



Use of Artificial Intelligence in Nursing in Low-Income Settings: Readiness Criteria for Application

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Introduction

Application of artificial intelligence (AI)² in all areas of human endeavor, including nursing practice, offers an opportunity for faster, smarter, and cost-effective processes (Ahmad, 2024). Others, Ronquillo et al (2021) have led reflections on the priorities and opportunities for use of AI in nursing from an international collaboration perspective. Bolarinwa, O.A et al., (2024) have outlined how AI can be used to transform maternity services in Africa. Bonsall (2024) argues that AI is here to stay and its role in nursing will continue to evolve. As AI impacts the role of nursing in patient care delivery, those in nursing care must be involved in the development and implementation of AI tools. It is important for nurses to be part of the discussion and be the best advocates for safe use of AI to inform and support – not replace – nursing care (Bonsall, 2024). This paper explores readiness criteria for low-income countries to exploit the potential of AI in nursing.

Examples of use of AI in nursing

There is limited data describing the extent of AI adoption in low-income healthcare systems including nursing, Njei et al. (2023). However, recently, a number of actual and aspirational uses of AI in nursing have been documented such as studies on use of AI in cancer nursing (O'Connor, 2024).

Examples of use of AI in low-income settings include Computerized Aid to Treat (CATT) in drug prescriptions in South Africa by nurses based on a cost-and-effectiveness algorithm (Owoyemi, et al., 2020).

Pailaha (2023) has also documented some of the impacts of AI including expanding access to high-quality medical care and improving care delivery, improving the electronic health record (EHR), improving collaboration and communication, including coordination between healthcare disciplines. Generative AI tools, such as ChatGPT and BardAI, summarize data into text for expedited information-gathering and content creation, and are gaining use in clinical and operations settings to help nursing staff improve productivity and decrease waste of resource inputs by eliminating menial tasks and enabling more informed and efficient clinical decisions (Carroll, 2023).

Chhetri & Shrestha (2023) have also documented use of AI to determine prenatal nursing interventions based on pregnant women's nursing records and predict the risk of developing postpartum depression. AI is also being used to predict the risk of delivery based on the age of the pregnant women, determine the demands for nursing care among older women with physical limitations, and forecast the chances of developing breast cancer before and after menopause. (Jeong, 2020.)

In other health care interventions that influence nursing care, there is evidence of positive outlook about AI in relation to clinical quality improvement, competent diagnosis, radiation dose reduction (Antwi, et al., 2021). In Africa, AI is being used to map and monitor malaria transmission, guiding targeted interventions to high-risk areas (Minakshi et al., 2020, Jacob et al., 2021). These example, while being of benefit to the wider health care, can benefit the practice of nursing through interdisciplinary dialogue in health care settings.

¹ The views expressed in this paper are those of the authors and not their current employers.

² Artificial intelligence (AI) refers to the simulation of intellectual human behavior by computers. AI can be designed using algorithms related to machine learning (ML), deep learning (DL), natural language processing (NLP), support vector machine (SVM), and artificial neural network (ANN)

Limitations of AI

Like all technologies, AI has limitations. Halmilton et al (2023) have outlined a number of limitations for AI such limited contextual understanding, lack of common-sense knowledge, limited memory, and inability to generate original ideas amongst others. In addition, AI has the potential to pose challenges in nursing including privacy issues De Gagne (2023). Others have also warned against limitations of AI such ambiguity surrounding copyright, the lack of truthfulness and accuracy, and the increased potential for misuse and bias (Emenike & Emenike,2023).

Readiness criteria for use of AI in nursing

There is potential for applying AI in nursing practice in low-income settings. Application of AI in nursing in all settings, but particularly in low-income settings will be driven and optimized through (i) Data Governance Structures; (ii) intentionality; (iii) understanding what AI is and is not; (iv) investing in public data infrastructure; (v) data science skills; (vi) identifying appropriate solution spaces and (vii) risk management amongst others. In nursing and health care, WHO (2021) has issued six (6) key ethical principles for use of AI in health care.

