Artificial Intelligence and Primary Care: Perceptions and Applications in Medical Clinic Operations

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Background

Primary care: entry point to health care with a focus on providing accessible, comprehensive, and community-based care.[1]

Artificial intelligence (AI): the ability for machines to mimic human intelligence and behaviour to complete tasks.

Clinic operations: tasks and processes related to administrative operations of a medical clinic.

Research Question: How can artificial intelligence be used in primary care clinic operations to improve efficiency and care delivery?

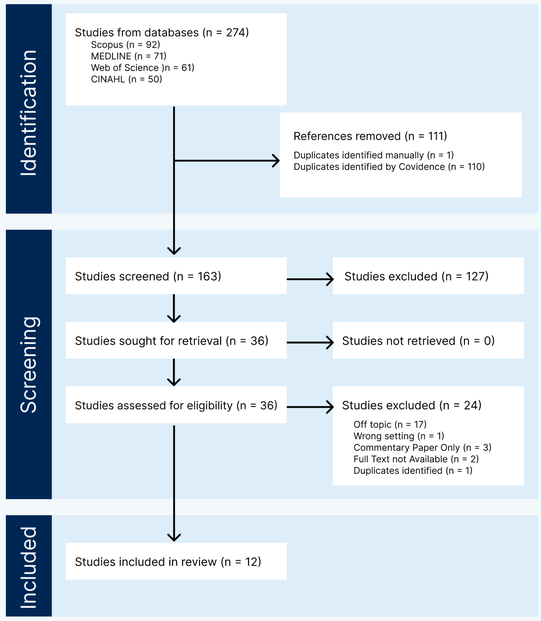
Methods

This study utilized a mixed-methods approach. The first part of this study aimed to understand the existing research about AI use in medical clinic operations. The second part consisted of gathering qualitative and quantitative information from clinic managers, leads, and physicians in the Victoria region.

1. Literature review

Four databases searched to identify relevant literature and the state of knowledge. Results were filtered using Covidence to identify relevant studies.

Figure 1: PRISMA flowchart of study selection process.



2. Survey and Interview

Survey sent to 22 medical clinics in Victoria, BC, including 20 primary care and family medicine practices, and two specialist-run clinics. The goal of the survey and interview was to contextually understand the perspectives and attitudes of clinic staff regarding the utility of AI and ChatGPT for clinic operations.

Results

1. Literature Review

Table 1: Highlighting five articles screened from Covidence standardized protocol of a scoping review of literature on AI in primary care.

Authors	Title	Country	Study Design	Findings
Kueper et al., 2022[2]	Connecting artificial intelligence and primary care challenges: findings from a multi stakeholder collaborative consultation.	Canada	Qualitative analysis (focus groups)	Nine priority areas were as follows: 1. Preventative care & risk profiling 2. Patient self-management of condition 3. Management & synthesis of info sources 4. Improved communication bw PC & AI stakeholders 5. Data sharing & interoperability bw providers 6a. Clinical decision support 6b. Administrative staff support 8. Practitioner clerical & routine task support 9. Increased mental healthcare capacity & support
Radionova et al., 2023[3]	Impacts of Symptom Checkers for Laypersons' Self-diagnosis on Physicians in Primary Care: Scoping Review.	Germany	Scoping review	Main themes found among the 15 articles (2015-2020): - Prediagnosis, - Social-technology relationship, - Physician-patient relationship, - Impact on provider tasks, - Future role of symptom checkers - 7/15 papers about primary care, others unspecified
Navarro et al., 2023[4]	Collaboration, not Confrontation: Understanding General Practitioners' Attitudes Towards Natural Language and Text Automation in Clinical Practice.	Australia	Qualitative analysis (interviews)	Four main themes derived from interviews: 1. Doctor-AI collaboration* 2. Desired features 3. Concerns & challenges 4. Consultation of the future *Preference for hierarchical relation between human & AI: Human supervises work of AI (with an assistant role).
Thirunavukarasu et al., 2023[5]	Trialling a Large Language Model (ChatGPT) in General Practice With the Applied Knowledge Test: Observational Study Demonstrating Opportunities and Limitations in Primary Care.	UK	Cross-sectional observational study	ChatGPT answered the medical exam questions with approximately 60% accuracy (less than 50% - greater than 60%).
Ben-Gal, 2022[6]	Artificial intelligence (AI) acceptance in primary care during the coronavirus pandemic: What is the role of patients' gender, age and health awareness? A two-phase pilot study.	Israel	2-phase mixed methods pilot study (survey and interview)	Individuals with high scores in innovativeness have higher level of readiness to use AI-based technology in primary care during COVID-19 pandemic.

