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RESEARCH REPORT

Learning Health Systems

Frameworks, guidelines, and tools to develop a learning health system for Indigenous health: An environmental scan for Canada

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Abstract

Introduction: First Nations, Inuit, and Métis (FNIM) peoples experience systemic health disparities within Ontario's healthcare system. Learning health systems (LHS) is a rapidly growing interdisciplinary area with the potential to address these inequitable health outcomes through a comprehensive health system that draws on science, informatics, incentives, and culture for ongoing innovation and improvement. However, global literature is in its infancy with grounding theories and principles still emerging. In addition, there is inadequate information on LHS within Ontario's health care context.

Methods: We conducted an environmental scan between January and April 2021 and again in June 2022 to identify existing frameworks, guidelines, and tools for designing, developing, implementing, and evaluating an LHS.

Results: We found 37 relevant sources. This paper maps the literature and identifies gaps in knowledge based on five key pillars: (a) data and evidence-driven, (b) patient-centeredness, (c) system-supported, (d) cultural competencies enabled, and (e) the learning health system.

Conclusion: We provide recommendations for implementation accordingly. The literature on LHS provides a starting point to address the health disparities of FNIM peoples within the healthcare system but Indigenous community partnerships in LHS development and operation will be key to success.

KEYWORDS

cultural competency, Indigenous peoples, learning health system, Ontario, social determinants of health

1 | INTRODUCTION

First Nations, Inuit, and Métis (FNIM) people in Ontario continue to experience health inequities and barriers to wellness, largely due to institutional and interpersonal racism, colonialism, and systemic inequities, especially within the healthcare system. To begin to rectify these challenges, the health systems must learn and change based on the available evidence. Learning health systems (LHS) is an emerging interdisciplinary area with the concepts to guide this system-level change. There is considerable variability in how LHS are conceptualized and operationalized, but as one starting point, an LHS has been defined by the Institute of Medicine's Roundtable on Value & Science-Driven Healthcare as "a system in which science, informatics, incentives, and culture are aligned for continuous improvement and innovation, with best practices seamlessly embedded in the care process, patients and families as active participants in all elements, and new knowledge is captured as an integral by-product of the care experience."[1] Initially conceived by the aforementioned United States Institute of Medicine,[2] LHSs have gained notable attention in Canada due to their potential to improve healthcare outcomes, to maximize cost efficiency, and to engage care providers.[3] The province of Ontario and the federal government have dedicated funding towards the establishment of LHS in Ontario.[4-9] Lavis et al.[10] adapted the Institute of Medicine LHS model to an Ontario context with pillars of (a) data and evidence-driven, (b) patient-centred, (c) system-supported, and (iv) culture and competencies enabled. However, LHS theories and practices are still emerging and research regarding LHSs in Canada's healthcare context are limited, indicating a need for careful conceptual and practical considerations of the ways the existing literature can be adapted for the needs of FNIM peoples. This research identifies existing frameworks, toolkits, and training courses on how to develop, implement and evaluate an LHS and identifies gaps in these knowledge areas specifically for FNIM populations in Toronto, Ontario, Canada. The use of LHS within the Ontario context may provide a culturally relevant and competent framework to reduce FNIM inequities.

2 | METHODS

This environmental scan is part of a larger Indigenous anti-racism project, and the methods were developed with the guidance and collaboration of the Toronto Anti-Racism Working Group, housed within the Toronto Central Local Health Integrated Network. Community consultation was undertaken with an Anti-Racism Steering Committee to guide the purpose and objectives of the project, and was comprised of health service providers, Elders and Indigenous community members in Toronto, Ontario, Canada.

An environmental scan was undertaken between January and April 2021 to identify relevant frameworks, tools, and training for developing, implementing and/or evaluating LHS. This methodology was selected as it allows for a systematic and time-bound search inclusive of broader grey literature such as policies, and operating procedures, which were identified as relevant by the funder.[11] We adapted Shahid & Turin's five-step protocol[11] for environmental scans in health research. Hiscock et al. detail this approach where each step allows an iterative returning and creates a more relational approach to an environmental scan, as illustrated in Figure 1.[12]