Intentionality (including Data Governance)³: AI will be used in low-income settings when there is intentionality in using AI for nursing practice. Part of “Intentionality” will be setting up Data Governance Structures⁴. WDR (2022) estimates that “*No low-income countries have a data governance entity, compared to 53 percent of high-income countries*”. Establishing Data Governance Structures will be one of the risk mitigation measures that will need to be taken by low-income countries prior to using AI for nursing practices.

Bridging the know gaps between AI experts and human development experts: AI can only appropriately be used if it is fully understood. There is a knowledge divide between experts in AI and nursing professionals. Bridging such a gap, through the later group reaching to the former will be the starting point for appropriately applying AI in the appropriate “solution spaces” including nursing.

Appropriate solution spaces. Since the “AI for Good Global Summit Report” (2017), which stated that AI will be “*central to the achievement of the Sustainable Development Goals and could help solve humanity’s grand challenges*”, there has been optimism in the development sector to employ AI. However not all “spaces” are amenable to AI. Identifying appropriate solution spaces in the nursing profession is therefore a starting point in application of AI in nursing practice.

Public data infrastructure⁵: AI can be used for nursing practice only if the correct infrastructure is available. Most low-income countries have “deficient” Data Density Index⁶ (Buluswar et. al., 2018). This deficiency is not conducive to using AI in nursing practice. Governments in low-income countries should progressively invest in “data” infrastructure if AI in nursing practice is to become a reality. Appropriate infrastructure is of utmost importance as a risk mitigation measure. Poor infrastructure would lead to abuse of data, privacy concerns, risking the central ethical considerations of nursing practice.

Data Scientists: In low-income settings, even when AI matures for nursing care, lack of data scientists and lack of nursing professionals with grounding in data science, can make its use extremely limited (Chui & Harrysson, 2019). To exploit AI for nursing practice, low-income countries need to invest in analysis skills in its data scientists and in nursing professionals with a grounding in data science. Low-income countries will need nationals with experience in using deep learning algorithms, using massive amounts of data to model overly complex patterns if AI is to be used for nursing practice (Buluswar et al., 2018).

Risk driven: AI has very well-known risks. [Geoffrey Hinton](#), the God Father of AI has been quoted as saying “*These things could get more intelligent than us and could decide to take over, and we need to worry now about how we prevent that happening.*” As use of AI in nursing becomes prominent, appropriate risk mitigation measures need to be put in place. AI will be a big industry, low-income countries should invest, now, in appropriate risk governance frameworks and tools to manage AI driven nursing. Bias, ethics, manipulation, and other issues have been identified as areas where risk management is imperative when using AI in any endeavor. A major part of risk management will be on “data protection,” yet WDR (2022) estimates that “*Only 24 percent of low-income countries have established data protection authorities, compared to 81 percent of high-income countries*”.

³ Data Governance constitutes control of risks by ensuring security, integrity, and protection of data and systems, and to capture value by establishing rules and technical standards to enable data to be more effectively transferred, combined, and exchange (WDR, 2022)

⁴ Data Governance constitutes control of risks by ensuring security, integrity, and protection of data and systems, and to capture value by establishing rules and technical standards to enable data to be more effectively transferred, combined, and exchange (WDR, 2022)

⁵ Data infrastructure refers to the various components—including hardware, software, networking, services, policies, and more—that enable data consumption, storage, and sharing. Having the right data infrastructure strategy is critical for organizations seeking to undertake data-driven digital transformation (Hewlett Packard Enterprise)

⁶ Data Density Index (DDI) is a measure of the strength of a country’s data infrastructure and its

readiness to utilize data to advance its development objectives (Buluswar et al., 2018). DDI covers dimensions of business, people, government, and infrastructure.

Conclusion

While there has been use of AI in nursing in developed nations, there is potential for exploiting AI to advance nursing in low-income settings. In addition to advancing scholarship and application, low-income countries need to prepare for risk informed adoption of AI in nursing.

This paper has identified data governance, knowledge gaps, public data infrastructure and skills amongst Data Scientists and nursing professionals in low-income countries as some of the most imminent areas that need investment if the nursing practice is to benefit from AI.

Academics have already started exploring and documenting areas where AI has been used and can be used in nursing practice. They need to be supported through government led investments. In addition to such investments, using AI for nursing practice will come with risks. Low-income countries will need to invest in public data infrastructure and data governance structures to manage risks that come with use of AI in nursing practice.

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