Artificial General Intelligence vs. Narrow AI:

- **Narrow AI:** This is a type of AI designed to perform a specific task or set of tasks. For example, voice assistants such as Siri or Alexa. (Russell & Norvig, 2016).

- **Artificial General Intelligence (AGI):** This refers to the type of AI that is designed to perform a specific task or set of tasks. Towards artificial intelligence that possesses the ability to learn and perform any human mental task. This is a far-fetched goal in the field of artificial intelligence (Boden, M. A. (2016).

2- Machine Learning: This is a branch of artificial intelligence concerned with developing algorithms that enable systems to learn from data and improve their performance based on that data without the need for pre-defined programming (Goodfellow; Bengio & Courville, 2016; Crisp & Taylor, 2016).

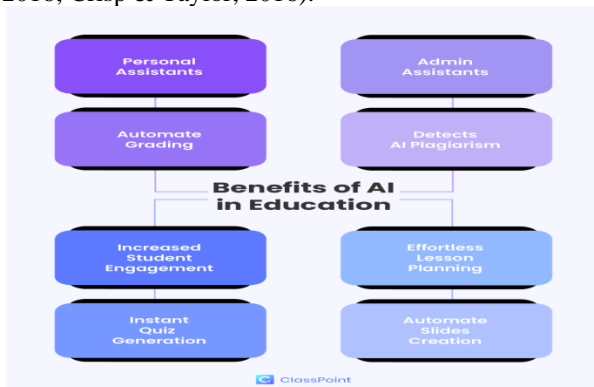


Figure (3)

- **Supervised Learning:** It relies on known data to train models.

- **Unsupervised Learning:** It does not rely on specific data and can detect patterns in data without human intervention (Goodfellow, Bengio & Courville, 2016).

- **Reinforcement Learning:** It is a type of learning where the system learns through rewards and punishments (Schmidhuber, 2015).

3- Artificial Neural Networks: Neural networks are structures inspired by the way the human brain works. The model consists of units (artificial neurons) that connect to each other to learn from data (Haykin, 2008).

4- Deep Learning: Deep learning, a type of machine learning, relies on multi-layer neural networks, which allow the system to learn complex patterns and representations from data (LeCun, Bengio & Hinton, 2015).

5- Computer Vision: Computer vision is a field of artificial intelligence that enables machines to "see" and analyze images and videos like humans. This includes facial recognition, object identification, and automatic dimension measurement (Szeliski, 2010; Deng, Dong, Socher, Li, Li & Fei-Fei, 2009).

6- Natural Language Processing (NLP): NLP aims to enable machines to understand, interpret, and process human language.

This includes tasks such as machine translation, text classification, and interacting with humans through dialogue. (Jurafsky & Martin, 2020).

7- Robotics: Robotics enhances the ability of robots to perform complex tasks such as navigation and interaction with the environment as systems capable of executing programmed tasks automatically. Artificial intelligence in this field (Siciliano & Khatib, 2016).

8- Explainable AI (XAI): Explainable AI refers to the development of AI systems whose decision-making process can be understood by humans. This is critical in fields that require confidence in decisions, such as healthcare. (Gilpin; Caruana & Gehrke, 2018; Ribeiro; Singh & Guestrin, 2016)



Figure (4)

9- AI Ethics: AI ethics concerns the ethical issues associated with the use of AI in areas such as privacy, discrimination, and automated decisions (Binns, 2018).

9- Smart Decision Systems: These systems use AI to support decision-making in a variety of fields, such as healthcare, finance, and manufacturing (Cath; Daniels & Kieseberg, 2018).

The researcher notes that AI is a broad field encompassing many concepts and models that aim to simulate and enhance human capabilities. From machine learning to interpretive AI, these systems improve many areas, from healthcare to autonomous navigation.

Aspects of AI Interventions in Nursing Performance: Artificial intelligence (AI) is one of the most prominent modern technologies impacting many healthcare fields, including nursing care.

This study aims to present a model that highlights the role of AI in improving nursing performance by improving diagnostic accuracy, patient monitoring, and the quality of healthcare.

Some of the benefits of AI interventions in nursing performance include:

1- Enhancing diagnostic and care efficiency: AI can support nurses in making accurate diagnoses based on the analysis of large amounts of medical data, such as medical test results, radiology, and clinical reports.

AI systems such as Deep Learning and Machine Learning (ML) are capable of detecting patterns that doctors or nurses may not notice. For example, AI can analyze X-ray images to identify diseases, such as tumors or fractures, that may go unnoticed by the medical team (Obermeyer; Powers; Vogeli & Mullainathan, 2016).

2- Improving personalized care and remote monitoring: AI technologies enable remote monitoring of patients, allowing nurses to track their health status in real time. For example, wearable devices such as smart watches and other smart measuring devices can be used to track heart rates, blood pressure, and blood sugar levels.

These devices collect and analyze data using AI, allowing for immediate action when health problems arise. (Banaee; Ahmed & Loutfi, 2013).

3- Accelerating diagnoses and improving the accuracy of results: In emergency situations, AI can speed up the diagnostic process through predictive models that help nurses make quick decisions.

For example, AI can help determine the progression of diseases in acute cases such as heart attacks or strokes based on available clinical data, allowing for immediate provision of appropriate treatment (Rajkomar; Oren; Chen et al., 2018).

6- Decision Support: AI contributes to supporting clinical decision-making through intelligent clinical decision support systems (CDSS).

These systems analyze clinical data and recommend appropriate treatment or warn of potential problems that could threaten patients' health. (Jiang; Jiang; Zhi et al., 2017).

