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Artificial Intelligence and Nursing Practice: Benefits, Applications, Challenges, and Evidence from Research

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***Abstract*: Artificial intelligence (AI) is rapidly transforming healthcare by supporting clinical decision-making, patient monitoring, documentation, education, and healthcare management. Nursing is one of the healthcare professions that may benefit substantially from the appropriate integration of AI because nurses manage large amounts of patient information and make continuous clinical decisions. AI-based technologies can assist nurses in identifying patient deterioration, predicting clinical risks, improving documentation, reducing administrative workload, and supporting personalized patient care. Recent systematic reviews have reported improvements in nursing decision-making, patient safety, workflow efficiency, and selected patient outcomes following the use of AI technologies. For example, a systematic review of AI technologies supporting nurses' clinical decision-making found improvements in decision-making, patient care, staff performance, documentation, pressure-ulcer prevention, and other clinical outcomes. However, AI also creates challenges involving data privacy, algorithmic bias, transparency, professional accountability, ethical practice, and the need for nurses to develop digital and AI literacy. Therefore, AI should be viewed as a tool that supports not replaces professional nursing judgment. Effective implementation requires appropriate education, human oversight, ethical governance, and ongoing research. This paper discusses the major applications and benefits of AI in nursing practice and reviews current evidence regarding its impact on nurses and patients.**

***Keywords*: Artificial intelligence, nursing practice, clinical decision-making, nursing care, patient safety, machine learning, nursing informatics, clinical decision support.**

1. Introduction

Artificial intelligence refers to computer-based technologies capable of performing tasks that traditionally require human intelligence, such as recognizing patterns, analyzing information, making predictions, understanding language, and generating content. In healthcare, AI is increasingly being applied to clinical care, medical research, health-system management, education, and administrative activities. The World Health Organization (WHO) recognizes the potential of AI to improve healthcare but emphasizes that its implementation must be safe, ethical, equitable, and appropriately governed.

Nursing practice involves continuous assessment, clinical reasoning, communication, documentation, medication administration, patient education, coordination of care, and evaluation of patient outcomes. Because nurses interact with patients throughout the care process, they generate and use substantial amounts of clinical information. AI can analyze large quantities of information rapidly and provide nurses with decision-support information that may be difficult to identify manually.

Recent research suggests that AI can positively influence nursing practice. A systematic review published in 2025 examined AI applications in healthcare and their effects on nursing practice and patient outcomes. The review identified benefits including improved diagnostic accuracy, patient management, operational efficiency, reduced administrative tasks, improved documentation, and enhanced patient safety. Therefore, understanding AI is becoming increasingly important for modern nursing practice.

A. Applications of Artificial Intelligence in Nursing Practice

1) Clinical Decision Support

One of the most important applications of AI in nursing is clinical decision support. AI systems can analyze patient information such as vital signs, laboratory results, medical history, medications, and clinical observations. Based on these data, an AI system may identify patterns associated with deterioration or other clinical risks.

For example, predictive algorithms can alert nurses when a patient may be at increased risk of deterioration. Such systems can support nurses in prioritizing patients and deciding when additional assessment or escalation may be necessary.

A systematic review of AI technologies supporting nurses' clinical decision-making found evidence that AI tools improved decision-making, patient care, and staff performance. The reviewed studies reported improvements in areas such as deterioration management, neonatal resuscitation accuracy, pressure-ulcer prevention, seizure assessment, and documentation quality. AI should not replace nursing judgment. Instead, it can provide additional information that allows nurses to make more informed decisions.

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B. Early Identification of Patient Deterioration

Early recognition of deterioration is an essential nursing responsibility. Changes in respiratory rate, heart rate, blood pressure, oxygen saturation, temperature, consciousness, and other clinical indicators may indicate worsening health.

AI-based predictive systems can continuously analyze these variables and identify patterns that may indicate deterioration before it becomes clinically obvious. This can allow nurses and other healthcare professionals to intervene earlier.

Early warning and predictive systems may therefore contribute to improved patient safety by helping nurses prioritize high-risk patients.

C. Reduction of Administrative Workload

Nurses spend considerable time documenting patient assessments, interventions, progress notes, handovers, and other clinical information. AI and natural language processing (NLP) can assist with documentation by converting information into structured records, summarizing clinical information, and supporting electronic health record documentation.

A recent systematic review found that NLP and other AI technologies can improve documentation and reduce administrative work for nurses. Reducing unnecessary administrative workload may allow nurses to spend more time on direct patient care, communication, emotional support, and health education.

D. Patient Monitoring

AI can support continuous patient monitoring through electronic health records, wearable devices, bedside monitoring systems, and remote-monitoring technologies.

For example, AI can analyze physiological information and identify abnormal trends. In chronic disease management, AI can help identify patients at risk for adverse clinical events or unplanned healthcare utilization.

