IDC INTERNATIONAL JOURNAL

OPEN ACCESS

International Online Peer- Reviewed, Referred, Indexed Journal *November - January 2025* Volume: 12 Issue: 1

AI REVOLUTION POWERING NURSING QUALITY IMPROVEMENT: A SCOPING REVIEW

Ms. Thushara Sekhar* | Dr. Robin Thomas**

**PhD Scholar, Shri Jagdishprasad Jhabarmal Tibrewala University, Jhunjhunu, Rajasthan, India.*

***Professor, Shri Jagdishprasad Jhabarmal Tibrewala University, Jhunjhunu, Rajasthan, India.*

DOI: http://doi.org/10.47211/idcij.2025.v12i01.006

ABSTRACT

Artificial intelligence (AI) is a dynamically changing and evolving field that has revolutionised healthcare. In nursing, the uses of AI are multifaceted - to improve quality of care, patient outcomes, and workflow efficiency. This article aims to provide a comprehensive review and insight into the current status of Artificial Intelligence in nursing quality improvement projects and the challenges therein. A study done by Vemulapalli et al (2016) demonstrates that application of advanced artificial intelligence methods in healthcare has the ability to enhance the quality of care by determining non-obvious, clinically pertinent relationships and enabling timely intervention. Imagine this: a nurse is using an AI tool that has been trained on thousands of patient records. The tool can quickly assess the likelihood of certain complications or adverse events based on various factors such as medical history, lab results, and vital signs. This means that nurses can be proactive in addressing potential issues before they escalate, ultimately improving patient outcomes.What's truly notable about these AI tools is how they are able to learn and adapt over time. As more data is collected and analysed, the algorithms become smarter and more precise in their predictions. Nurses can bank on these tools as a valuable resource in decision-making, warranting that every patient receives the best possible care.

Key Words: *Artificial intelligence (AI), healthcare, patient outcomes, workflow efficiency.*

ABOUT AUTHORS:

Ms. Thushara Sekhar is a Ph.D. Scholar at Jagdishprasad Jhabarmal Tibrewala University. She is also currently working as a Lecturer in College of Nursing. Her research Interest includes innovations in education, quality improvement and nursing informatics.

Dr. Robins Thomas is a Professor at Shri Jagdishprasad Jhabarmal Tibrewala University at Jhunjunu, Rajasthan in India. He is an active researcher who has contributed to various national and international journals through his published articles.

INTRODUCTION TO AI IN NURSING

In recent years, there has been a growing interest in the integration of artificial intelligence in various aspects of healthcare delivery. The Nursing and Artificial Intelligence Leadership Collaborative has recognised the potential of AI in nursing to improve documentation, identify scope for quality improvement and easily obtain and integrate data related to environment, genomics, health data, and patient/ community socio-demographics. This was discussed during the invitational think-tank in autumn 2019, where interdisciplinary experts in AI development, biomedical ethics, AI in primary care, AI and legal aspects, philosophy of AI in health, nursing practice, implementation science, leaders in health informatics practice and international health informatics groups, a representative of patients and the public, and the Chair of the ITU/ WHO Focus Group on Artificial Intelligence for Health convened to identify priority areas for action, opportunities and recommendations to address these.

AI Tools possess the ability to make predictions and have the potential to make a significant contribution to risk prediction in nursing quality improvement projects. These tools utilise advanced algorithms and machine learning techniques to analyse large volumes of data and identify patterns or trends that could indicate potential risks. By utilising AI tools, nurses can more accurately forecast the likelihood of adverse events such as falls, pressure injuries or deviations from optimal management protocols in pain, catheter use and ventilator management. Additionally, AI tools can augment nurses' critical thinking and decision-making abilities by providing them with access to abundant information and data (Ronquillo et al., 2021).

By analysing various datasets which include nursing documentation and patient data, primarily entered on Electronic Health Records, AI tools have evolved to be able to provide nurses with real-time insights into potential risks. Furthermore, AI tools can easily identify trends within documentation that may point to opportunities for quick and accurate improvement in care. These tools can also improve the overall quality of care by integrating various types of data and strengthening nurses' capacity to provide multi-faceted care. Furthermore, AI tools can aid in the identification of trends within documentation that may point to opportunities for quick and accurate improvement in care (Özsezer, 2022).

