

INTEGRATION OF AI AND MACHINE LEARNING IN NURSING CLINICAL DECISION SUPPORT

Faizan Rafique^{*1}, Basit Ali Arain²

^{*1,2}BScN, Dr. Ziauddin Hospital, Karachi, Pakistan

^{*1}faizanrafique712@gmail.com, ²basitarain1999@gmail.com

DOI: <https://doi.org/10.5281/zenodo.21280153>

Keywords

AI in Nursing clinical, AI in clinical decision support, integration of AI in nursing clinical, AI and machine learning in healthcare

Article History

Received: 25 April 2026

Accepted: 04 June 2026

Published: 21 June 2026

Copyright @Author

Corresponding Author: *

Faizan Rafique

Abstract

AI and ML making health care systems more significant by improving patient health outcomes better with patient satisfaction. These are helpful especially through good clinical decision and support. Technologies help to provide accurate and make faster nursing decision making capabilities, providing more available and everyone can afford in nursing by the utilization of innovation such as AI and ML. It provide better patient health results where patient get easily received personalized care and this care is being provided that is organized, coordinated and less chance of error, where the Decisions were made by clinically and collaboratively. AI is Machine learning also the involvement of human Decision makings them self-capacity in nursing these tools have power to help and improve patient outcomes. The staff in hospital setting about AI provide research based ideas and reliable suggestions make the staff alert toward important procedures and technique including patient assessment, the care plan, education and other administrative activities support them buildup more confidence in difficult situations. AI provided benefits for nurses in practices to enhance patient safety, good outcome and automatically do tasks free up time to provide more care in nursing. AI help with some things should be considered the first one is we should update with AI to make to use better for us. Second thing that is to create rules and guidelines to use AI responsible protect safe and rights of patient, not arise any mistake with misuses.

Introduction

Artificial intelligence AI is quickly going to take crucial part in healthcare setting and it has the ability to change how to take care of patients, make good decisions and how to manage health care services. AI means with the help of machines to perform tasks related to hospital or other purpose full task which are required human thinking capability. If talk about this in nursing AI can help with performing tasks such as assessing or checking patients and planning patient care plans teaching also for handling administrative work purposes. Research has

shown that AI can play an integral role in nursing. For example, this can easily monitor patient, assess and predict health risk, causes and according to them create personalized care plan supports decision making. AI tool also called as clinical decision support system and it is important in nursing through the usage of this nurse make a good and critically clinical decision which as a result better and achievable patient outcomes meet. By using this system they analyzed or collect a lot of patient information like their vital signs, patient lab results and electric health records. One important use of

these tools predicts when patient might get toward worse condition. AI algorithm look at a time real patient data and identify accurately the risks and cause of serious health issue by using AI in health care settings all process of giving medication to patient become easier and faster way also for health care workers and interdisciplinary team can make better informed decision so, doing this it shows that AI can rapidly change patient care by helping to create personalized medication plan [1].

AI means by use of computers which act like human being but ML is one of category of AI which helps computer to learn data and prepared predict toward better decisions. ML algorithm can predict possible health problems by identifying patterns in data, which gives healthcare providers to detect early complications and prepared instructions for care [2]. AI becomes useful in healthcare setting where care providers need to understand the benefit and challenges both by using these tools [3].

Assessment Related to Clinical practice Concerns

Artificial intelligence (AI) and Machine learning (ML) introduction in nursing Field bring opportunities as well as challenges both so, one of the major concern is that there are many nursing schools which are not clearly provide enough knowledge, education and arrange training programs about these technologies due to this reason many of nurses feel unsure or even anxious about to use AI in their work and this lack of training can make it difficult for nurses[4]. Another important issue is related to data privacy and its security because Nurses are very responsible to keep patient health information confidential but AI system often depends on need to access to a lot of sensitive health data, so this raises more concern about the possible data misuse[5]. Algorithm bias is another clinical concern in healthcare if AI system created using biased or incomplete data, information so their recommendations may not accurate for all the patients. For example some studies have shown that AI tools unfairly affect the patient care or certain their ethnic backgrounds age or gender

and less special precautions are taken[6]. Another thing that is about nurse worries to rely on AI could make their critical thinking and decision making capacity, skills weaken if they were not managed or use it properly [7]. Operational challenges include integrated AI tools into current workflows in health care setting nurses find new system which disturb their usual work routine with addition of extra task burden which can lead to frustration [8].

Synthesis of Best Practices

There are some recommendations to understand for using artificial intelligence and Machine learning in nursing field which help in making clinical decision.