The researcher points out that integrating artificial intelligence into nursing care can improve nursing performance and provide more accurate and efficient healthcare.

Health systems should focus on investing in this modern technology to develop the health system and improve the patient experience.

The Role of Artificial Intelligence in Improving Nursing Performance: In recent years, artificial intelligence (AI) has become one of the most prominent areas experiencing rapid development in various industries, including the healthcare sector. With the growing need to improve the quality of healthcare, it has become important to explore how advanced technologies such as AI can play a critical role in improving nursing performance.

This research will review the role of AI in improving nursing performance and identify how it can be used to improve the quality of healthcare. (Crisp & Taylor, 2016).

1- Employing Artificial Intelligence in Healthcare: AI refers to systems or programs designed to mimic intelligent human behavior, such as learning, analysis, and decision-making. In the healthcare sector, AI can be used to analyze data, and AI is a powerful tool for improving many aspects of nursing performance.

By using AI technologies, nurses can become more capable of making accurate and rapid treatment decisions. AI also helps in:

- Assisting nurses in clinical decision-making: Using AI can improve the ability to diagnose medical conditions and provide appropriate treatment plans based on clinical data (Dilsizian & Siegel, 2017). **1- Improving communication between patients and nurses:** Using intelligent systems can improve communication between nurses and patients. AI applications help, and many hospitals now use AI systems to analyze clinical data, helping nurses predict potential health problems in patients, such as chronic diseases or sudden health problems (Razzak; Imran & Xu, 2018).

2- AI in healthcare robots: AI-powered robots are used in healthcare delivery in some settings, such as assisting patients with daily tasks or providing psychological support to patients in intensive care units. (Jung & Choi, 2019).

Challenges and Opportunities in Integrating Artificial Intelligence into Nursing "Challenges and Opportunities": Challenges:

1- Lack of technical knowledge among nurses: There is a need to provide adequate training for nurses on the

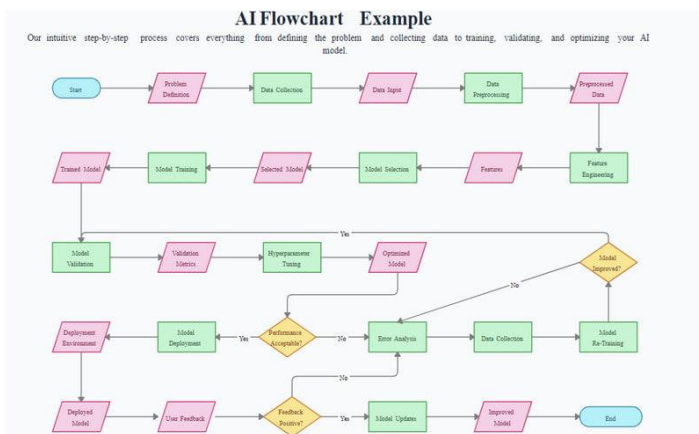


Figure (5)

4- Improving administrative efficiency and communication: AI can help improve administrative efficiency and communication among the medical team. For example, AI technologies can be used to analyze work schedules and distribute tasks among nurses more efficiently, ensuring that everyone can provide the necessary care. AI can also improve inventory management of medications and medical supplies. (Amara & Liu, 2019).

5- Educating and Training Nurses Using AI: AI can significantly contribute to improving nurse training programs. Technologies such as augmented reality (AR) and virtual reality (VR) can be used to simulate various medical conditions and train nurses on how to handle them.

This type of training allows them to learn practically without risking patients' lives. (Giger & Rauscher, 2021).

use of AI technologies, as the majority of nurses may not be fully familiar with the use of this technology in their clinical settings.

- 2- **Concerns about privacy and security:** Because AI deals with sensitive health data, ensuring the privacy and protection of this data is a major challenge (Binns & McNeil, 2017).

Opportunities:

- 1- **Improving work efficiency:** AI can improve the operational efficiency of hospitals and clinics by reducing medical errors and increasing the speed of decision-making.
- 2- **Enhancing personalized care:** AI can personalize healthcare based on accurate analysis of health data, enhancing the quality of care (Tschandl et al., 2020).
- 3- **The Future and Expected Improvements:** As artificial intelligence technologies continue to advance, their role in nursing will become more integrated into healthcare.

AI is expected to be used in areas such as improving clinical decision-making, patient monitoring, and disease prevention through early diagnosis (Verghese; Shah & Harrington, 2018; Bresnick, 2019).

AI is considered a powerful tool that can radically transform nursing performance by providing tools for data analysis, accurate clinical decision-making, and improved communication with patients (Zhao & Wu, 2019).



Figure (6)

Functions of Artificial Intelligence (AI) in Nursing Care: These include the following:

- 1- **Disease Diagnosis:** AI systems excel at analyzing complex diagnostic data. Through advanced algorithms, these systems can recognize patterns in X-rays, MRIs, or genetic information, often detecting diseases such as cancer more quickly and accurately than traditional

methods. For example, AI algorithms in dermatology have proven effective in distinguishing between benign and malignant skin lesions with remarkable accuracy, helping dermatologists detect cancer early.