UNDERSTANDING QUALITY IMPROVEMENT PROJECTS IN NURSING

Quality enhancement initiatives in the nursing field strive to augment patient healthcare by ensuring safety and quality. These endeavours employ organised methods to recognise potential areas of improvement, formulate intervention strategies, and assess their efficacy. The process typically involves gathering and examining data pertinent to patient outcomes in conformity to evidence-based practices and in compliance with clinical protocols.

Projects aimed at enhancing quality in nursing strive to improve patient safety and healthcare standards. Such endeavours utilise structured methods to pinpoint areas requiring improvement, design interventions and assess the efficacy of those measures. Generally, this process involves gathering and examining data pertinent to patient outcomes, compliance with evidence-based practices, and adherence to clinical guidelines. Incorporating AI tools into nursing quality improvement projects can significantly impact risk prediction and patient outcome enhancement. These AI tools give nurses access to more thorough and precise data analysis, allowing them to proactively identify potential hazards. Moreover, AI tools can support nurses in making well-informed choices by offering evidence-based suggestions and valuable insights (Fernandes et al., 2023). Integrating AI tools into nursing quality improvement projects holds the promise of transforming healthcare by strengthening nurses' capabilities in risk prediction and anticipation, refining their critical thinking and decision-making abilities and ultimately resulting in superior patient outcomes (Özsezer, 2022).

The Nursing and Artificial Intelligence Leadership Collaborative has identified current and potential uses of AI in nursing including enhanced nursing documentation with the use of speech recognition technologies, text mining of nursing documentation to identify opportunities for quality improvement based on risk detection for falls or pressure injuries, or deviations from processes in pain catheter insertion, or administration of medication. Integration of AI tools in nursing quality improvement projects can facilitate the prediction of risks and contribute to improved patient outcomes (Ronquillo et al,2021). Integration of AI tools in nursing quality improvement projects can facilitate the prediction of risks and contribute to improved patient outcomes.

The integration of AI tools in nursing quality improvement projects has the potential to revolutionise healthcare by enhancing nurses' ability to predict and anticipate risks, improving critical thinking and decision-making skills and ultimately leading to better patient outcomes (Özsezer, 2022).

However, it is important to acknowledge the risks associated with using AI tools in nursing. These risks include the potential for AI algorithms to be trained on poor quality datasets, leading to biased or misleading results.

Education and awareness are crucial in addressing these risks, as nursing students need to be informed about the limitations and potential pitfalls of AI tools. Moreover, nursing students should receive training on academic integrity and the importance of gaining knowledge through in-depth reading, critical thinking, and scientific writing. This will equip them with the necessary skills to evaluate AI-based healthcare technologies and ensure that they are used safely and effectively in practice.

AI technology can act as an extra set of eyes for nurses, helping to enhance patient safety by providing real-time monitoring. These AI tools can offer alerts and reminders to nurses, ensuring that they do not miss any important information or tasks.

By utilising AI analysis, nurses are able to make more informed decisions based on concrete evidence. This can greatly enhance nursing practice and improve patient outcomes.

Examples of AI applications in nursing quality improvement:

1. Clinical Decision Support: AI tools can analyse large amounts of patient data and provide evidence-based recommendations to support clinical decision-making. This can help nurses identify risks, recommend interventions, and improve patient outcomes.
2. Predictive Analytics: AI algorithms can analyse patient data to identify patterns and predict potential health complications. Nurses can use this information to proactively intervene and prevent adverse events (Tiase et al 2021).
3. Workflow Optimisation: AI can automate routine tasks, such as scheduling and documentation, allowing nurses to focus more on direct patient care. This can improve workflow efficiency and reduce the burden of administrative tasks (Seibert, 2021).
4. Patient Monitoring: AI-powered sensors and wearable devices can continuously monitor patients' vital signs and alert nurses of any abnormalities. This enables early detection of deteriorating conditions and timely interventions.
5. Natural Language Processing: AI can analyse and interpret unstructured data, such as nursing notes and patient narratives, to extract meaningful information. This can assist in identifying critical data elements and improving documentation accuracy.
6. Robotics: AI-powered robots can assist nurses in various tasks, such as medication delivery, patient lifting, and repetitive procedures. This can reduce physical strain on nurses and improve patient safety.
7. Augmented Reality: AI can be used to create virtual simulations and training modules for nursing education. This allows nurses to practice complex procedures in a safe and controlled environment (Tiase et al 2021).
8. Quality Monitoring and Surveillance: AI algorithms can analyse healthcare data to identify trends, patterns, and potential areas for quality improvement. This can help nurses and healthcare organisations identify areas of concern and implement targeted interventions (Tiase et al 2021). With this data, the nurses can identify areas for improvement.

