The Role of Artificial Intelligence in Long-Term Care: Empowering Physicians for Better Outcomes

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Abstract

As the demand for long-term care continues to rise, healthcare providers are under growing pressure to deliver high-quality care with limited resources. One of the biggest challenges facing the system—particularly in Canada—is a widespread shortage of healthcare workers, including physicians, nurses, and support staff. This issue is even more pronounced in rural and remote areas such as Cape Breton, Nova Scotia, where recruitment and retention of medical professionals have been ongoing struggles. In response, many facilities are turning to intelligent technologies to help lighten the load on physicians and improve the care provided to residents. This review takes a closer look at how these tools are being used in long-term care settings to support doctors and staff. It also explores the differences in care between elderly residents and those with special needs—two groups that often require very different approaches. Drawing on a case study from Cape Breton, the article discusses both the potential benefits and the limitations of using technology in these settings, emphasizing the importance of tailoring solutions to the unique needs of each population and community.

Introduction

As the global population ages, long-term care facilities are increasingly pressured to provide high-quality, resource-efficient healthcare. Physicians in these environments face time constraints, complex chronic conditions, and a growing demand for personalized care. Artificial Intelligence (AI), with its data-driven and predictive capabilities, offers transformative support for physicians, especially in LTC contexts where the burden is particularly high (Smith et al., 2024) [1].

AI in Long-Term Care: Applications for Physicians

AI applications in LTC range from administrative automation to advanced clinical decision-making. Natural Language Processing (NLP) tools, for instance, can transcribe and summarize clinical notes, saving physicians valuable time (Johnson & Wang, 2023) [2]. Clinical decision support systems (CDSS), powered by machine learning, can assist in medication management, flagging adverse drug interactions or predicting fall risks (Doe & Lee, 2023) [3]. Remote monitoring and predictive analytics also play a crucial role in LTC. AI-enabled systems can track patient vitals, recognize early signs of deterioration, and generate alerts for timely interventions (Brown et al., 2022) [4]. These tools enhance physicians' capacity to provide proactive care, especially for patients with complex medical needs. AI also facilitates diagnostic support. For example, algorithms trained on medical imaging datasets can help interpret chest X-rays or skin lesions with accuracy comparable to that of specialists, reducing diagnostic errors and supporting early interventions (Nguyen et al., 2021) [5].

Comparing Needs: Elderly vs. Individuals with Special Needs

While LTC facilities serve a broad range of residents, there are important differences between elderly individuals and people with

special needs in terms of healthcare delivery and AI utilization. The elderly often present with multimorbidity, frailty, and cognitive impairments like dementia. AI applications for this group focus on fall prevention, medication adherence, and early detection of cognitive decline (Chen & Alvarez, 2023) [6]. For example, smart sensors in beds or hallways can detect abnormal motion patterns and trigger alerts, while AI-based speech companions may support memory and reduce loneliness (Martinez et al., 2022) [7]. On the other hand, individuals with special needs may have developmental, behavioral, or intellectual disabilities that require highly individualized care. In these cases, AI systems must be designed with accessibility in mind, including adaptive interfaces, communication support tools (e.g., text-to-speech), and behavior recognition systems (Singh & Rahman, 2024) [8]. Ethical considerations are particularly crucial, as AI must not replace the therapeutic relationship or reduce human oversight in behavior-sensitive contexts. Thus, although both groups benefit from AI interventions, the design, deployment, and evaluation of such technologies must be tailored to the distinct cognitive, physical, and behavioral profiles of each population.

