Assessing the evidence on Artificial Intelligence: Health technology assessments and real-world needs for decision-making in health care

A E. Helis[1], C. Wells[1], A. Morrison[1], C. Lachance[1]

[1] Canadian Agency for Drugs and Technologies in Health (CADTH), Ottawa ON, Canada

I. INTRODUCTION

With many AI tools available, an increased interest in understanding and identifying effective AI applications for different aspects of healthcare delivery is reported in Canada. In response to requests by decision-makers, the Canadian Agency of Drugs and Technologies in Health (CADTH) has conducted reviews of the evidence on the use of AI technologies for two different fields in healthcare: lung cancer diagnosis [1] and mental health (in collaboration with the Mental Health Commission of Canada) [2]. A pan-Canadian survey on the use of AI in imaging departments across Canada has also been conducted [3].

II. METHODS AND KEY FINDINGS

A. AI and Lung Cancer Diagnosis

Diagnosing lung cancer can often be challenging. Novel approaches, including AI, are being considered to improve the accuracy of lung cancer screening. CADTH reviewed the evidence in 7 studies that reported on the accuracy of AI for diagnosing lung malignancies from CT scans compared with diagnosis based on human observation. These studies were identified from a limited literature search of key resources which used "artificial intelligence" and "lung nodules" as the main search concepts. Overall, the evidence suggests that AI models might be a promising support for improving accurate diagnosis for lung cancer.

B. Use of AI in Imaging Departments in Canada

According to a recent survey conducted by CADTH, AI is being used in at least 40 imaging departments across Canada, mostly in CT imaging.

C. Use of AI in Imaging Departments in Canada

With the high demand for mental health services in Canada, AI could play an important role in improving access and supporting mental health care. To address the uncertainty in the effectiveness of AI and understand the current landscape of AI use for mental health, the Mental Health Commission of Canada collaborated with CADTH on a review of the evidence and an environmental scan. CADTH reviewed the evidence in 34 studies that reported findings on a wide range of AI applications and on populations with various mental health disorders. These studies were identified from a limited literature search of key resources which used "artificial intelligence" and "mental health" as the main search concepts. Overall, in diagnosis, the accuracy of AI models is generally moderate to high compared with physician diagnoses. In treatment, AI applications appear to be effective for reducing symptoms of depression and improving access to crisis resources.

III. DISCUSSION

The reviews of the evidence highlight that AI is a promising technology to support clinical care in lung cancer diagnosis and mental health. However, the variability in AI technologies contributes to mixed results. As many AI technologies are still in the early stages of development and testing, integration into clinical practice is limited. More data from research and real-world testing and other aspects of AI use (e.g., privacy and safety of patient data, cultural considerations, rapid evolution of these technologies, how AI fits in the clinical routine) need to be considered when policy and clinical decisions for the optimal use of AI are to be made.

REFERENCES

1. Artificial intelligence for classification of lung nodules: clinical utility, diagnostic accuracy, cost-effectiveness and guidelines. (CADTH rapid response report: summary with critical appraisal). Ottawa: CADTH; 2020 Jan.
2. Artificial Intelligence and Machine Learning in Mental Health Services: A Literature Review. Ottawa: CADTH; 2020 Aug. (CADTH Rapid Response Report: Summary With Critical Appraisal). Joint publication with the Mental Health Commission of Canada.
3. The Canadian Medical Inventory 2019-2020. Ottawa: CADTH; 2021 Jan. (CADTH health technology review).