**Bandwagon of Artificial Intelligence in Nursing Profession**

**Dr.S.Jasmindebora1, PHD Scholar, Professor Cum HOD Medical surgical Nursing, SGT University, Gurugram, Haryana 122505,** [**settepallijasmin\_fnur@sgtuniversity.org,8008329751**](mailto:settepallijasmin_fnur@sgtuniversity.org,8008329751)

**Dr. Sunil Kumar Dular2, Dean, Professor Cum HOD Community Health Nursing, SGT University, Gurugram, Haryana – 122505,** [**skdular@sgtuniversity.org**](mailto:skdular@sgtuniversity.org)

**Abstract:** Today's technological and methodological advancements in healthcare are made possible by a broad category of concepts known as artificial intelligence (AI). The use of AI health technologies is expanding globally. Nurses need to Adapt, Adopt, accommodate new emerging trends and apply Artificial intelligence applications to the wholistic nursing care with out any breach in the quality of care and Privacy. AI applications like Deep learning, Machine Learning Neural networking should amalgamate in to Nursing Intelligence.To achieve this epitome Nursing leaders in different domains including administration, clinical care, education, policy, and research should be handy such that Nursing profession is empowered.

**Key words:** Artificial intelligence, Nursing profession, AI Health technology, Bandwagon, Deep learning, Machine learning, Neural language processing, Clinical decision support system.

**Introduction:**

Artificial intelligence is an overture for persuading a computer, a robot that is controlled by a computer, or a piece of software to ponder critically, much like an intelligent individual might. In order, to generate intelligent software and systems, it is essential to know how the human brain works and how people learn, influence judgments, and work to resolve problems.1

Artificial intelligence epitome goal is to develop expert systems, or machines that can learn, demonstrate, explain, and provide people with advice, create systems that comprehend, think, learn, and behave like people in order to implement human intelligence in machines.3

The term "artificial intelligence" (AI) is frequently used in the context of healthcare to describe computer software tools that analyze data (such as patient records, administrative claims, medical imaging, and data from mobile devices), learn from that data, and then inform clinical and operational decision-making.4 AI health technologies (AIHTs) are becoming considerably more common in clinical settings around the world; AIHTs are expected to directly and indirectly transform the nursing profession in a variety of ways due to their ability to improve workflows and guide clinical decision making.4 Nurses are the most myriad health professionals, with kinds of settings spanning the five domains of nursing activity identified by the Registered Nurses' Association of Ontario (RNAO; i.e, administration, education, clinical practice, policy, and research).13AIHT trends are expected to change the nature of the nurse-patient relationship; As a result, strong nursing leadership is required to drive this change and ensure the delivery of high-quality, person-centered compassionate nursing care in the future.5 The impact of AIHTs on nursing roles, workflows, processes, and patient care has recently been examined in studies and expository papers; However, no scoping reviews are available that map the breadth and depth of evidence concerning the current or anticipated influences of AIHTs on the nursing profession.4 Furthermore, little research has been conducted on nurses' roles in influencing AIHT implementation and co-designing these technologies to protect patients' safety and privacy. Nurses will not fully appreciate the implications of AI for nursing practice, policy, administration, and research unless they understand the existing evidence on the topic.4 It is critical for nurses to gain a more comprehensive understanding of these emerging technologies in order to shape them.4 The industry's future and decision-making regarding nursing care aspects that AIHTs can effectively handle Nurses provide the highest quality of care by utilizing core practices such as assessment, planning, and outcome evaluation. Few nurses, however, are familiar with AI applications such as machine learning, deep learning, and natural language processing (NLP), as well as their implications for nursing research and practice and potential role in improving patient care and health outcomes.4

**Artificial Intelligence Appeal**

**Machine learning**

The potential of machine learning is at the root of much of the excitement surrounding AI in healthcare. Simply put, machine learning is the use of a computer programme to autonomously learn from data to perform a specific task. The term "learning" refers to software self-adjustment that fine-tunes an algorithm over time to improve accuracy. The goal of the machine learning tool and the data it has access to are determined by its developer, but how the programme uses the data is unknown. This inherent uncertainty is referred to as the "black box."19-30