- 2- **Treatment Personalization:** AI enables personalized patient care by analyzing individual health records, genetic information, and lifestyle factors. It helps determine the most effective treatment plans for individual patients. For example, in oncology, AI tools analyze various data points to recommend personalized drug combinations, leading to improved treatment outcomes and reduced side effects.
- 3- **Drug Discovery and Development:** AI accelerates the drug discovery process, analyzing biological and chemical data to identify potential drug candidates. It shortens the drug development timeline and also improves the likelihood of success. AI algorithms can predict how different compounds will behave and how likely they are to produce an effective treatment, thus improving the drug discovery process.
- 4- **Predictive Analytics:** AI predictive analytics are useful in forecasting healthcare trends and patient outcomes. By processing large data sets, AI can predict disease outbreaks, patient readmission risks, and potential disease progression. These insights enable healthcare providers to proactively manage health conditions and prepare for pandemic events.
- 5- **Robotic-Assisted Surgery:** AI-guided robotic surgery enhances precision and control during operations. These AI systems can analyze data from pre-operative medical records to guide surgeons in real-time during procedures. The minimally invasive techniques enabled by robotic-assisted surgeries reduce patient recovery time and reduce the risk of infection.
- 6- **Virtual Health Assistants and Chatbots:** AI-powered virtual assistants and chatbots are redefining patient engagement and support. These platforms can handle inquiries, schedule appointments, and provide medication reminders, enhancing the efficiency of patient-provider interactions. For example, AI-powered chatbots in mental health can provide initial consultations, track mood, and provide support until a human specialist is available.
- 7- **Assisting with Administrative Workflow:** AI significantly reduces the administrative burden in healthcare settings. From managing patient data to processing insurance claims and billing systems, AI streamlines administrative processes, allowing healthcare staff to focus more on patient care and less on paperwork.
- 8- **Clinical Trial Research:** In clinical trials, AI improves trial participant recruitment, identifies optimal trial sites, and predicts study success rates. By analyzing historical data and current medical trends, AI ensures the efficient design and execution of clinical trials, thereby accelerating the development of new treatments.

9- Remote Monitoring and Wearables: AI-powered wearables continuously monitor patient health metrics. It helps provide vital data for remote patient monitoring. Real-time data tracking allows for timely interventions in chronic diseases. Furthermore, it enhances patient management outside of traditional healthcare settings.

10- Radiology and Pathology: AI algorithms help analyze and interpret medical images, such as CT scans and pathology slides. These tools improve diagnostic accuracy by identifying subtle patterns that the human eye might miss. This leads to earlier detection of conditions such as tumors or strokes.

11- Mental Health: AI tools in mental health provide innovative solutions such as sentiment analysis and behavior prediction. These tools can monitor patient speech patterns and social media activity to identify signs of mental health problems and provide timely alerts for interventions.

12- Ethical and Privacy Considerations: The use of AI in healthcare requires strict adherence to ethical standards and privacy regulations. AI systems must be robustly designed to protect sensitive patient data and ensure fair and unbiased treatment recommendations.

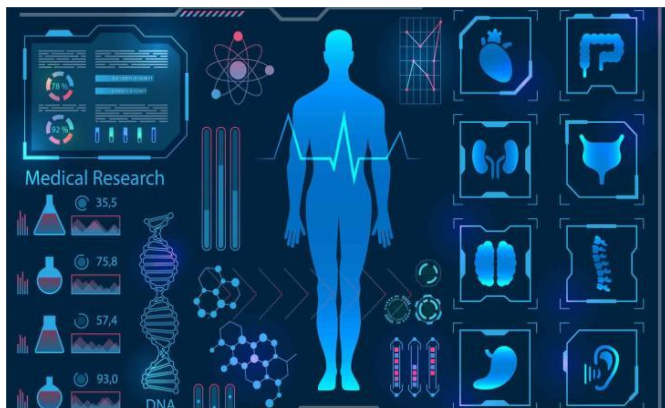


Figure (7)

13- Continuous Learning and Improvement: AI systems in healthcare are designed to continuously learn, allowing them to adapt and improve with every interaction. This feature ensures that healthcare delivery becomes more accurate and personalized over time.

14- Interoperability and Data Integration: AI enhances interoperability in healthcare systems. It facilitates data exchange and seamless integration across platforms. This capability ensures a more coherent and comprehensive view of a patient's health, which is critical for effective treatment planning and decision-making.

15- 24/7 Patient Engagement: Healthcare chatbots provide 24/7 support and address patient inquiries at any time.

This constant availability ensures that patients always have access to essential information and support. This significantly enhances patient experience and engagement.

16- Personalized Patient Interaction: AI-powered chatbots provide personalized communications based on a patient's history and preferences. They can tailor their responses and recommendations, making each patient interaction unique and more beneficial.

17- Effective Appointment Scheduling: Chatbots simplify the appointment scheduling process by handling reservations, reminders, and rescheduling requests, reducing administrative burdens and improving the overall patient booking experience.

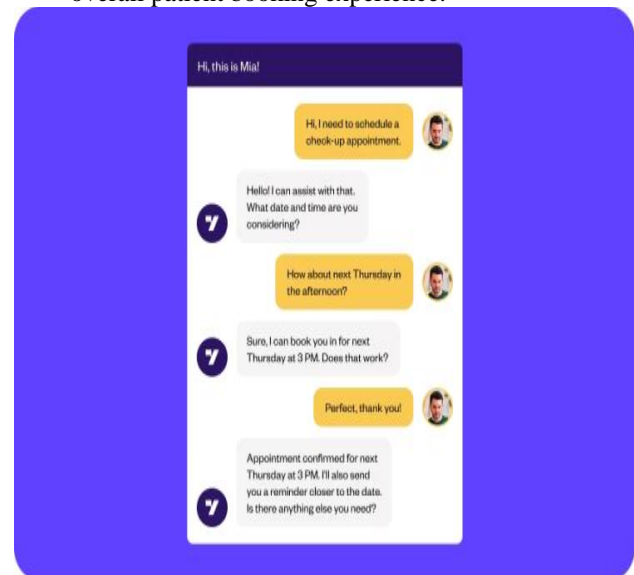


Figure (8)

18- Symptom Screening and Initial Diagnosis: AI-powered chatbots can conduct initial symptom assessments and guide patients through a series of questions to better understand their condition. While they are not a complete replacement for professional diagnosis, they provide valuable initial insights.