An umbrella review of AI-based nursing interventions for chronic illness care found evidence that AI interventions can assist in predicting adverse clinical events, unplanned hospital utilization, and healthcare costs. However, the authors also noted that evidence concerning psychosocial outcomes remains insufficient.

E. Medication Safety

Medication errors are an important patient-safety concern. AI-based clinical decision-support systems can assist healthcare professionals by identifying potential medication interactions, inappropriate doses, allergies, and other risks.

For nurses, such systems can provide an additional safety check during medication administration. However, nurses must verify AI-generated recommendations against the patient's condition, prescription, institutional policy, and professional standards.

F. Prevention of Pressure Injuries

Pressure injuries are an important nursing quality indicator. AI can analyze patient characteristics such as mobility, nutritional status, age, medical conditions, skin condition, and length of hospitalization to estimate the risk of developing pressure injuries.

The resulting risk information can help nurses prioritize preventive interventions such as repositioning, skin assessment, pressure-relieving surfaces, and nutritional support.

Research included in a recent systematic review found improvements in pressure-ulcer prevention when AI-supported approaches were used.

G. Nursing Education

AI can also support nursing education. Generative AI systems can provide explanations, create practice questions, support simulation-based learning, summarize educational materials, and provide conversational practice.

WHO identifies medical and nursing education as one potential application of large multimodal AI models, while also warning that AI-generated information can be inaccurate, incomplete, or biased. Consequently, AI can be a useful educational assistant, but nursing students should verify information using textbooks, clinical guidelines, peer-reviewed research, and qualified educators.

H. Nursing Research

AI has important applications in nursing research. Researchers can use machine learning and NLP to analyze large datasets, identify patterns, classify information, support literature analysis, and explore factors associated with patient outcomes.

A systematic review of AI in nursing research included 15 studies and identified applications involving NLP and machine learning. The review concluded that AI provides significant opportunities for nursing research but emphasized the importance of methodological rigor, nurse involvement, AI literacy, and attention to ethical and sociotechnical risks.

I. Major Benefits of AI for Nursing Practice

The potential benefits of AI can be summarized in Table 1.

A 2024 systematic review focusing specifically on AI and nursing care concluded that AI has applications in clinical

Table 1

Area	**Potential benefit to nursing**
Clinical decision-making	Provides additional evidence and predictive information
Patient monitoring	Detects abnormal trends and potential deterioration
Patient safety	Supports identification of clinical risks
Documentation	Reduces repetitive documentation and summarizes information
Workflow	Automates selected routine tasks
Pressure injury prevention	Identifies high-risk patients
Chronic disease care	Supports prediction and monitoring
Education	Provides personalized learning and simulation support
Research	Facilitates analysis of large datasets
Resource management	Helps prioritize patients and healthcare resources

decision support, patient monitoring, nursing education, and workflow optimization, including potential improvements in early disease detection, reduction of diagnostic errors, and documentation efficiency.

2. Research Evidence

A. Research Study 1: Systematic review of AI applications in healthcare and nursing

A recent systematic review examined the impact of AI applications on nursing practice and patient outcomes. The researchers searched PubMed, Google Scholar, and Web of Science and followed PRISMA methodology. The review identified research involving machine learning, robotic process automation, and natural language processing.

The findings indicated that AI could improve diagnostic accuracy, patient management, and operational efficiency. Machine learning supported disease detection and prediction, robotic technologies contributed to patient safety and comfort, and NLP improved documentation. The review also identified important challenges involving privacy, integration into clinical workflows, and variability in research methods.

B. Research Study 2: AI and Nurses' Clinical Decision-Making

A systematic review of AI technologies supporting nurses' clinical decision-making included eight studies. The findings showed improvements in decision-making, patient care, and staff performance.

Notably, one discharge-support system reduced 30-day readmissions from 22.2% to 9.4% ($p = 0.015$). Another deterioration algorithm reduced the time required to contact senior staff and order investigations. The reviewed studies also reported improved neonatal resuscitation accuracy, pressure-ulcer prevention, and documentation quality.

These findings demonstrate that AI can have measurable effects on clinical outcomes and nursing workflow. Nevertheless, the results should be interpreted carefully because AI technologies differ considerably in their design, implementation, and clinical context.

C. Research Study 3: AI and the Nursing Practice Environment

A mixed-methods systematic review examined the effect of AI on positive nursing practice environments. Eleven studies were included. The review reported that AI could optimize decision-making, task performance, patient safety, and nursing management.

However, the researchers also identified privacy concerns, resistance to change, and the need for professional education and training. The findings suggest that successful implementation depends not only on the technology itself but also on nurses' readiness to use it.

D. Challenges and Risks of AI in Nursing

Although AI offers many benefits, its use also presents significant challenges.