Both academic and grey literature were searched using PubMed, SCOPUS, and Google Scholar. Relevant grey literature was identified through websites of the Institute of Medicine, Canadian Institutes of Health Research, and other Canadian federal health organizations, provincial and territorial health authorities, Institute for Health Innovation (United States), and Google. One author extracted the academic literature and then categorized it into the 4 Lavis et al.[10] pillars as well as an additional fifth pillar, to encompass high-level LHS components not adequately captured within a single Lavis et al. pillar. The grey literature searches, abstract screening, and full-text review were conducted within each pillar, with approximately one author per pillar. Key search terms can be found in Table 1. Despite the purpose of the environmental scan, the search criteria did not explicitly include FNIM literature due to the already limited amount of literature on LHS toolkits, guidelines, frameworks, trainings, and evaluations. Inclusion criteria were toolkits, guidelines, frameworks, trainings, and evaluations on LHS or components thereof, in English, and pertaining to studies from Canada, which was later expanded to the United States given the lack of research on this emerging interdisciplinary area.

To ensure completeness before publication, a second search was undertaken in June 2022 with identical search criteria. This search was limited to publications from 2021 and 2022 and one additional source was retrieved.

2.1 | Patient and public involvement statement

Indigenous Elders and Community members were involved in the planning and for the larger report publication. They provided guidance into possible resources and the ideal directions for health systems in Toronto, which LHS can be used to achieve.

3 | RESULTS

A limited number of resources were identified by the searches (n = 37). As previously adapted from Lavis et al.,[10] five pillars of LHS guided our searches and findings: (a) data system and infrastructure; (b) patient-centred approach; (c) system-supported; (d) culture and competencies; and (e) the LHS elements not captured by one or by only one of the prior four pillars, with groupings into the three areas of (a) frameworks, guidelines and toolkits (n = 24), (b) training (n = 7), and (c) evaluation or accountability (n = 6).

3.1 | Frameworks, guidelines, and toolkits

3.1.1 | Data and evidence driven

With regards to data systems and infrastructure within LHSs, a number of frameworks addressed data reuse and sharing across jurisdictions,

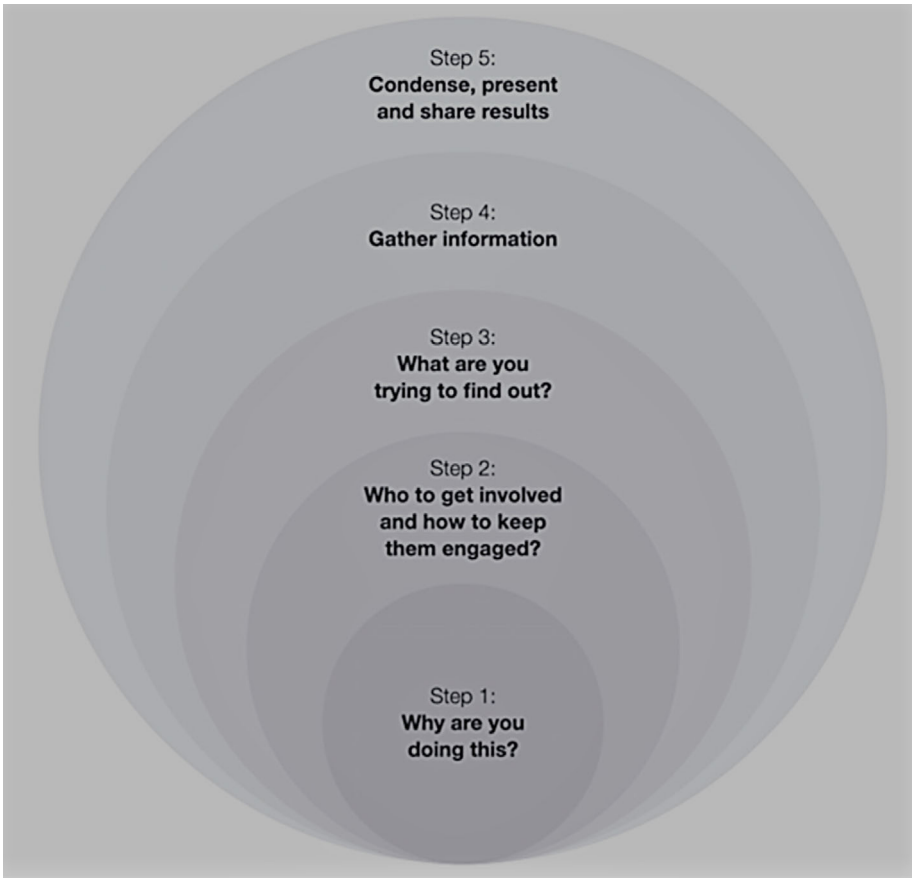

FIGURE 1 An iterative and relational approach to environmental scans, adapted from Shahid & Turin[11] by Hiscock et al.[12]