19- Medication Management and Adherence: Chatbots can remind patients of medication schedules, ensuring adherence to treatment plans. They can also provide information about drug interactions and side effects, promoting better medication management.

20- Reducing the Workload for Healthcare Professionals: By handling inquiries and routine tasks, AI-powered chatbots ease the workload for healthcare professionals.

This allows medical staff to focus on more complex and important aspects of patient care.

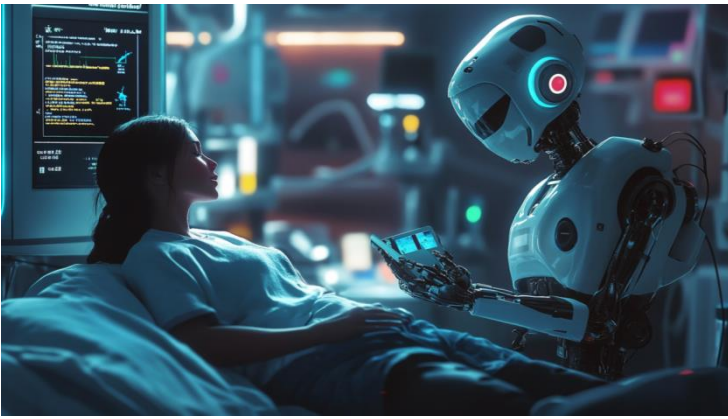


Figure (9)

21- Data Collection and Analysis: Healthcare chatbots collect valuable patient data during interactions. This data can be analyzed to gain insights into patient needs, preferences, and behavior, helping to improve healthcare services and patient outcomes.

22- Improving Access to Healthcare Information: Chatbots provide a convenient and accessible way for patients to access healthcare information.

They can answer inquiries about diseases, treatments, and health advice, enhancing patient education and awareness.

23- Cost-Efficiency: Chatbots reduce operating costs.

The efficiency and scalability of chatbots make them a cost-effective solution for healthcare providers.

24- Enhancing Patient Satisfaction and Loyalty: By providing prompt, accurate, and personalized responses, healthcare chatbots enhance patient satisfaction.

This enhanced experience fosters patient loyalty and trust in healthcare providers.

25- Mental Health Support: AI-powered chatbots are increasingly being used to support mental health.

They provide a non-judgmental platform for patients with mental health conditions to express their feelings and receive guidance.

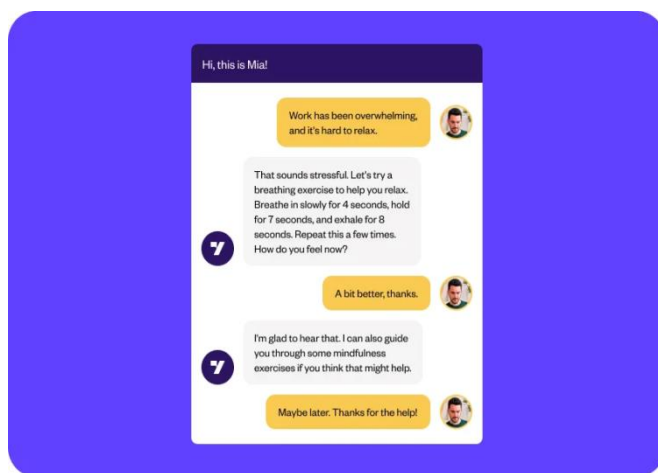


Figure (10)

26- Language and Accessibility: With multilingual capabilities, chatbots break down language barriers, making healthcare accessible to diverse patient groups.

Yellow.ai Automation: In the dynamic healthcare space, where every second and every interaction matters, Yellow.ai stands out as a leader in innovation and efficiency.

Its sophisticated AI-powered chatbot solutions can enhance patient experiences and streamline healthcare processes.

Here's how Yellow.ai is changing healthcare:

Advanced AI Technology: Yellow.ai chatbots are powered by sophisticated AI algorithms, ensuring responsive and insightful interactions.

Our chatbots understand patient needs through advanced natural language processing (NLP), delivering a level of engagement that feels personalized and empathetic.

Personalized Patient Care: Every patient's journey is unique, and Yellow.ai recognizes this by delivering personalized healthcare experiences.

Whether it's managing appointments or providing health information, Yellow.ai chatbots tailor their responses to individual patient profiles.

Seamless Integration: These chatbots easily integrate with existing healthcare systems, ensuring a smooth transition and enhancing workflow without interruption.

Data Analysis and Insights: By analyzing interactions and patient data, Yellow.ai provides invaluable insights to healthcare providers, enabling them to optimize their care strategies and better understand patient needs.

Scalable Solutions: As healthcare demands grow, Yellow.ai's Dynamic Automation Platform (DAP) solutions can help you scale accordingly, deftly handle increased interactions, and adapt to changing healthcare environments.



Figure (11)

Final Thoughts: The future of healthcare with AI looks beyond traditional approaches to a world where data and machine learning redefine patient care.

