

Artificial Intelligence and the Sustainable Development Goals: Implications for Canadian Nurses and Nurse Leaders

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Abstract

Artificial intelligence (AI) offers many opportunities for nursing to improve health outcomes and contribute to meeting the Sustainable Development Goals nationally and globally. However, it also presents challenges to meeting these goals and keeping pace with innovation, which nurses must anticipate and mitigate. Canadian nurse leaders are well-positioned to guide transformative change in the nursing workforce, ensuring that nurses have the competencies and resources needed to thrive in AI-supported care environments. This not only allows nurses to better adapt to AI but also leverages new skills to take on more significant roles in improving healthcare on a wider scale.

Introduction

Artificial intelligence (AI) is gaining global attention for its potential to revamp industries and economies due to its ability to accomplish complex tasks that were previously done by humans, but remarkably with much more speed and less effort (Innovation, Science and Economic Development Canada 2025). Many nurses see promise in AI technologies to improve care planning and administrative efficiency, allowing them more time to focus on patient care and the global challenges confronting health systems, such as the aging of the population and the social determinants impacting health (Al Khatib and Ndiaye 2025; Alenezi et al.

2024; McGrow 2025; Vinuesa et al. 2020; Yakusheva et al. 2025). However, nurses' understanding of AI, including its benefits and potential risks, is pivotal to ensure that the integration of AI technologies does not compromise patient safety, health data, clinicians' decision making, their interactions with patients and the overall quality of care (Rony et al. 2024; Yakusheva et al. 2025). Nurses also have a responsibility to ensure that AI technologies are designed to be of benefit to patients' needs. Human oversight of AI is also pivotal; however, for this to occur, healthcare providers will need to have new skill sets as well as ongoing support for them to adapt to these changing demands in their practice settings, without causing additional strains (van Voorst 2024; Yakusheva et al. 2025).

Presently, Canadian nurses are largely unfamiliar with AI and report several challenges with digital health integration across practice settings (Canada Health Infoway 2024). These gaps and the potential influences of AI on the nursing profession in the short and long term have propelled the Canadian Nurses Association and Canadian Nursing Informatics Association to urge nurses to embrace the digital health transformation by actively participating in the design, implementation and evaluation of new technologies and solutions such as AI and robotics (CNA and CNIA 2024). Nurses' active involvement is critical for examining the impact of AI technologies on nursing roles and patient outcomes, ensuring that the practice of nursing remains ethical, compassionate and patient-/family-centred. They also underscore the importance of supporting nurses and nurse leaders in advancing their informatics competency and AI literacy, so they are better prepared to take part in policy decisions relative to AI and digital health (CNA and CNIA 2024).

Nurses represent the largest occupational group and are uniquely positioned to accelerate progress toward achieving the Sustainable Development Goals (SDGs) (WHO 2025). Canadian nurses, in particular, have a long history of advocacy for policies and systems that promote health equity, address the social determinants of health and improve health outcomes for all (Grdisa 2025; Health Canada 2024). Building on these successes and strengthening nursing leadership in AI to develop an AI-informed nursing workforce is therefore key to greater progress. In this article, we discuss key AI technologies revolutionizing healthcare in the context of the SDGs, exploring both potential benefits and challenges associated with AI integration, and how nurse leaders can prepare to strengthen nursing leadership in AI.

AI and SDGs

As a member of the United Nations, Canada has committed to working toward achieving the 17 SDGs goals, aimed at creating a peaceful and prosperous planet for all (UN 2015). Despite this commitment, progress toward the SDGs falls below the target. Inequities still exist and climate-related initiatives are insufficient.

Canadian nursing leadership can play an important role in advancing SDGs' progress through the strategic use of AI. Nursing leaders must also recognize that AI offers both opportunities and challenges toward the progression of attaining these goals.

Opportunities

AI offers many opportunities for nursing to contribute to the achievement of SDGs both globally and nationally (UN 2024). Although every SDG is arguably influenced by nursing, there are several initiatives focused on achieving the SDGs in Canada where nurses are leading or part of the multidisciplinary teams using AI to help meet the overarching targets.