While the actual and potential uses of Artificial Intelligence are enormous in nursing, and specifically in Quality Improvement Projects, it is important to understand its flip side also. It is imperative to understand the challenges that come into existence with the advancement of Artificial Intelligence.

Challenges to implementing AI in nursing quality improvement include: —

1. Limited Nurse Involvement: Despite the potential benefits of AI in nursing, there is a need for greater involvement and input from nurses in the development and implementation of AI tools. Nurses should be actively engaged in the design process to ensure that AI solutions align with their workflow and address their specific needs.
2. Data Quality and Privacy: AI relies on large amounts of data for training and decision-making. Ensuring quality, accuracy and privacy of patient data is crucial. Nurses must be confident about the validity and security of the data used by AI systems (Smith et al, 2021).
3. Regulation and Interoperability: The regulatory landscape for AI in healthcare is still evolving. There is a need for clear guidelines and standards to ensure safe and ethical use of AI in nursing. Additionally, interoperability between different AI systems and healthcare technologies is essential for seamless integration and data exchange (Smith et al, 2021).
4. Transparency and Explainability: AI algorithms can be complex and opaque, making it difficult for nurses to understand how decisions are made. It is important for AI-system developers to make the outputs of AI systems transparent and explainable to nurses, so that they can trust and effectively use the technology (Gartley, et al 2020).
5. Workflow Integration: Integrating AI into existing nursing workflows can be challenging. Nurses may need to adapt their practices and learn new skills to effectively utilise AI tools. It is important to ensure that AI enhances, rather than disrupts, nursing workflows.
6. Ethical Considerations: AI raises ethical concerns, such as bias in algorithms, potential for automation bias and its impact on the nurse-patient relationship. Nurses must be aware of these ethical considerations and ensure that AI is used in a way that upholds patient safety, privacy and autonomy.

Artificial intelligence (AI) has the potential to improve the quality of nursing care by enhancing clinical decision-making, documentation processes, and patient monitoring. AI applications in nursing care settings include predictive analyses for falls prediction and wound management, as well as image and signal processing for tracking, monitoring and classification of activity and health. These applications can help improve nurses' preparedness and management of patients' conditions. However, there is a need for more randomised controlled trials in real-life healthcare settings to enhance the rigor of evidence. Nurses should be empowered with education in the application of AI to lead technological transformations and ensure that they are actively involved in decision-making and evaluation of AI technologies. Ethical, legal, and social implications of AI in nursing care should also be considered and discussed in detail. Overall, AI has the potential to optimise nursing practice, improve clinical efficiency and enhance patient care and outcomes.

All said and done, the most notable point would be digital literacy of the nurses. Their willingness in adopting and adapting to the newer technologies and their own innovations can contribute to the field of artificial intelligence to promote patient safety and quality nursing care.