This integration represents a fundamental shift toward precision, efficiency, and personalization in treatment approaches.

- AI in healthcare creates a collaborative ecosystem.
- This ecosystem includes technology that complements human expertise.
- It leads to breakthroughs in patient experiences and treatment outcomes.

As AI technology continues to mature, it promises to reshape our strategies for addressing healthcare challenges, fostering innovations for more effective treatments and enriched patient care.

AI-powered treatments, designed with advanced algorithms and machine learning capabilities, offer numerous benefits:

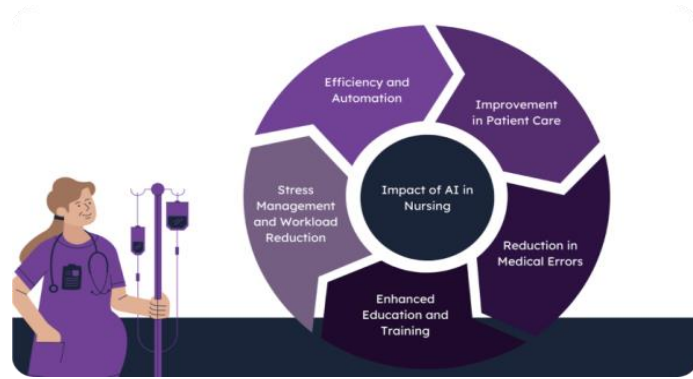


Figure (12)

The Role of Artificial Intelligence in Improving Nursing Performance:

Artificial intelligence (AI) is a modern technology that has significantly impacted many fields, especially healthcare.

In recent years, AI has begun to play an increasing role in improving nursing performance by enhancing healthcare efficiency and diagnostic accuracy, as well as improving interactions between nurses and patients.

AI enhances the role of nurses in making clinical decisions, analyzing big data, and performing personalized care.

- Artificial Intelligence and its Applications in Healthcare:

AI in healthcare is used to analyze clinical data, provide tools to aid medical decision-making, improve communication between patients and nurses, and support the overall treatment process. -AI has transformed the healthcare landscape, with rapid diagnoses, tailored treatments, and effective preventative care becoming the norm.

-Beyond being just a technological fad, AI in healthcare is reshaping the fabric of medical practice.

-It's important to understand that AI isn't just about automating tasks or reducing errors.

- In fact, it's a dynamic shift toward smarter, patient-centered care. (Razzak; Imran & Xu, 2018).

Artificial intelligence (AI) is characterized by the ability of systems to process and analyze data in ways similar to the human mind. In healthcare, AI is applied to analyze medical data, improve diagnosis, support clinical decisions, and monitor patient health (Razzak; Imran & Xu, 2018).

1- Applications of AI in Improving Nursing Performance:

A. Improving the Accuracy of Medical Diagnosis:

B. AI is an effective tool for improving diagnostic accuracy by using machine learning and artificial neural networks to analyze clinical data and medical images.

C. Nurses can use these tools to more accurately identify medical conditions, which helps in making quick and accurate treatment decisions (Sharma & Singh, 2020).

D. The healthcare sector has witnessed significant progress in the use of artificial intelligence (AI) technologies to improve nursing performance, as AI has become an essential part of improving the quality of healthcare and providing innovative solutions.

E. AI in nursing can help make more accurate clinical decisions, improve communication between nurses and patients, and monitor patient health conditions in real time. In this program, we will review how artificial intelligence (AI) technologies can contribute to improving nursing performance, and we will review recent foreign references that support this trend (Topol, 2019).

2-Using AI to Improve Nursing Performance:

A. **Improving Diagnostic Accuracy:** AI helps provide accurate and reliable diagnoses, enhancing nurses' ability to identify complex medical conditions.

An intelligent system can analyze medical images, such as x-rays or patient records, to provide recommendations on potential diagnoses (Sharma & Singh, 2020).

B. **Improving Patient Follow-up:** AI technologies monitor patient conditions in real time. AI can collect and analyze patient data such as heart rate, blood pressure, and temperature, and analyze changes in this data to predict potential health problems (Bates, D. W., & Wright, 2016).

3. AI Tools to Improve Patient Communication:

A. **Using Smart Robots:** AI-powered smart robots are used in nurses' interactions with patients. Robots provide medical advice, explain instructions to patients, and ask questions that help diagnose conditions (Jung & Choi, 2019).

B. **Improving patient interaction:** AI can also improve communication between nurses and patients through smart applications that help closely monitor patients' health and alert nurses to any changes in their health status (Tschandl et al., 2020).

4- Applications of AI in enhancing clinical decision-making:

A. **Assisting in determining treatment plans:** AI can analyze clinical data, including patient history,

symptoms, and other medical information, to provide accurate treatment options. Nurses can use this information to make more accurate decisions about patient treatment (Bresnick, 2019; Verghese; Shah & Harrington, 2018).

5-Improving nursing efficiency: The role of artificial intelligence is to improve nursing efficiency by reducing medical errors, accelerating decision-making, and improving the quality of healthcare.

AI can be used to improve daily processes such as medical record management, remote patient monitoring, and nurse scheduling (Sharma & Singh, 2020; Wright & Bates, 2016).