SDG 1: No poverty

AI-driven telehealth initiatives may reduce travel costs and improve access to care in remote and rural communities, thus improving timely access to care and reducing individual health spending (Kuziemsy et al. 2019). For example, in Saskatchewan, the Virtual Health Hub (VHH) is a federally funded multidisciplinary health team based out of the University of Saskatchewan (University of Saskatchewan 2025). The initiative includes using AI for remote triage and diagnostics. Nurses are active participants in the VHH and function as coordinators, implementers and evaluators of the AI-enabled remote presence care (University of Saskatchewan 2025). The project has the potential to close gaps, reduce inequities and improve access to health services for rural, remote and Indigenous communities (University of Saskatchewan 2025).

SDG 3: Good health and well-being

The health and well-being of Canadians may be influenced by AI using AI triage tools, such as chatbots and virtual nursing assistants, which can help prioritize high-risk patients, and AI-assisted diagnostics or predictive analytics to assist nurses to detect conditions early and intervene before complications arise. In one Canadian study, ChatGPT (GPT-4) and Bing Chat, both publicly available free tools, were used to triage fictional ophthalmologic clinical vignettes (Lyons et al. 2024). The results of the study showed that ChatGPT-4 was as accurate as the ophthalmology trainees, and both ChatGPT-4 and Bing Chat outperformed WebMD Symptom checker (Lyons et al. 2024). However, there were instances where the pre-trained transformers overstated the urgency of the condition (Lyons et al. 2024). One emerging area that may see increased utilization of AI is mental health tools, such as screening algorithms or chatbots that can detect early signs of mental health challenges in vulnerable clients, such as postpartum mothers or isolated seniors. Nursing will play a critical part in the implementation and evaluation of these technologies because of the unique relational aspects of its role. As these technologies become integrated into workflows, nurses will need

to use clinical judgement and critical thinking to be assured AI is not missing the nuances of human communication, such as body language, tone and cultural and contextual meanings. Since empirical studies including Canadian populations are limited, nurses should recognize this as an emerging area for research.

SDG 4: Quality education

Nursing education has seen a rapid growth in technological integration, such as synchronous and asynchronous online learning at the undergraduate and graduate levels. These non-traditional learning approaches contributed to the development of life-long learning and relevant skills for employment, enhancing the overall preparedness of the nursing workforce for the complexities of digital health and AI (Kleib et al. 2024). For example, the use of simulated electronic health records allows students to expand on their digital skills and acquire informatics competencies such as electronic charting and data literacy. Immersive learning experiences through AI-powered simulation and virtual reality allow students to practice clinical reasoning in a realistic, risk-free setting, enhancing their critical thinking ability and confidence to respond to complex patient situations (Lifshits and Rosenberg 2024). The utilization of these technologies increased markedly during the COVID-19 pandemic to compensate for lost clinical placements and expanded opportunities for accessing difficult-to-reach populations such as community healthcare settings (Kleib et al. 2024). While opportunities exist, there remain limitations and areas that need to be addressed. The integration of these technologies into nursing programs and healthcare settings is not at scale yet, largely due to the cost of these technologies, the pace of technological innovations and the need to develop new skills among users to ensure responsible use. Health sciences programs, and nursing schools, in particular, continue to face challenges in securing funding and resources to support educators and increase their capacity to teach about digital health technologies in the classroom and simulation laboratories. Furthermore, the variable implementation of AI technologies in healthcare settings makes it difficult for nursing programs to find suitable clinical placements to train nursing students about the application of these technologies in clinical care (Charow et al. 2021; Kleib et al. 2024; Nagle et al. 2020).

SDG 6: Clean water and sanitation

Many nurses in primary care play a role in both the prevention and response to water-borne illnesses such as *Escherichia coli*, *Campylobacter* and *Salmonella*. Nurses are often part of surveillance efforts to monitor and report illness to health authorities and provide education about safe practice for handling, storing and consuming water. AI technologies can monitor water quality and provide decision algorithms, allowing nurses to receive earlier updates about changing water quality, ultimately enabling quicker response times and issuing of public health advisories (Frincu 2025).

AI can be an assistive tool for municipal planning of the location of washrooms and handwashing areas to reduce the spread of infection. At the Ottawa Hospital, AI has been used to monitor and remind healthcare workers to do hand hygiene. Following the implementation of the Artificially Intelligent Monitoring System, one unit observed a 27% increase in hand hygiene practices, and there were no significant outbreaks on the unit for the year following implementation (Ontario Hospital Association 2025).