which could span regional, provincial, federal, or Indigenous jurisdiction for this context. The five safes model provides guidance on private and secure data sharing,[13] where data protection is comprised of: safe people, safe projects, safe data, safe settings, and safe outputs. However, the five safes model does not consider Indigenous data sovereignty or Indigenous research principles, such as OCAP (ownership, control, access, and possession). By limiting "safe people" to approved government analysts and government contractors, the model fails to recognize the colonial history and present rights violations by the government towards Indigenous Peoples and respect Indigenous Peoples as owners of their own data. Some guidelines on implementing data systems for a "highly participatory rapid learning" LHS suggest the use of technologies, standards, and policies that work to reinforce one another and could draw from electronic health records as a foundational data source.[14] For instance, the Distributed Approach creates networks of resources and locally processes sensitive patient data, to share across collaborators for analysis[15] while the centralized database architecture uses anonymized data from several collaborators, which accumulates in a repository to provide data analysis, visualization, and matching capacities. However, both of these frameworks position the institutions as the owners and gatekeepers to the data and would require adaptation to fulfil ethical obligations to Indigenous communities under OCAP. Experts also believe that adopting advanced statistical models and technologies, such as artificial intelligence, are necessary to develop predictive models that can be applied to individual patients and provide actionable knowledge.[16] However, artificial intelligence calculations would need to adequately account for the social determinants and inequities experienced by Indigenous patients during the care process to produce relevant models.

3.2 | Patient-centeredness

Various principles have been identified to guide the implementation of the patient-centred component of an LHS.[1] The patient engagement (PE) framework created for the strategy for patient-oriented research by the Canadian Institutes of Health Research was developed in consultation with Indigenous stakeholders,[17] and emphasizes inclusiveness, support, mutual respect, and co-building of knowledge to achieve patient-oriented, transparent, and relevant data. Complementary to the PE Framework are the PETAL framework, which integrates equity with a focus on the non-Indigenous social determinants of health[18] and the Continuum Model for Community Engagement, which helps to distinguish between different levels of community engagement in the context of an expanding healthcare system.[19] The trio of frameworks—PE framework, PETAL framework, and Continuum Model for Community Engagement—could facilitate a holistic, community-co-developed, culturally safe LHS.

TABLE 1 Keywords searched.

Key terms 1 (separated by OR)		Key terms 2 (separated by OR)
learning health system*	**AND**	system* change
learning healthcare system		value
LHS		health disparit*
health system		health equit*
healthcare system		patient centred
		person centred
		Strategy for Patient Oriented Research
		SPOR
		community engagement
		cultural* safe*
		Quality Improvement
		quality enhancement
		continuous learning
		Artificial Intelligence
		performance*
		framework*
		training*
		tool*
		develop*
		implement*
		evaluat*

Note: The "*" shows that the words are truncated to show more results.

3.3 | System-supported

For system-supported development and implementation of LHSs, we found architectural frameworks; these can address various LHS dimensions and provide a critical understanding of the types of decisions that need to be made within each dimension[20] while others systemically support the involvement of patients in healthcare decision-making.[21] The ITPOSMO-BBF (information, technology, processes, objectives, staffing, management, and other factors—barriers, benefits, and facilitators) framework is an example of the former; this framework provides categories of common barriers and facilitators to achieving high-value care within an LHS[22] and evaluates the scale of the gap between the design and implementation along each of the seven dimensions. However, it assumes an absence of bias by the evaluators and in the design, which may be a challenge in the context of institutional anti-Indigenous racism within hospitals and inadequate partnerships with Indigenous communities.

Other useful guidance includes British Columbia Academic Health Science Network's (BC AHSN) PARTNER tool, which can measure, map, and monitor patient-provider relationships to identify strengths, gaps, and strategies for improvement.[23] The PARTNER tool has capacity to support patient autonomy and monitor cultural safety within the patient-provider relationship. The BC AHSN has provided an action plan for other healthcare systems interested in developing and implementing the LHS within their jurisdiction.