2. Survey and Interview

Figure 2: Are you familiar with AI in the context of using it in your clinic? (15 responses)

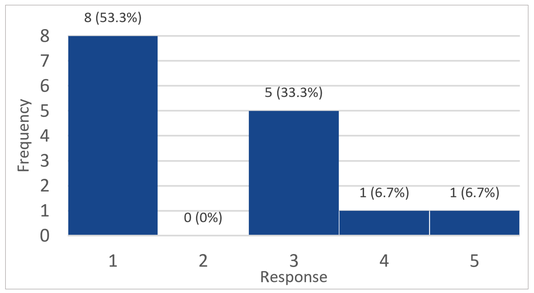
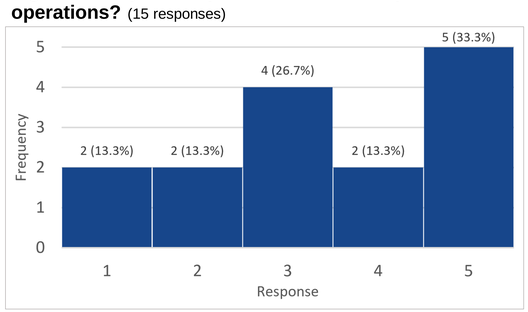


Figure 3: Do you see potential for AI to improve healthcare operations? (15 responses)



The survey received responses from 15 out of 22 clinics, resulting in a final response rate of **68.2%**.

Survey results indicated that although participants were familiar with the concept of AI, few had begun implementing it in their clinics. Seven respondents (46.7%) saw potential for AI to improve healthcare operations, with six (40%) foreseeing AI being able to automate basic administrative tasks in clinics.

The survey also found that none of the participants were familiar with the Canada Health Infoway toolkit on AI that started in November 2021.

Three potential use cases were also provided in the survey for using ChatGPT in clinic operations. Positive reception was found for the premise of using ChatGPT to generate code for pre-defined content that can be directly implemented into existing clinic websites. Eight respondents (53.3%) indicated that they found this use case to be practical.

Five clinics (5/15, 33.3%) participated in semi-structured interviews:

One clinic stated that they were **using ChatGPT to generate ideas for the phrasing and content of marketing and promotional materials** for their clinic.

Another clinic highlights their use in **inputting the logic for content into ChatGPT to create code that allows for the staff members to directly implement into their existing clinic website** for patient use.

One interviewee indicated that they were in the process of applying for funding to implement various AI solutions in the clinic.

One medical office assistant (MOA) mentioned having 40 years of experience, however, they did not foresee using AI in their clinic, but did see potential use for it.

Discussion

Overall, the use of AI in health care is still largely not being used. Nevertheless, the literature review found that studies are distributed among multiple countries and that there are many potential uses for AI, such as for symptom checkers and clinical decision support. There are also many AI domains, such as machine learning and natural language processing, across the >30 keywords or concepts with clinical context that are found in the studies included in the literature review. **There is considerable interest for using AI for operations and automation.** The survey reflected the findings of the literature review, but also the fact that clinics are unfamiliar with how to use AI and with the Canada Health Infoway AI toolkit.

The interviews supported similar results in conceptualizing the use of AI in primary care. There are also clinics currently using ChatGPT for various non-clinical tasks and applying for funding to implement various AI solutions.

Conclusion

There is significant interest in AI that exists not only for clinical purposes, but also for the operational aspects of health care.

Clinic leads and managers express interest in various AI technologies, but also reflect their lack of understanding and training on the topic.

The complexity inherent in the various domains of AI presents challenges in both the comprehension of the concept and in its practical application.

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Acknowledgements

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