SDG 15: Life on land

Canada's climate is changing, resulting in higher temperatures and more frequent heat waves. The increase in average temperatures results in changes to animal migration patterns and transmission of zoonotic and vector-borne diseases (VBDs) in areas where they were previously less common. For example, the expansion of tick populations due to warming temperatures has been directly linked to increased incidence of Lyme disease spreading to areas of northern Canada (Vandenberg et al. 2024). In a recent literature review conducted by the Public Health Agency of Canada exploring innovative surveillance technologies, AI specifically has been used to track and predict the migration patterns of disease-carrying animals and synthesize symptoms mentioned on social media platforms to identify at-risk areas and detect early patterns of transmission (Rilkoff et al. 2024). However, surveillance of VBDs highlights possible limitations of AI when human context is neglected. While models can forecast mosquito or tick activity, they often overlook the lived realities of vulnerable populations in these locations, including rural, low-income, senior and Indigenous communities. The relational aspect of nursing positions nurses as valuable contributors to AI design, ensuring that the technology is socially responsive and does not forgo patient-centred care and individual circumstances at the expense of efficiency and decision-support algorithms. The literature review acknowledges that this is an emerging area and suggests that more research is needed (Rilkoff et al. 2024).

Challenges

While AI may offer opportunities for nursing to contribute to the achievement of the SDGs, there are also challenges that AI-supported technologies can present, which may either slow or undo progression. Similarly, workforce readiness for AI may exacerbate these challenges, possibly alienating nurses from the opportunity to influence health outcomes and overall population health on a wider scale. There are several instances where nursing has recognized the complexities of AI and raised concerns about the ways its utilization may be problematic.

SDG 8: Decent work and economic growth

Despite being the backbone of the Canadian healthcare system, morale and retention of nurses remain key concerns. Persistent shortages and poor working

conditions increase workloads, stress and risks to patient safety. These conditions exacerbate burnout among nurses and nurse leaders alike, adding further burden to an already strained nursing workforce (Health Canada 2024). While emerging evidence suggests that AI technologies could help reduce waste, enhance efficiencies and facilitate resource allocation, risk assessment, decision making, change management and communication, potentially contributing to better health outcomes (Gonzalez-Garcia et al. 2024), there are also concerns worth noting. AI has been praised for automating areas of charting and documentation to free up time for more meaningful patient interaction. However, in healthcare settings, faster care does not always equate to better care. Nursing regulators, charged with the mandate of protecting the public and ensuring nurses provide safe, competent and ethical care, are recognizing the evolving landscape of AI and the need for nurses to adapt to the new technology. However, they also caution that these tools need to be used to support, not replace, nurses. Although the relational aspect of nursing will likely protect the profession from ever being fully replaced by AI, in a time where healthcare is costly and often at the forefront of provincial and federal budgetary conversations, the perception that AI is a solution to free up time for front-line staff and create operational efficiencies may be used to justify lay-offs, increases to patient ratios, and assign heavy workloads. AI could become the scapegoat response to nursing burnout, staffing shortages and unsafe patient ratios, rather than hospital administrators addressing the core problems and solutions that Canadian nurses have been calling on governments to address for decades (Health Canada 2024).

SDG 4: Quality education

Despite the benefits of technological integration into nursing, AI also presents challenges to nurse leaders and the profession at large. One key challenge is developing AI literacy in the current and future nursing workforce (Charow et al. 2021; CNA and CNIA 2024). A study about digital health and AI education needs found that while nursing students may have strong digital literacy skills, they report limited educational opportunities to fully understand the relevance of digital health and AI to nursing practice and a lack of access to hands-on opportunities for learning about these technologies in the clinical setting (Kleib et al. 2025). These gaps negatively impact the development of informatics competencies needed for professional practice and can create a “digital divide” where some nurses are unprepared to use technologies such as electronic health records, which are becoming essential for management and coordination of care in contemporary healthcare environments. Students in this study urged their nursing programs to offer more education on topics such as machine learning, applications of data science in nursing and the role of AI in clinical care delivery to better prepare graduates for safe practice in digitally enabled care environments (Kleib et al. 2025). Another key challenge is the lack of policy and regulations on the use of

AI. Such regulations are critically needed to ensure that AI integration does not amplify biases and inequalities already prevalent within educational systems, ensure data privacy and security, critical thinking and academic integrity and the appropriate use of these tools by students and their educators to augment rather than replace the critical role of nursing educators (Lifshits and Rosenberg 2024; Rony et al. 2024).