A machine learning tool's operation and use, like any data-dependent tool, are only as good as its data sources. This is where nurses come in handy; Nurses with hands-on experience understand patient care and the information required to make sound clinical decisions. Nurse input increases the applicability and accuracy of machine learning tools.19-30

For instance, Wang and colleagues developed a technique to predict the severity of falls in order to protect high-risk patients. Utilizing information on age, sex, race, bone density, procedure data, and diagnoses, this tool developed a risk score for the likelihood of experiencing a fall with a severe injury.23 The model was trained using retrospective data, and when it had learned it was able to make accurate predictions. For later phases of the study, nurses are expected to evaluate the tool's practical value. As shown by this machine learning example, risk prediction ratings could not be generated using human calculations or flowsheets coupled with the electronic health record (EHR). 19-30The ability of nurses to read and translate signals into precise patient monitoring has advanced thanks to the usage of AI and EHR data. Hu's Super Alarm application, for instance, uses patterns of co-occurrence of individual alarms to forecast impending cardiac arrests (such as arrythmia alerts and hemodynamic monitoring). Hu showed 90% sensitivity in determining when critical care patients would need to be revived. This machine learning technology is pertinent to nursing since it minimizes alert fatigue by consolidating alarm signals into less frequent but important useful information in addition to enhancing patient outcomes.19-30

**Deep learning**

Nursing is advanced by deep learning, a branch of machine learning that uses neural networks for sophisticated pattern identification. This allows machine learning to be used to new forms of data, such as speech recognition and picture analysis. By combining information from many sources, AI can precisely personalize medicines to patients' unique genetic make-up, dietary habits, and treatment preferences.19-30

Deep learning applications can help nurses identify at-risk patients who would benefit from clinical interventions to avoid negative health outcomes such as sepsis or hospital readmission. For example, Duke University researchers Theiling and colleagues created Sepsis Watch, which uses deep learning to analyses over 32 million data points to determine a patient's risk of developing sepsis. If the findings require immediate action, the hospital's rapid response team is notified and guided through the first three hours of care administration.19-30

Although nurses are not the primary users of imaging technology, its impact on patient care is significant. Advances in deep learning imaging include detection (for example, early or automated detection of neurologic abnormalities or cancer), characterization (staging or diagnosis), and monitoring (tumor changes over time). Many of these tools are as accurate (or even more so) than humans, and they have the potential for further development and widespread adoption.9,19-30

**NLP**

NLP is the study of text data in EHRs rather than numbers or other countable elements. It can be used alone or in conjunction with machine learning methods, and it may contribute to other areas of artificial intelligence. Sentiment analysis, for example, could be used to determine how positive or negative a clinician or patient feels about a prognosis. 19-30Because of the lack of formal data intake and reporting, NLP is frequently cited as the most difficult AI application to adopt. Several promising applications that are currently in use, on the other hand, have an impact on patient care and health outcomes. Nursing notes, which are frequently dense with patient information, are a valuable source of text data in nursing.19-30 Nursing notes have been used to create a variety of applications, nurse notes have been used to predict emergency department patient disposition (Sterling and colleagues), uncover patient financial barriers (Skaljic and colleagues), and predict falls (Nakatani and colleagues).19-30

NLP can refer to voice recognition, as in Siri or Alexa, as well as research applications and subsequent decision support. In healthcare, voice recognition could help with note taking, information retrieval, and chart navigation. Although speech recognition programmes convert language to text, advances in natural language processing (NLP) may provide more sophisticated options.12,19-30

**AI and analytics**

**Clinical analytics** provide insights and help to improve treatment and outcomes Among the many examples of AI for clinical analytics are clinical pathway prediction, disease progression prediction, health risk protection, predictive risk scoring, and virtual assistants embedded in clinical systems for workflow improvements. AI may also be used in disease management, assisting with differential diagnosis on medical images and combining patient data with academic evidence and regulatory guidelines to tailor treatment plans.. 6