Finally, Harrison & Shortell[24] present three frameworks for LHS research: the Consolidated Framework for Implementation Research for research addressing collective learning programmes to improve LHS effectiveness, the Social-Ecological Framework to identify multi-level determinants of health behaviours and their influence on healthcare practice, and the Organizational Change Framework on organization-level learning to support governance decision-making within an LHS. Combining these frameworks is suggested to help move an LHS toward implementation and may provide a framework to improve care for Indigenous patients if leveraged with an explicit anti-Indigenous racism focus (eg, political conditions could include the 1979 Indian Health Policy and federal/provincial jurisdictional disputes over healthcare for Indigenous populations).

3.4 | Cultural competencies enabled

A number of frameworks support the culture and competencies component of LHS, sometimes explicitly supporting Indigenous communities and priorities. The Institute for Healthcare Improvement (IHI) provides the Quality Improvement Project Management framework[25] that guides how to leverage leadership potential and execute strategic improvement, while highlighting the importance of evidence-informed planning. A second IHI framework offers healthcare system quality improvement planning (Quality Improvement Essentials Toolkit)[26] to encourage long-term sustainability.[27] Finally, the Cultural System Change Assessment Tool[28] and the Government of Ontario's Health Equity Impact Assessment Workbook[29] aim to facilitate Indigenous engagement efforts over time. There are frameworks not associated with LHSs that may benefit LHS adopters, but we have not included them in this environmental scan as it would be out of scope.

3.5 | The learning health system

Many frameworks gathered in this scan did not primarily address any of the previous four components and thus were added into a fifth category, of system-wide frameworks to develop and implement LHSs, some of which aligned closely with cultural safety and self-determination. Mullins et al.[30] have identified the equity-relationship gap in many LHS frameworks and set out high-level directives for developing and implementing an LHS which centers community engagement to achieve a "Learning Healthcare Community." The authors identify the need for trust and co-development for the LHS to meet the needs of made-vulnerable patients. Faden et al.[31] similarly discuss obligations for LHSs in their learning activities, which notably include respecting patients' rights and dignity, avoiding placing risks and burdens on patients, and reducing health inequities. Other frameworks contain only the relationship component without consideration of power imbalance, such as Allen et al.'s[32] Kaiser Permanente Washington LHS logic model which incorporates patient and family engagement and partnerships with key stakeholders, and Lessard et al.'s[20] "architectural frameworks" which take a highly biomedical approach with patient input in the "social dimension."

However, thoroughly included, the partnership and patient-centred principles within LHS frameworks should not be seen as a substitute for Indigenous-developed ethical frameworks like OCAP, Inuit Qaujimajatuqangit (I.Q. or Inuit societal values), and Métis research principles, which contain guiding principles and practices not accounted for in these frameworks.

In addition, some frameworks provided system-level directives on quality improvement in multi-institutional LHS collaboratives. A toolkit developed by Krapohl et al.[33] gives directives on how to start, replicate and sustain an LHS for quality improvement, based on the experience of a 70-hospital collaborative for improving surgical care in Michigan. Similarly, based on the experience of the United States Department of Veteran's Affairs Quality Enhancement Research Initiatives, Kilbourne et al.[34] set out an Implementation Roadmap to facilitate uptake of evidence-based practices by aligning research and health system priorities. More broadly, guidance is available on the interaction of LHS components to yield system-level improvements, such as Borsky et al.'s[35] feedback loop framework.

Finally, an interdisciplinary team in Québec developed a comprehensive LHS framework that uniquely draws on implementation science theory and can support advances in precision medicine.[36] While implementation science is recognized as integral to an LHS due to the dynamic, context-dependent nature of healthcare and integration of real-world complexities for its constant improvement, implementation science literature without explicit ties to LHSs was beyond the scope of our environmental scan.