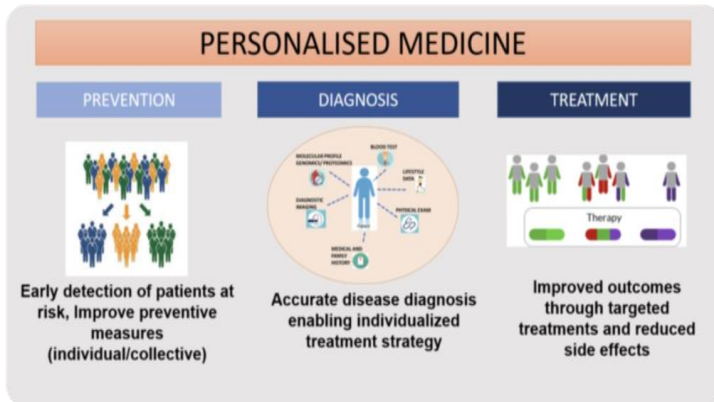


Figure (13)

6- Challenges and Opportunities in Integrating Artificial Intelligence into Nursing:

Challenges: - Technical Training: There is a need to train nurses to use AI tools effectively.

- Privacy and Security: Protecting medical data is one of the most important challenges that must be addressed when using AI (Zhao & Wu, 2019).

Opportunities:

- **Improving Personalized Care:** By analyzing big data, AI can provide personalized care to patients. - **Increasing Efficiency:** AI helps reduce medical errors and improve the overall quality of healthcare (Binns & McNeil, 2017).

The researcher indicates that AI is one of the essential tools that can contribute to improving nursing performance. By improving diagnosis, patient monitoring, and supporting clinical decision-making, AI can significantly improve the quality of healthcare. Despite the challenges associated with implementing this technology, the benefits of its use in the nursing sector herald a bright future for the healthcare sector (Topol, 2019).

A.Continuous Patient Monitoring: AI technologies allow nurses to monitor patients' health in real-time using smart devices. For example, wearable devices can analyze vital signs such as heart rate and blood pressure, helping to detect conditions early and provide the necessary interventions quickly (Bates & Wright, 2016).

C- Assisting Clinical Decision-Making: AI provides solutions to difficult clinical decisions by providing accurate data and analyzing them. Nurses can use smart tools to help them make

integrated treatment decisions based on the clinical information entered (Dilsizian & Siegel, 2017).

7- Improving Communication Between Nurses and Patients Using AI:

A. Smart Robots in Nursing Care: Smart robots powered by AI technologies improve communication between nurses and patients. These robots can provide medical advice, answer patient questions, and, in some cases, even provide simple care such as medication transfers (Jung & Choi, 2019).

B. Improving the Quality of Healthcare: AI contributes to improving communication between the medical team and patients, enhancing the overall quality of healthcare. By using AI, nurses can improve the level of care and provide appropriate support to patients at the right time (Tschandl et al., 2020).

C- Benefits and Opportunities Offered by AI in Nursing:

A. Accelerating Patient Response: AI contributes to accelerating nurses' response to emergencies.

Intelligent systems can provide immediate alerts when a patient's vital signs change, allowing nurses to intervene quickly. (Verghese; Shah & Harrington, 2018) Bresnick, 2019).

B. Personalizing Healthcare: AI enables the analysis of big data to provide personalized care to patients based on their specific medical needs, leading to improved treatment outcomes and healthcare quality. (Zhao & Wu, 2019).



Figure (14)

Challenges Facing the Use of Artificial Intelligence in Nursing:

A. Technical Challenges: There is a need to train nurses to use AI technologies effectively. Although AI can improve nursing performance, there are challenges related to the lack of proficiency in using these new tools.

B. Privacy Concerns: Healthcare faces issues related to the protection of sensitive data. Therefore, it is essential to ensure the security of data processed by AI systems, especially in healthcare (Binns & McNeil, 2017).

Sharma & Singh (2020) investigated the use of AI applications to improve diagnostic accuracy in nursing, focusing on how AI technologies are used in medical data and radiology image analysis. The study demonstrates that AI can contribute to supporting nurses in making quick and accurate decisions, improving clinical outcomes and reducing medical errors.

While Bates & Wright (2016) examined the role of AI in improving patient monitoring, it examined its role in improving real-time patient monitoring by continuously monitoring patients' health status using smart devices, enabling nurses to detect and quickly address any sudden changes in health status.

Tschantl et al.'s (2020) study examined improving the quality of nursing care using AI and how AI can significantly contribute to improving the quality of healthcare, including improving the quality of nursing care.

The study focused on how AI can be used in areas such as medical image analysis and explaining diagnoses to patients, helping nurses provide better and more personalized care.

Dilsizian & Siegel (2017) examined how AI can be used in clinical decision-making by assisting nurses and physicians in making accurate treatment decisions based on patient data analysis. The study focused specifically on AI applications in cardiac medicine, but it provided insights that can be applied in nursing to improve clinical decision-making in various fields.

Jung & Choi (2019) examined patient-nurse interactions using artificial intelligence (AI), examining the impact of AI in improving nurse-patient interactions. The study suggests that AI-powered robots can help facilitate communication between patients and nurses, contributing to improved smart care provided by nurses. The study also demonstrated that AI can improve nursing efficiency by offering innovative solutions such as optimizing nurse scheduling, reducing medical errors, and remotely monitoring patients.

Binns & McNeil (2017) examined the use of AI in nurse training and skill development. The study demonstrated how AI can provide innovative training environments for nurses, enhancing their ability to handle complex cases and make accurate decisions. Financial indicators confirm the importance of AI in healthcare. In 2020, the global AI-based healthcare market reached \$4.9 billion. By 2024, it is expected to reach \$45.2 billion. These figures reflect an astonishing compound annual growth rate of approximately 45%.