**Operational analytics** increases the efficiency and effectiveness of care delivery and management systems AI in healthcare includes the ability to predict operational issues, track safety metrics, maintain equipment, monitor the supply chain, and detect fraud. Documentation coding to process claims and new platform interfaces to automatically change claims for reimbursement in revenue cycle management are examples of operational improvements. 6

**Behavioral analytics** examines customer behaviour patterns to enhance healthcare delivery. Technology also enhances the likelihood of taking efforts to boost the adoption of advised practises. It employs AI to enhance patient engagement, wellbeing, and readmissions health.. 6

**Fig : 2 ARTIFICIAL INTELLIGENCE V/S NURSING INTELLIGENCE**

**Tab: 1 Artificial Intelligence (AI) Mechanization19-30**

**1.Visual Recognition:** The use of physical images and streamed video by computers to identify and diagnose conditions.

Nurses can assess and diagnose skin and wound integrity, as well as identify nonverbal cues for pain, anxiety, or depression.

**2.Voice assistance:** employs voice commands to identify pertinent information at the time.

Retrieve current Nursing policies, answer patients' questions about appointments and revisits, upcoming tests, and set timers and reminders for nursing care tasks.

**3.Machine learning:** Processes data using complex algorithms and then improves itself automatically based on past experiences.

Identifies a patient's course of care on a map and then initiates and completes tasks such as scheduled follow-up appointments and sending results to care team members who need to be notified.

**4.Expert solution:** Solve complex problems by reasoning through multiple sources to make decisions as accurate as human experts.

Predict the cost of care based on the supplies used and the services provided. Can predict high-risk patients' falls, sepsis, readmission, relapse, financial hardship, or prolonged hospitalisation.

**5.Virtual reality:** A computer-generated image, environment, or experience with which to interact in a seemingly real way.

Patients are assisted with educational assistive avatars and virtual companions, as well as nurse education, simulation, and mock learning exercises.

|  |  |  |  |
| --- | --- | --- | --- |
| Connotation of AI in Nursing profession.8,9,19-30 | | | |
| Nursing Practice | **Nursing Administration** | **Nursing Education** | **Nursing Research** |
| Robots have the potential to reduce nursing workload by assisting with daily activities.  One unintended consequence of this emerging trend is that nurses may spend less time with their patients or be assigned a heavier patient load as a result.  The anticipated new and changing nursing care delivery models will necessitate strong leadership from nurse executives, who will play a critical role in developing the necessary skills for direct care providers who will use AIHTs in practice.  Examining predictive analytics models can help newcomers and less experienced nurses develop their ability to understand AI's individualized decision-making process in the clinical setting.  Nurses may find new opportunities as care coordinators, using AIHTs such as robots to assist with patient care tasks, or as case managers who remotely monitor a caseload of patients using smart home technologies.. | Applications of AIHTs included planning nursing tasks, reducing the amount of documentation required, and helping nurses prioritize patients using AIHT computer systems. These features could help streamline workflow processes and improve the precision and efficacy of patient care.  Using AIHT in a way that fosters high-quality treatment and patient safety in nursing practice Strong leadership will be needed to create new policies and procedures that will support new care models, nursing roles, workflows, and possibly even modifications to the scope of practice for nurses as a result of the integration of AI in nursing. | laboratories for clinical simulation Humanoid robots and cyborgs will become more common in these environments to supplement the existing high-fidelity simulators.  Predictive analytics can help students improve their clinical judgement and decision-making skills by observing the AIHT's executed decision path.  Virtual patient video games and chatbot tutors may change the way that nursing instruction is given in educational settings as teachers use them as teaching tools to recreate interactive clinical scenarios and improve students' understanding of particular nursing principles.  Nurse educators may use AI and machine learning to analyze student data and create personalized learning pathways, which would improve student engagement and retention and meet their learning needs.  Educators should use big data to improve the accessibility, visibility, visual appeal, and data quality of nursing knowledge both inside and outside of the classroom.  The skill gaps in the nursing profession might be filled by collaborations between a variety of academic subjects, which would also benefit careers like clinical data scientists, medical software engineers, and digital medicine professionals. | Nurses are uniquely equipped to compete research on AI and patient centered in collaboration with other health disciplines, given that compassion is a core tenet of the nursing profession.  To promote nursing and patient engagement in AIHT co-design activities, nursing leadership at both the executive and staff nurse levels will be required.  Robot use has received the majority of attention in studies on AIHTs and compassion; however, future studies should examine how other AIHTs might affect the provision of compassionate care.  The educational prerequisites and basic competences required for particularly incorporating AIHTs into nursing practise deserve more study. Future studies should concentrate on figuring out the best applications for artificial intelligence in nursing education. |