4 | TRAINING

4.1 | Data and evidence driven

As LHS frameworks are being developed largely to implement LHS in unique contexts, there is a notable absence of broader trainings for LHS implementation across contexts. LHSs require reliable, accurate, high quality data, which requires trainings in research ethics, data collection, and analysis for people in a wide range of roles. A toolkit by the Michigan Surgical Quality Collaborative presents trainings to enhance the quality of data collected in an LHS.[33] The training includes, for example, the allocation of consistent data codes for clinical information, such as disease name and procedural terminology. As few clinical investigators have advanced training in data science, it is recommended to include data scientists in research teams.[37] Training in quality improvement methods and statistical analysis is also recommended.[38]

4.2 | Patient centeredness

LHS capacity-building should involve supports for patient-partner (patients as partners) participation in research and quality improvement processes. Training to improve patient-centred care and having patients as co-researchers is imperative for a successful and effective LHS. However, we did not find training for patients, as co-creators and co-researchers in health, that addresses effective partnering in an LHS.

What tends to be more widely available is Indigenous cultural safety training, which aims to create an inclusive and safe environment for Indigenous patients and anti-racism and anti-bias trainings, which were not included in this environmental scan.

4.3 | System-supported

To support value-added decision-making in an LHS, researchers and employees must have the information necessary to develop or expand training programmes for LHS researchers and patient researchers. Such training could follow the LHS Competency Appraisal Inventory tool, which identifies the training gaps and their respective levels within the LHS.[39] In addition, there is a framework for developing or expanding existing training programmes for LHS researchers to adequately address healthcare delivery challenges.[40]

4.4 | Cultural competencies enabled

A successful LHS requires that staff and external stakeholders feel encouraged and comfortable to participate in learning.[3] Indigenous cultural safety training is necessary for all non-Indigenous LHS stakeholders, as the foundation for an equitable, progressive LHS and Health System Leaders must be trained to promote collaboration and ethical decision-making within the LHS. Knowledge translation training[41] is also necessary to be able to apply current research evidence and quality improvement training upholds data quality improvement.[42] These trainings can be supported by awards, such as the Canadian Institutes of Health Research's Health System Impact Fellowship training awards for developing the scientific, clinical, and leadership capacity of fellows to drive health system innovation.[43]

5 | EVALUATIONS AND ACCOUNTABILITY

5.1 | Data and evidence driven

In order for a healthcare system to continue to learn, it must have quality real-time data. The LHS must have data that reflects the patient perceptions of care received as well as the services provided. It is imperative for the LHS to also have data about itself.[44,45] However, few LHS data systems have been implemented to collect and synthesize the evidence, as reflected in the lack of LHS data system implementation literature.[15] The complexity of accessing and reusing data in heterogeneous systems and forms are barriers to data system implementation and evaluation efforts.

5.2 | Patient centeredness

At this time, no tools exist for evaluating patient-centred care in an LHS, but several evaluations with potential to evaluate cultural safety in health systems were amalgamated into a toolkit by Northern Health, one of the

five regional health authorities in British Columbia and with specific priorities in Indigenous health.[28] When seeking evaluation guidance for patient engagement, it is critical to select tools that can be adapted to measure the characteristics and objectives of the patient-centred component of LHS.

5.3 | System-supported

The Governance of Quality Assessment tool was designed to identify and improve issues in board governance quality and effectiveness within health systems.[27] The Model for Assessment of Telemedicine Framework also measures the impact of LHS, focusing on domains of clinical effectiveness, organizational challenges, and socio-cultural, ethical, and legal issues related to health system governance.[15] Finally, the Clinical Performance Feedback Intervention Theory guides the creation, implementation and evaluation of patient feedback,[46] to support system-level decision-making.

5.4 | Cultural competencies enabled

LHS must be evaluated in collaboration with community populations and if appropriate, physicians, to ensure accountability and equity. The Paloma-Wellesley Institute developed an evaluation framework to assess programme effectiveness, which examines equity, cultural accountability, and progress towards objectives.[47] Kraft et al.[48] provide a combined strategy that dually emphasizes physician engagement and accountability for continued education.

6 | ACCOUNTABILITY CHECKLIST

An accountability checklist (Table 2) was developed from the findings of the environmental scan, as a preliminary tool to implement and evaluate progress towards an LHS.