REFERENCES

1. Artificial intelligence in nursing. (2022, January 11). American Nurse. https://www.myamericannurse.com/ai-artificial-intelligence-in-nursing/
2. Barrera, A., Gee, C., Wood, A., Gibson, O., Bayley, D., & Geddes, J. (2020). Introducing artificial intelligence in acute psychiatric inpatient care: Qualitative study of its use to conduct nursing observations. Evidence-Based Mental Health, 23, 34 - 38. https://doi.org/10.1136/ebmental-2019-300136.
3. Chang, C., Jen, H., & Su, W. (2022). Trends in Artificial Intelligence in Nursing: Impacts on Nursing Management.. Journal of nursing management. https://doi.org/10.1111/jonm.13770.
4. Fernandes, F., Santos, P., Sá, L., & Neves, J. (2023). Contributions of Artificial Intelligence to Decision Making in Nursing: A Scoping Review Protocol. Nursing reports (Pavia, Italy), 13(1), 67–72. https://doi.org/10.3390/nursrep13010007
5. Gartley, C. E. (2020, September 6). How artificial intelligence is transforming the future of nursing. American Nurse. https://www.myamericannurse.com/how-artificial-intelligence-is-transforming-the-future-of-nursing/
6. Hackl, W., Rauchegger, F., & Ammenwerth, E. (2015). A Nursing Intelligence System to Support Secondary Use of Nursing Routine Data. Applied Clinical Informatics, 06, 418 - 428. https://doi.org/10.4338/ACI-2015-04-RA-0037.
7. How Artificial Intelligence is Partnering with Nursing to Provide Care. (2020, April 29). Consult QD. https://consultqd.clevelandclinic.org/how-artificial-intelligence-is-partnering-with-nursing-to-provide-care/
8. Ng, Z., Ling, L., Chew, H., & Lau, Y. (2021). The role of artificial intelligence in enhancing clinical nursing care: A scoping review.. Journal of nursing management. https://doi.org/10.1111/jonm.13425.
9. Özsezer, G. (2022). The future of artificial intelligence in nursing. Journal of Human Sciences. https://doi.org/10.14687/jhs.v19i2.6217
10. Ronquillo, C. E., Peltonen, L. M., Pruinelli, L., Chu, C. H., Bakken, S., Beduschi, A., Cato, K., Hardiker, N., Junger, A., Michalowski, M., Nyrup, R., Rahimi, S., Reed, D. N., Salakoski, T., Salanterä, S., Walton, N., Weber, P., Wiegand, T., & Topaz, M. (2021). Artificial intelligence in nursing: Priorities and opportunities from an international invitational think-tank of the Nursing and Artificial Intelligence Leadership Collaborative. Journal of advanced nursing, 77(9), 3707–3717. https://doi.org/10.1111/jan.14855
11. Ronquillo, C.E., Peltonen, L., Pruinelli, L., Chu, C.H., Bakken, S., Beduschi, A., Cato, K.D., Hardiker, N.R., Junger, A., Michalowski, M., Nyrup, R., Rahimi, S.A., Reed, D.N., Salakoski, T., Salanterä, S., Walton, N., Weber, P., Wiegand, T., & Topaz, M. (2021). Artificial intelligence in nursing: Priorities and opportunities from an international invitational think-tank of the Nursing and Artificial Intelligence Leadership Collaborative. Journal of Advanced Nursing, 77, 3707 - 3717.
12. Seibert K, Domhoff D, Bruch D, Schulte-Althoff M, Fürstenau D, Biessmann F, Wolf-Ostermann K. Application Scenarios for Artificial Intelligence in Nursing Care: Rapid Review. J Med Internet Res. 2021 Nov 29;23(11):e26522. doi: 10.2196/26522. PMID: 34847057; PMCID: PMC8669587.
13. Smith, M., Sattler, A., Hong, G., & Lin, S. (2021). From Code to Bedside: Implementing Artificial Intelligence Using Quality Improvement Methods. Journal of General Internal Medicine. https://doi.org/10.1007/s11606-020-06394-w
14. Tiase, V.L., Cato, K.D., (September 30, 2021) "From Artificial Intelligence to Augmented Intelligence: Practical Guidance for Nurses" OJIN: The Online Journal of Issues in Nursing Vol. 26, No. 3, Manuscript 4.
15. Vemulapalli, V., Qu, J., Garren, J., Rodrigues, L., Kiebish, M., Sarangarajan, R., Narain, N., & Akmaev, V. (2016). Non-obvious correlations to disease management unraveled by Bayesian artificial intelligence analyses of CMS data. Artificial intelligence in medicine, 74, 1-8 . https://doi.org/10.1016/j.artmed.2016.11.001.