**Conclusion:** This review provides a comprehensive overview of the current and future effects of artificial intelligence in nursing fields. The review's findings will assist nurse leaders at all levels and in all fields in actively creating the nursing-AI interface while maintaining consistency with core nursing principles that support moral, safe, high-quality, and compassionate care for patients, families, and caregivers. This review will help Nursing Professionals prepare for the anticipated growth or trend of AI in nursing. AI is expected to revolutionise nursing in all areas of practise, including administration, clinical care, education, policy, and research. Researchers are increasingly looking into the potential effects of AI health technologies (AIHTs) on nursing and nursing education in general.

**Acknowledgement:**

We Acknowledge the SGT management for their continuous support and cooperation in conducting this review.

**Author contribution:**

Dr.S. Jasmindebora, (Author ) created, collected, examined, reviewed, and wrote the article.

SKD, reviewed, modified, and approved the article.

**Conflict of Interest:** No conflict of interest noted

**References:**

1. Lexico Artificial intelligence. Lexico US Dictionary. 2019. [2020-08-31]. <https://www.lexico.com/en/definition/artificial_intelligence>.
2. Robert N. How artificial intelligence is changing nursing. *Nurs Manage.*2019Sep;50(9):3039.doi: 10.1097/01.NUMA.0000578988.56622.21
3. Artificialintelligence-Overview