SDG 9: Industry, innovation and infrastructure

As previously discussed, AI technologies may help to serve rural and remote communities who otherwise may not have access to various healthcare services. The provision of these services may necessitate significant updates to infrastructure and resource allocation, including professional development for healthcare providers. Investing in AI is a priority for the Canadian government with a pledge of a 2-billion-dollar investment over the next five years to situate Canada as a global leader in AI (Innovation, Science and Economic Development Canada 2025). However, often, funding for federal initiatives is finite, and the investment in AI could potentially divert funding from other necessary health infrastructure and programs that also would benefit from essential funding. Policy makers will need to ensure that resource allocation decisions will yield the best benefits to Canadians while also advancing Canadian leadership in AI.

SDG 12: Responsible consumption and production

The goal of responsible consumption and production is to reduce waste and promote sustainable business practices and management of resources. AI may help to meet this goal by analysing and streamlining supply orders or adjusting light and temperatures in empty rooms of healthcare facilities during the off hours to help mitigate some of the criticisms of the significant waste in the Canadian healthcare system. However, nurses and healthcare providers should be mindful of the criticisms of AI for its use of resources, including electricity to run, water to cool the servers and land space for the data centres. All of these have an environmental and economic impact across the globe. The Canadian Climate Institute has weighed in on the establishment of data centres across Canada and highlights the need for a balanced approach that values both growth and sustainability (Harland 2025).

AI and Workforce Adaptation: What Can Nurse Leaders Do?

Nursing practice is relational in nature, entailing soft skills such as communication, caring and clinical reasoning (Yakusheva et al. 2025). These capabilities are not easily replaceable by machines; however, nurses will need to adapt to the changing context of healthcare while also preserving the essence of the nursing profession. To overcome the above-mentioned challenges and reap the full benefits of AI, there is a need for adaptable, forward-thinking and strategic leadership

across all domains of nursing to better prepare and continuously develop the nursing workforce (Grdisa 2025). Furthermore, collective action and coordinated efforts with leaders and policy makers across health systems are also needed so that nurses can stay at the forefront of the digital transformation (CNA and CNIA 2024; Grdisa 2025).

AI Literacy and Nursing Education

As AI transforms healthcare, scholars emphasized the need to update health sciences curricula to build care providers' AI skills so that they have the foundational knowledge to understand algorithms, consider social and ethical implications and evaluate AI workflows (Charow et al. 2021; Lee et al. 2025). Limited understanding about AI can hinder the effective and safe integration of these technologies into clinical practice (Lifshits and Rosenberg 2024; Rony et al. 2024). Nurses lacking essential knowledge and skills in AI are also more likely to encounter challenges as they adapt to more AI integration into their practice environments. While not all nurses are expected to become experts in AI, every nurse should be a critical user of AI systems to champion digital and AI innovations that enhance nursing practice and patient outcomes while also mitigating potential risks (Al Khatib and Ndiaye 2025; Yakusheva et al. 2025).

Nursing informatics competency frameworks serve as a foundation to guide nursing education interventions relative to digital health; however, this education varies widely, with a limited focus on AI (Kleib et al. 2024). Understandably, these frameworks were developed prior to AI becoming a prominent focus. Some countries updated their nursing informatics competencies by adding specific indicators about AI (CASN 2025). Nurse educators and nurses are encouraged to use these frameworks to inform undergraduate curricula as well as teach core AI concepts, emphasizing safe, ethical and effective application of AI tools in the clinical environment (Charow et al. 2021; Kleib et al. 2025). Ideally, these learning experiences should be augmented with hands-on practice within the nursing laboratory/simulation and clinical training sites (Kleib et al. 2024; Lifshits and Rosenberg 2024; Rony et al. 2024). Equally important, nurse leaders in academic programs and healthcare organizations should continue advocating for more resources to support the development of informatics competencies in the entire current and future nursing workforce (Lifshits and Rosenberg 2024; Nagle et al. 2020; Yakusheva et al. 2025).