1) Privacy and Confidentiality

AI systems require access to large amounts of patient data. Nurses must protect patient confidentiality and ensure that information is accessed and shared only for legitimate purposes. Unauthorized use of patient information may violate ethical and legal requirements.

2) Algorithmic bias

AI systems learn from data. If the data used to develop an AI system are incomplete or biased, the system may produce biased recommendations. WHO has highlighted the risk that AI systems may perform differently across populations and emphasizes the importance of equity and protection against harmful bias.

3) Lack of transparency

Some AI systems operate in ways that are difficult for users to understand. Nurses may receive a recommendation without knowing exactly why the algorithm produced it. Lack of transparency can create difficulties when nurses need to explain or justify clinical decisions.

4) Professional accountability

Nurses remain professionally responsible for the care they provide. AI-generated recommendations should therefore not automatically be accepted. Nurses must use clinical judgment and verify information before acting on AI-generated recommendations.

5) Risk of inaccurate information

Generative AI can produce information that appears convincing but is incorrect. WHO specifically warns that large multimodal models can generate false, inaccurate, biased, or incomplete information. Therefore, AI outputs should always be evaluated against reliable clinical evidence.

6) Need for education and AI literacy

Nurses need education regarding how AI systems work, their limitations, ethical considerations, data privacy, and appropriate clinical use. AI literacy should become an important component of nursing education and continuing professional development.

E. Role of the Nurse in an AI-Enabled Healthcare System

The increasing use of AI does not eliminate the importance of nurses. Rather, it may change some aspects of nursing work.

The nurse remains responsible for holistic patient assessment, communication, empathy, advocacy, ethical decision-making, clinical judgment, and individualized care. AI can process information rapidly, but it cannot replace the human relationship between a nurse and patient.

Nurses should therefore participate in the development, evaluation, implementation, and monitoring of AI technologies. Research on AI in nursing has specifically emphasized active nurse involvement in AI development and policy.

The future nurse may need a combination of traditional clinical competencies and digital competencies, including:

- Understanding basic AI concepts.
- Evaluating the reliability of AI-generated information.
- Protecting patient data and confidentiality.
- Recognizing algorithmic bias.
- Using clinical decision-support systems appropriately.

- Maintaining human-centered communication.
- Applying professional and ethical judgment.
- Participating in quality improvement and AI evaluation.

F. Ethical Considerations

AI implementation should follow principles of autonomy, beneficence, non-maleficence, justice, privacy, transparency, and accountability.

WHO recommends that ethics and human rights remain central to the design, development, and use of AI in healthcare. It also emphasizes appropriate governance, regulation, accountability, and protection against inequity.

For nursing practice, this means AI should be implemented in a manner that protects patients while supporting nurses. Healthcare organizations should establish clear policies regarding appropriate AI use, data protection, human oversight, documentation, and accountability.

G. Recommendations

Based on the current evidence, the following recommendations can be made:

1. Integrate AI education into nursing curricula so that nursing students develop basic AI and digital-health literacy.
2. Provide continuing education for practicing nurses regarding AI applications, limitations, privacy, ethics, and clinical decision-making.
3. Maintain human oversight for important clinical decisions.
4. Protect patient privacy through strong cybersecurity and appropriate data-governance policies.
5. Evaluate AI systems before implementation for accuracy, safety, fairness, usability, and clinical effectiveness.
6. Involve nurses in AI development because nurses understand real-world clinical workflows and patient-care needs.
7. Conduct more high-quality research, particularly randomized controlled trials and long-term implementation studies.
8. Monitor AI performance continuously after implementation to identify errors, bias, and unexpected consequences.
9. Use AI to complement rather than replace nurses, preserving human-centered and compassionate nursing care.

3. Conclusion

Artificial intelligence has considerable potential to improve nursing practice. AI can support clinical decision-making, early detection of patient deterioration, patient monitoring, documentation, medication safety, pressure-injury prevention, chronic disease management, nursing education, and research. Recent systematic reviews provide evidence that AI can improve selected aspects of nursing workflow, decision-making, patient safety, and clinical outcomes.

However, AI is not a substitute for professional nursing judgment or the human connection that is central to nursing care. Privacy, bias, inaccurate information, accountability, transparency, and inadequate training are important concerns. Successful implementation therefore requires collaboration among nurses, healthcare organizations, researchers, technology developers, educators, policymakers, and patients.

The future of nursing is likely to involve increasing collaboration between healthcare professionals and intelligent technologies. Nurses who develop AI literacy while maintaining strong clinical, ethical, and interpersonal skills will be well positioned to use AI safely and effectively. Ultimately, the goal should not be to make nursing less human through technology, but to use technology to give nurses more time, information, and support to provide safe, efficient, evidence-based, and compassionate patient care.

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