<https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_overview.htm>

1. Buchanan C, Howitt ML, Wilson R, Booth RG, Risling T, Bamford M. Predicted Influences of Artificial Intelligence on the Domains of Nursing: Scoping Review. JMIR Nurs. 2020 Dec 17;3(1):e23939. doi: 10.2196/23939. PMID: 34406963; PMCID: PMC8373374.
2. Gaut D, Leninger M. Caring: The Compassionate Healer. Denver: National League for Nursing Press; 1991. [Google Scholar]
3. McGrow, Kathleen DNP, MS, RN, PMP Artificial intelligence, Nursing: September 2019 - Volume 49 - Issue 9 - p 46-49 doi: 10.1097/01.NURSE.0000577716.57052.8d
4. Artificial Intelligence <https://www.ibm.com/cloud/learn/what-is-artificial-intelligence>
5. Robert, Nancy PhD, MBA-DSS, BSN How artificial intelligence is changing nursing, Nursing Management (Springhouse): September 2019 - Volume 50 - Issue 9 - p 30-39doi: 10.1097/01.NUMA.0000578988.56622.21
6. Journals.lww.com “How artificial intelligence is changing nursing.” *Nursing Management*, Robert, N., September 2019.
7. Canadian-nurse.com “Artificial intelligence, automation and the future of nursing.” Glauser, W., May 01, 2017.
8. Nurse.org “Will these nurse robots take your job? Don’t freak out just yet.” Hamstra, B., February 27, 2018.
9. Hoy MB. Alexa, Siri, Cortana, and More: An Introduction to Voice Assistants. Med Ref Serv Q. 2018 Jan-Mar;37(1):81-88. doi: 10.1080/02763869.2018.1404391. PMID: 29327988.
10. Registered Nurses' Association of Ontario . *Professionalism in nursing.* Toronto: Registered Nurses' Association of Ontario; 2007. [2020-08-31].
11. Mano L, Mazzo A, Neto J, Meska M, Giancristofaro G, Ueyama J, et al. Using emotion recognition to assess simulation-based learning. Nurse Educ Pract 2019 Mar;36:13-19.
12. Afzal M, Hussain M, Ali Khan W, Ali T, Lee S, Huh E, et al. Comprehensible knowledge model creation for cancer treatment decision making. Comput Biol Med 2017 Mar 01;82:119-129.
13. Sitterding M, Raab D, Saupe J, Israel K. Using Artificial Intelligence and Gaming to Improve New Nurse Transition. Nurse Leader 2019 Apr;17(2):125-130
14. Clipper B, Batcheller J, Thomaz A, Rozga A. Artificial Intelligence and Robotics: A Nurse Leader's Primer. Nurse Leader 2018 Dec;16(6):379-384
15. Kutafina E, Laukamp D, Jonas S. Wearable Sensors in Medical Education: Supporting Hand Hygiene Training with a Forearm EMG. Stud Health Technol Inform 2015;211:286-291.
16. Wang L, Xue Z, Ezeana CF, et al. Preventing inpatient falls with injuries using integrative machine learning prediction: A cohort study. NPJ Digit Med. 2019;2:127. nature.com/articles/s41746-019-0200-3
17. Douthit BJ, Hu X, Richesson RL, Kim H, Cary MP. How artificial intelligence is transforming the future of nursing. American Nurse J. 2020;15(9):100-2.
18. Theiling BJ, Donohoe R, Sendak MP, et al. 2 Sepsis Watch: A successful deployment of a deep learning sepsis detection and treatment platform. Ann Emerg Med .2019;74(suppl 4):S1-2.
19. Velupillai S, Suominen H, Liakata M, et al. Using clinical natural language processing for health outcomes research: Overview and actionable suggestions for future advances. J Biomed Inform. 2018;88:11-19.
20. Hermansson J, Kahan T. Systematic review of validity assessments of Framingham risk score results in health economic modelling of lipid-modifying therapies in Europe. Pharmacoeconomics. 2018;36(2):205-13.
21. Hu X. An algorithm strategy for precise patient monitoring in a connected healthcare enterprise. npj Digital Medicine. 2019;2(30). nature.com/articles/s41746-019-0107-z
22. Kumah-Crystal YA, Pirtle CJ, Whyte HM, Goode ES, Anders SH, Lehmann CU. Electronic health record interactions through voice: A review. Appl Clin Inform. 2018;9(3):541-52.
23. Matheny M, Israni ST, Ahmed M, Whicher D, eds. Artificial Intelligence in Health Care: The Hope, the Hype, the Promise, the Peril. NAM Special Publication. Washington, DC: National Academy of Medicine; 2019. nam.edu/wp-content/uploads/2019/12/AI-in-Health-Care-PREPUB-FINAL.pdf
24. Nakatani H, Nakao M, Uchiyama H, Toyoshiba H, Ochiai C. Predicting inpatient falls using natural language processing of nursing records obtained from Japanese electronic medical records: Case-control study. JMIR Med Inform. 2020;8(4):e16970.
25. Sterling NW, Patzer RE, Di M, Schrager JD. Prediction of emergency department patient disposition based on natural language processing of triage notes. Int J Med Inform. 2019;129:184-8.
26. Sendak M, Elish MC, Gao M, et al. “The human body is a black box”: Supporting clinical decision-making with deep learning. Paper presented at: Proceedings of the 2020 Conference on Fairness, Accountability, and Transparency; January 2020; Barcelona, Spain. doi.org/10.1145/3351095.3372827
27. Skaljic M, Patel IH, Pellegrini AM, Castro VM, Perlis RH, Gordon DD. Prevalence of financial considerations documented in primary care encounters as identified by natural language processing methods. JAMA Netw Open. 2019;2(8):e1910399.