This progress chart illustrates AI's potential to save more than its market value in healthcare costs by 2026. AI-based healthcare startups embody this trend, having raised over \$2.5 billion in 2021 alone.

The Future Landscape: AI in healthcare is poised for an exponential growth trajectory.

By 2026, it is expected to save an estimated \$150 billion in healthcare costs.

These figures attest to AI's potential to improve the efficiency and effectiveness of healthcare. Practically speaking, while AI may not replace human medical professionals, it complements their work in various fields. From robotic surgeries and virtual health assistants to advanced diagnostic tools and patient management systems, AI is improving the healthcare landscape.

The researcher notes that previous studies on AI in nursing have ranged from improving diagnostic accuracy and clinical decision-making, to enhancing nurse-patient interactions, and improving nurse training.

All of these applications contribute to improving overall nursing performance, enhancing the overall quality of healthcare.

Proposed Program for Artificial Intelligence in Nursing Performance Development: The proposed program uses artificial intelligence to improve nursing care practices in several ways, as follows:

Phase One: Medical Data Analysis: AI is used to analyze patients' clinical data, such as their medical records, helping nurses make accurate medical decisions and improve interactions with patients through:

1. Collecting patients' medical data.
2. Analyzing medical data to identify patterns.
3. Using artificial intelligence to analyze medical data and provide recommendations.

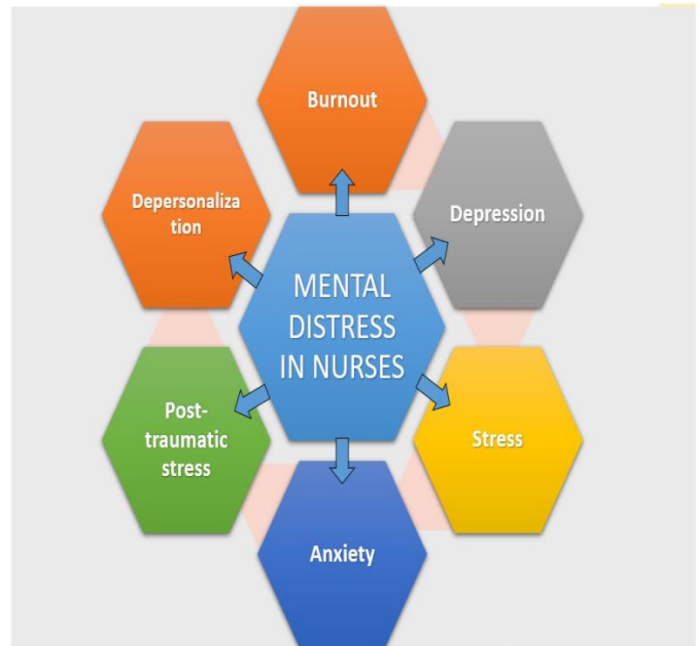


Figure (15)

Phase Two: Developing a Smart Nursing System with Health Monitoring: Artificial intelligence can monitor patients' health status in real time using devices such as smart watches or wearable devices.

This contributes to the early detection of health changes that may require immediate intervention.

Patients are monitored by developing smart wearable devices that use artificial intelligence to continuously monitor patients' health. These devices can send alerts to nurses if a deterioration in a patient's condition is detected, such as sudden changes in heart rate or blood pressure.

Examples include devices such as the Apple Watch and Fitbit that use artificial intelligence to monitor health status.

This is demonstrated through:

1. Developing a smart nursing system that uses artificial intelligence to analyze medical data and provide recommendations.
2. Integrating the smart nursing system with existing health information systems.
3. Testing the smart nursing system to ensure its accuracy and effectiveness.

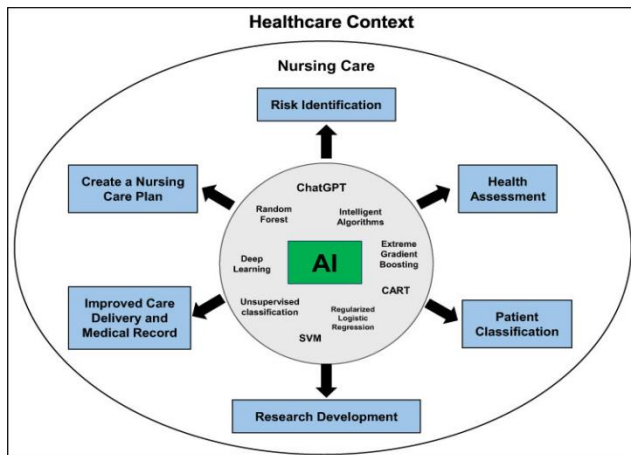


Figure (16)

Phase Three: Training Nurses to Use the Smart Nursing System to Enhance Medical Diagnosis:

Artificial intelligence can support nurses in making accurate diagnoses by analyzing medical images (such as x-rays or CT scans) and providing recommendations related to the patient's condition.

This is achieved through:

1. Training nurses to use the smart nursing system.
2. Providing technical support and advice to nurses using the smart nursing system.
3. Evaluating the effectiveness of training nurses to use the smart nursing system.