- Nurses should receive training and awareness programs, seminar about Machine learning and artificial intelligence this training should happen in nursing schools, this strategies should continue throughout their career ahead training not just cover technically aspects, not only about how to use of technology while it also helpful in ethically deal with issues and for practical uses [3].
- Nurses should need to know how AI make its recommendation transparent algorithms that is known as explainable AI this help nurses to trust on technology and its uses making decisions with their judgment[9].
- According to ethical rules hospital should have strong rules how and when AI use to prevent any misuse of patient data, patient privacy and decrease biasness in nursing context these ethical guidelines should be very specific[5].
- Teamwork create a very effective which require both inputs from computer expert as well as nurses. Nurses are familiar what is needed during care of patients, working collaboratively highlights that these AI tools are useful and helpful to meet the realistic goal and needs[10].
- In healthcare setting this AI tools should be really tested this helps to find out how effect on patient care, workload of nurse and their overall efficiency, identify fast how issues arise[11]
- AI uses as helpful tool in health care facilities especially for nurses to provide as a Support instead of replace of their own expertise

and skills. AI play a key role to point out specific issues and what the patterns are but final decision making nurses use their own knowledge and compassion by human judgment [2].

Application of Nursing Theory

There are many nursing theories that can help to understand how to use Artificial intelligence and Machine learning in healthcare systems to support clinical Decision. For example Jean Watson's Theory of Human Caring highlight that a caring relationship in between patient and nurse is very crucial aspects [3]. This means AI tool help to connect nurses with patient to achieve better outcome in a supportive way instead of human to human interaction. AI can make free up nurses from more time consuming other administrative tasks and it allow nurses to spend prolong time with patient and provide care [12].

Patricia Brenner's Novice to expert theory give idea about how nurses overly time day by day develop their clinical expertise and skills in that AI can assist new nurses to provide helpful tips and guidance based on research provide support to gain their learning and confidence in tricky conditions as nurses gain more experience and knowledge. AI change and offer about advance and tailored support for nurses instead of just give basic advice [13].

Florence Nightingale focused on importance to observe and collect data and this data is relevant to Artificial intelligence and Machine learning. These tools helpful to gather and organized data to make decision about care when nurses and AI work together nurse knowledge make sense data that leads to better patient care [14].

Application of Best Practice:

Artificial intelligence and Machine Learning are being used in nursing Field of many areas following are some real examples.

Through AI it can organized Patient electric health records, patient vital signs to predict that which Patient has chance to might get infection, chance of fall and need to come back to again in hospital. This help to nurse prepare early interventions and prevent further complications [15].

AI tool can make alert nurse during the drug interactions, patient lab values and series risk of health condition like sepsis this help nurses to make a quick and fast decision making especially in a busy condition [16].

AI system can help to give complete and accurate patient record fast reduce chance of mistakes and it allows nurse to more focus on patient and provide direct care to Patient [17].

AI monitor timely patient conditions and find out what changes occur in Patient health condition give clues to nurse about patient when there is. Any abnormal value seen in Patient vital signs this is important especially in the critical areas where critically ill patient were treated to keep the patients safe [18].

Artificial intelligence tools and platform are used to teach nursing students and practicing nurses to learn things also provide personally feedback and help to buildup skills in a safe way and safe environment [19]. But still there are challenges that we should know and update with these Artificial intelligence tools to know whether they are helpful do not create any error, increase workload and show bias [20].

Conclusion

Artificial intelligence and Machine Learning change nursing especially the tools help nurses to make good decisions make work easier and quick response of nurses, keep patient safe and provide quality of care. To use these tools well so it is important to follow some practice which includes arrange training to nursing staff make sure to them they know about the technology and how technology work, organize data ethically rules, encourage as a team for their work among other health care providers and assess regularly how tools works and their results while providing care to patient. Nursing theories play a key role, the important figures like Brenner's, Watson and Florence Nightingale their struggle and guidance for nurse's how the use of AI while providing Care with honesty and being responsible. AI tool helpful for nurses to improve and develop skills to build up trust connections with the clients so, AI really help in nursing, nurses health care workers, Health care organizations. There is need

to solve issues like training and keep data confidential, avoid biasness making sure that AI help in daily work, should research create polices and collaborate with other stakeholders, engagement are very important to increase the value of AI in making clinical Decision Support in nursing and ensure that the care provide to patient will be safe, ethically and to focused by patient health specifically.