Furthermore, nurse leaders in academic nursing programs are uniquely positioned to advocate for more investment in specialized nursing informatics roles, for example, the nurse informatician role, to support large-scale deployment of AI technologies, lead health innovation and support the nursing workforce in developing their AI capacity (Alenezi et al. 2024; Lee et al. 2025; McGrow 2025;

Yakusheva et al. 2025). Creating graduate education programs at the master's and PhD levels with a focus on digital health and nursing informatics and increasing awareness about these programs will help attract graduate students with an interest in the field. In turn, this ensures a pool of highly qualified nursing professionals with the desired skill set and expertise (e.g., AI, data science) needed in the job market.

Fostering a Culture of Innovation and a Growth Mindset

As healthcare organizations introduce more AI technologies, there is a need for a cultural shift in how technology is perceived in the context of clinical practice. This means moving away from a technical user-training model to a more integrated educational approach to enable the development of new skills and the acquisition of foundational knowledge of AI in the nursing workforce (Kleib et al. 2024). Fostering a culture of learning and innovation is key to driving quality improvement and tracking and evaluating the impact of AI systems in the short and long terms (Alenezi et al. 2024; Lee et al. 2025; McGrow 2025). Nurse leaders in healthcare organizations are encouraged to champion initiatives that support accurate data collection and data standards that enhance nurse visibility and patient outcomes, explore new and innovative models for care delivery that augment nursing practice and ensure that nurses' voice is represented in strategic decisions about AI within their organizations (Alenezi et al. 2024; CNA and CNIA 2024; Lee et al. 2025; Rony et al. 2024).

Through shared decision making, transparent communication and opportunities to evaluate and reflect upon how AI is transforming nursing practice and patient care, these leadership behaviours and practices empower nurses to lead innovations in their workplaces. To facilitate these conversations, nurse leaders in healthcare organizations can consider creating a repository for AI use cases. These use cases provide a real-world example of how AI is applied to address a healthcare challenge (e.g., prediction of disease conditions, managing staffing needs) for nurses to review lessons learned, inform future decisions and promote ongoing critical evaluation of AI solutions (Alenezi et al. 2024; Rony et al. 2024). These cases can also be a useful resource for educating future nurses, research and forging collaborations and partnerships with industry (Alenezi et al. 2024; Lee et al. 2025; Yakusheva et al. 2025).

Upgrading Clinical and Regulatory Policies

There is a need for a systematic review of existing organizational policies and clinical workflows involving nursing practice with AI, with particular emphasis on data and data security, clinical decision making, and transparency regarding the use of AI tools in the context of care. Not only will this ensure nurses know how to use AI, but it will also enable them to identify concerns and/or potential

risks to patients and/or their sensitive health data (Lee et al. 2025; Rony et al. 2024). Having clear and consistent guidance about AI applications in care delivery can also help minimize confusion and reduce potential fear and/or anxiety for using AI to augment clinical practice (Al Khatib and Ndiaye 2025; Yakusheva et al. 2025). Equally important, nurse regulators will need to explicitly develop and endorse professional expectations regarding AI use, emphasizing the professional accountability and responsibility, and ethical use of AI. At the time of writing this paper, a few nurse regulators and associations have issued guidance on AI use to their nurses and educational resources (BCCNM 2026; CNO 2025; CRNA 2025; NANB 2025). These developments are encouraging and may lead to greater progress in the near future to upgrade entry-to-practice competency standards as well as the standards of nursing practice with the intent to facilitate informed use of AI as opposed to policing its integration (Al Khatib and Ndiaye 2025; Yakusheva et al. 2025).

Conclusion

AI is already widespread in Canadian society and healthcare. Preparing the nursing workforce for the digital health and AI revolution empowers them to address emerging issues, risks and opportunities related to AI to improve patient care and health systems and achieve the SDGs. This requires a strong educational foundation and a growth mindset so that nurses not only adapt to new technologies but also lead their effective and ethical integration into healthcare, ensuring that the humanistic core of nursing is preserved.

Nurse leaders across all domains of practice have a responsibility to guide their teams through technology transitions, addressing concerns and ensuring that resources are available to redesign health systems and support the acquisition of new skills in the nursing workforce so that they can assume larger roles and use technological advancements to improve patient outcomes and contribute to a more resilient healthcare system.

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