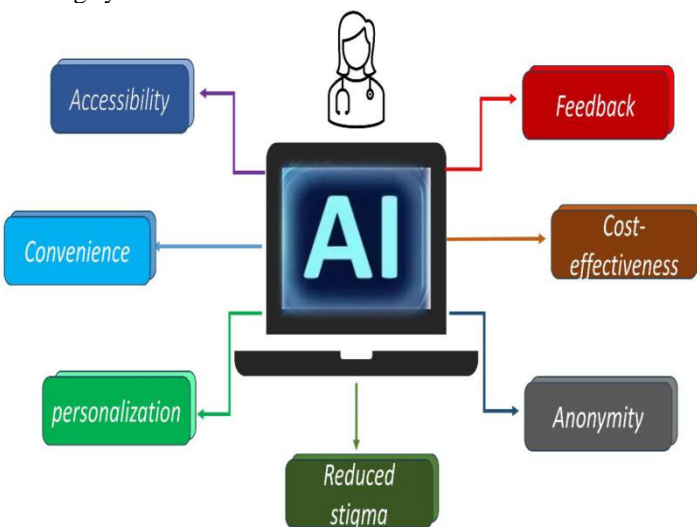


Figure (17)

Phase Four: Evaluating the Effectiveness of the Smart Nursing System:

- 1- Evaluating the Effectiveness of the Smart Nursing System in Improving the Quality of Nursing Care.
- 2-Evaluating the Effectiveness of the Smart Nursing System in Reducing Medical Errors.
- 3- Evaluating the Effectiveness of the Smart Nursing System in Improving Satisfaction with Nursing Care.

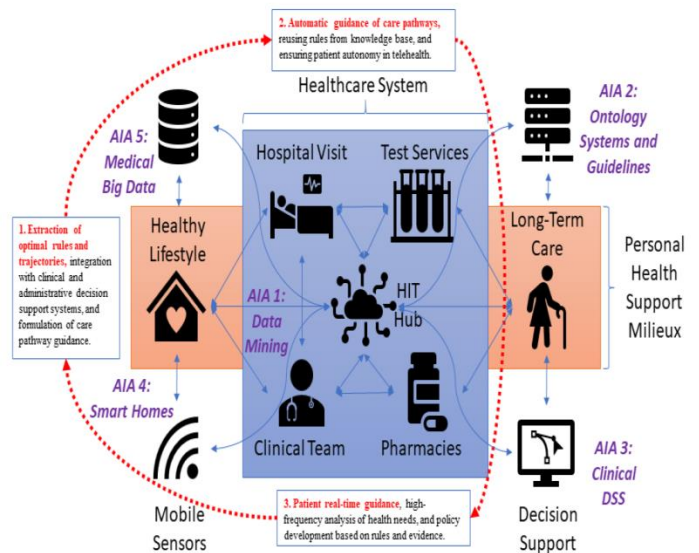


Figure (18)

Phase Five: Improving the Efficiency of the Smart Nursing System by Developing Nursing Training Skills:

This is achieved using artificial intelligence-based simulations. Nurses can be trained on complex clinical cases without the need for actual experiments.

This simulation allows nurses to learn to make sound decisions in simulated environments and manage human resources in nursing care.

Artificial intelligence can help optimize nurse work schedules based on future projections of patient numbers and the volume of care needed, contributing to a more efficient allocation of human resources.

- **Example:** Artificial intelligence systems used in hospitals to identify the busiest visiting times and allocate nurses accordingly.

This is demonstrated through:

1. Improving the smart nursing system based on the results obtained from evaluating its effectiveness .
2. Adding new features to the smart nursing system to improve its effectiveness.
3. Testing the smart nursing system after it has been improved to ensure its accuracy and effectiveness.



Figure (19)

Stage Six: Predicting Clinical Developments:

This is done using AI-powered systems to predict clinical changes in a patient's condition based on analyzing previous data.

These systems contribute to improving nurses' decisions, as nurses can take immediate action if complications are anticipated.

This is achieved through:

- Making clinical decisions.

- **Example:** The use of AI systems in major hospitals, such as St. Thomas' Hospital, which analyzes medical data to provide recommendations to patients.

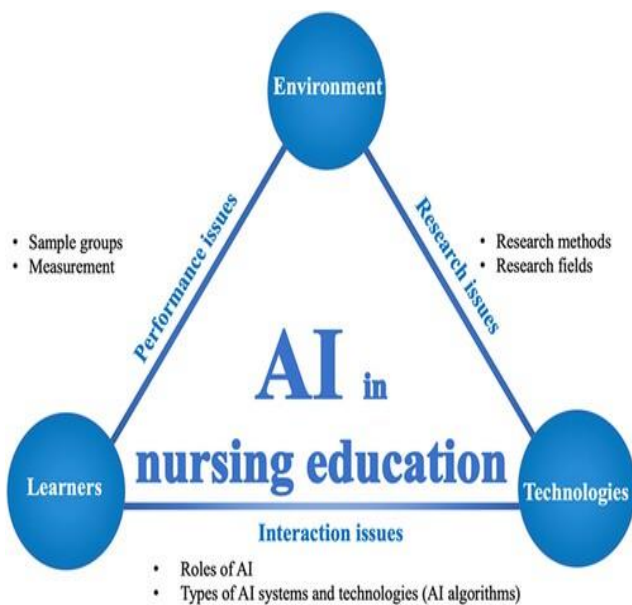


Figure (20)

According to recent statistics, the penetration of artificial intelligence in healthcare is significant and growing: 35% of medical organizations already use AI in their operations, with another 42% ready to adopt it.

This adoption is due to AI's ability to perform routine tasks, reduce human error, and significantly enhance patient care.

The researcher notes that AI is an effective tool that can significantly contribute to improving nursing performance.

By improving diagnosis, enhancing clinical decision-making, and helping nurses accurately monitor patients' health conditions, AI can improve the quality of healthcare.

However, integrating this technology into nursing work requires ongoing training and considerations for privacy and security.

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