REFERENCE

- Wei, Q., Pan, S., Liu, X., Hong, M., Nong, C. and Zhang, W., 2025. The integration of AI in nursing: addressing current applications, challenges, and future directions. *Frontiers in medicine*, 12, p.1545420.
- M. K. K. Rony et al., "The Role of Artificial Intelligence in Nursing Care: An Umbrella Review," *Nursing Inquiry*, 2025. <https://doi.org/10.1111/nin.70023>
- V. Balpande, P. Rewatkar, P. Dhole, I. Alwadkar, K. Gomase, "Artificial intelligence transforming healthcare and nursing: A comprehensive bibliometric analysis," *Multidisciplinary Reviews*, 2025. <https://doi.org/10.31893/multirev.2025.267>
- D. Kosmidis, D. Simopoulos, K. Anastopoulos, S. Koutsouki, "Machine Learning in Nursing: A Cross-Disciplinary Review," *Cureus*, 2025. <https://doi.org/10.7759/cureus.87181>
- S. A. A. K. Mohammed, Y. M. Osman, A. Ibrahim, M. Shaban, "Ethical and regulatory considerations in the use of AI and machine learning in nursing: A systematic review.," *International Nursing Review*, 2025. <https://doi.org/10.1111/inr.70010>
- S. OConnor, R. Booth, "Algorithmic bias in health care: Opportunities for nurses to improve equality in the age of artificial intelligence," Elsevier BV, 2022. <https://doi.org/10.1016/j.outlook.2022.09.003>
- G. Brydges, "Artificial Intelligence in Nursing Practice: Decisional Support, Clinical Integration, and Future Directions," *Online Journal of Issues in Nursing*, 2025. <https://doi.org/10.3912/ojin.vol30no02man04>
- S. Sivan, K. Chauhan, "Artificial Intelligence in Prenatal Screening: Implications for OBG Nursing," *International Journal For Multidisciplinary Research*, 2025. <https://doi.org/10.36948/ijfmr.2025.v07i03.49013>
- O. T. Nwadiokwu, "Ethical AI and machine learning integration in health innovation information systems for clinical excellence," None, 2025. <https://doi.org/10.51594/csitrv.v6i3.1872>
- M. M. Matmi et al., "AI-Led Healthcare Leadership: Unveiling Nursing Trends and Pathways Ahead," *Evolutionary Studies in Imaginative Culture*, 2024. <https://doi.org/10.70082/esiculture.vi.1266>
- J. Choi, H. Lee, Y. Kim-Godwin, "Decoding machine learning in nursing research: A scoping review of effective algorithms," *Journal of Nursing Scholarship*, 2024. <https://doi.org/10.1111/jnu.13026>
- S. Yadav, "Embracing Artificial Intelligence: Revolutionizing Nursing Documentation for a Better Future," *Cureus*, 2024. <https://doi.org/10.7759/cureus.57725>
- P. Gkta, A. Kkkaya, P. Karaay, "Leveraging the efficiency and transparency of artificial intelligencedriven visual Chatbot through smart prompt learning concept," Wiley, 2023. <https://doi.org/10.1111/srt.13417>
- J. Kwon, M. E. Karim, M. Topaz, L. Currie, "Nurses Seeing Forest for the Trees in the Age of Machine Learning: Using Nursing Knowledge to Improve Relevance and Performance," *Computers, Informatics, Nursing*, 2019. <https://doi.org/10.1097/CIN.0000000000000508>

- J. Choi, H. Lee, Y. S. KimGodwin, "Decoding machine learning in nursing research: A scoping review of effective algorithms," Wiley, 2024.
<https://doi.org/10.1111/jnu.13026>
- S. A. Abdelmohsen, M. Al-Jabri, "Artificial Intelligence Applications in Healthcare: A Systematic Review of Their Impact on Nursing Practice and Patient Outcomes.," Journal of Nursing Scholarship, 2025.
<https://doi.org/10.1111/jnu.70040>
- S. Yadav, "Embracing Artificial Intelligence: Revolutionizing Nursing Documentation for a Better Future," Cureus, Inc., 2024.
<https://doi.org/10.7759/cureus.57725>
- E. Porcellato, C. Lanera, H. Ocagli, M. Danielis, "Exploring Applications of Artificial Intelligence in Critical Care Nursing: A Systematic Review," Nursing Reports, 2025.
<https://doi.org/10.3390/nursrep15020055>
- S. Li, X. Liu, J. Wen, S. Shen, S. Cao, "Artificial intelligence-driven nursing examination research: dynamic evolution and hotspot analysis," None, 2025.
<https://doi.org/10.1145/3733006.3733025>
- K. Seibert et al., "A Rapid Review on Application Scenarios for Artificial Intelligence in Nursing Care (Preprint)," None, 2020.
<https://doi.org/10.2196/preprints.26522>