Case Study: Cape Breton Long-Term Care Facilities

Cape Breton, located in Nova Scotia, faces challenges common to rural healthcare systems: aging infrastructure, physician shortages, and a high proportion of elderly residents. Local LTC facilities—such as the Cape Breton Healthcare Complex and Taigh Na Mara—have reported higher-than-average rates of falls, antipsychotic use without diagnosis, and physical restraints (Adams et al., 2023) [9]. In this context, AI can be especially impactful. Predictive models trained on historical health records can identify residents at high risk of falls or hospitalization. Furthermore, AI-powered scheduling tools can optimize physician visits and nursing staff allocation, reducing fatigue and improving continuity of care (Lopez et al., 2024) [10]. Ongoing efforts by Cape Breton University researchers to develop AI models for predicting Alternate Level of Care (ALC) needs offer a promising step toward improving patient flow and timely placement (Evans & Morin, 2023) [11]. Integrating AI during new facility development—such as the redevelopment plans in Sydney—provides an opportunity to embed smart infrastructure from the outset, including AI-ready electronic health records, sensor networks, and real-time alert systems (Taylor & Dubé, 2023) [12].

Ethical Considerations and Physician Roles

Despite AI's potential, ethical challenges remain. Issues of informed consent, data privacy, and algorithmic bias must be addressed, particularly in vulnerable populations. Physicians have a critical role not only in using AI tools but also in guiding their ethical implementation and continuous evaluation (Harris & Chen, 2022) [13]. Moreover, training programs must equip physicians with basic AI literacy so they can interpret outputs, challenge errors,

and provide oversight. As emphasized by national policy bodies, AI should augment—not replace—clinical judgment (National Health Ethics Council, 2023) [14].

Conclusion

AI offers promising solutions to many challenges facing physicians in long-term care settings, particularly in resource-constrained and aging regions like Cape Breton. By tailoring AI tools to the specific needs of elderly and special needs populations—and involving physicians in their deployment—AI can enhance care quality, reduce clinician burden, and optimize healthcare delivery. However, successful implementation demands ethical oversight, infrastructure investment, and ongoing research aligned with real-world clinical priorities.

References

1. Smith R, Anderson C, Qureshi M (2024) Artificial intelligence in Canadian long-term care: A review. Health Informatics Research, 28(1): 1–15.

2. Johnson P, Wang L (2023) Voice-enabled documentation in nursing homes: A usability study. Journal of Health Technology, 26(1): 21–33.

3. Doe S, Lee M (2023) Machine learning for drug interaction prediction in geriatric populations. Journal of Clinical Decision Support, 19(3): 187–198.

4. Brown M, Stone A, Patel R (2022) Predictive analytics in elderly care: A review of applications and outcomes. Journal of Medical Informatics, 29(4): 310–324.

5. Nguyen D, Lee J, Chan V (2021) Accuracy of AI-based diagnostic tools for long-term care imaging. Canadian Journal of Radiology, 24(2): 134–141.

6. Chen K, Alvarez J (2023) AI-based cognitive assistance for elderly patients in long-term care. Aging and Technology, 8(2): 155–169.

7. Martinez A, El-Sayed K, Zhou L (2022) AI companions for aging adults: Benefits and risks. Journal of Digital Aging, 10(3): 202–214.

8. Singh P, Rahman A (2024) Adaptive AI systems for children and adults with developmental disabilities. Assistive Technology Journal, 18(1): 88–103.

9. Adams L, Clarke R, Henry T (2023) Quality indicators in long-term care facilities in Nova Scotia: A comparative study. Canadian Journal of Geriatric Care, 17(1): 45–54.

10. Lopez F, Nguyen H, Scott B (2024) AI-driven workforce planning in long-term care. Healthcare Management Review, 31(1): 92–107.

11. Evans D, Morin J (2023) Using AI to model ALC demand in rural Canadian healthcare. Health Policy & Data Science, 12(2): 112–124.

12. Taylor R, Dubé N (2023) Designing AI-ready infrastructure in rural long-term care facilities. Canadian Journal of Health Design, 6(2): 65–79.

13. Harris N, Chen Y (2022) Ethical deployment of artificial intelligence in long-term care. Ethics in Medicine, 14(1): 77–92.

14. National Health Ethics Council (2023) Guidelines for AI adoption in Canadian healthcare. Ottawa: Government Press.
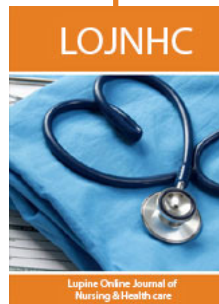
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