7 | DISCUSSION

Our search results showed a number of gaps in the literature on LHS, and across all the categories that guided the analysis: frameworks, guidelines, and toolkits; training; and evaluation. Existing literature on LHS frameworks are mostly conceptual and lacking explicit connection between concept and practice (implementation). As a result, there is a gap in knowledge on how to expand and transfer existing LHS frameworks to new contexts.[3] In addition, little methodology has been put forth for evaluating LHSs,[15] and no long-term rigorously designed evaluations of LHSs have been undertaken.[3] To assist the health system that this project was intended for, we conducted a gap analysis with recommendations, comparing the difference between the current literature on LHS with the practices needed to support future equitable health for FNIM populations alongside the general population in Canada. LHS is an emerging interdisciplinary area of scholarship, but can be used by any healthcare system to improve in many areas including adding trauma-informed, culturally responsive, and timely biomedical healthcare. Preliminary recommendations are derived from these literature gaps in Table 3.

While electronic health records have been identified as a valuable resource for accumulating healthcare data, there is a gap in applicability due to data quality which is frequently challenged by inadequate sampling, complex types of data, inconsistent terminology, and confounders.

Within the available literature on patient-centred care among LHSs, there is a disproportionate emphasis on the need to acquire knowledge *from* community as opposed to building knowledge *with* community[44] which contradicts best practices for working with Indigenous communities. This may reflect the assumptions of the biomedical model, where physicians are positioned as experts and gathering knowledge for their independent analysis, as well as the large time investment required to build relationships and co-create knowledge, which is decreasingly accessible in an underfunded, overburdened healthcare system. Inclusion of Indigenous research principles can ground patient-centred data and systems improvement.

For the system-supported dimension, there is limited research on social, ethical, and governance aspects of LHSs, especially related to patient confidentiality, risks, and benefits of clinical research, and recommendations for supporting groups experiencing health disparities.[16] Furthermore, there are knowledge gaps related to roles and responsibilities for those involved in LHS research, thereby diffusing such responsibilities and a paucity of frameworks and evaluation tools to measure transparency in decision-making processes.

Differing organizational norms and subcultures across medical specialties, leadership, staff, and patient health service departments can undermine receptiveness to collaborative learning[24] and collaborative communications strategies should be developed to overcome this barrier. Moreover, clinicians may be hesitant to engage with an LHS model in the absence of allotted time to adapt to and learn a new system.[3]

Table 3 provides the key points from the literature and the gap analysis. There was a notable absence in literature specific to LHS in relation to First Nations, Inuit. and Métis Peoples, or their needs. Therefore, incorporating First Nations, Inuit. and Métis specific knowledges, ways of doing, and experiences in a health care system, and more specifically in an LHS, will require more work. The ethical considerations of the tools, frameworks, and trainings found for this environment scan do not meet the needs of Indigenous data sovereignty or collaboration when conducting Indigenous research that is specified in the Tri-Council Policy Statement Chapter 9, OCAP, Inuit Qaujimajatuqangit (IQ), Principles of Ethical Métis Research,[49] or FAIR Guiding Principles for scientific data management. As such, healthcare systems that wish to develop and implement an LHS must consider how to be inclusive and follow existing Indigenous research and ethics guiding principles. Made-vulnerable populations such as Indigenous, Black, 2SLGBTQ

TABLE 2 Accountability checklist.

	Health service organization check list: developing a learning health system	Not in place	In progress	Completed/in place	Notes
1.	Executive board				
1.1	The goals of health equity and addressing the social determinants of health are established priorities for the health organization				
1.2	Indigenous patient-partners are engaged throughout governance, decision-making and other organizational processes and their perspectives are integrated				
1.3	Organizational policies, standards and ethical guidelines have been developed on sharing and reusing patent health data				
1.4	Investments in technological infrastructure have been made to enable the sharing and reuse of patient health data				
1.5	Organizations have established shared digital communications and knowledge platforms for Learning Health Systems				
2.	Department directors				
2.1	Roles and responsibilities for actors involved in learning health systems are established				
2.2	Health equity is prioritized at every level of services provision				
2.3	Ethical guidelines and policies have been developed for data systems to address patient consent, establish eligible data system users, monitor user compliance to privacy and security policies, and establish processes to address unethical practices				
2.4	Organizations undertake routine evaluations on clinical effectiveness, organizational challenges, and socio-cultural, ethical and legal issues related to health system governance				
2.5	Patient feedback is continuously evaluated to facilitate the achievement of high-value care and their perspectives are reflected in changes to health service delivery				
3.	Clinical researchers				
3.1	Training is available for health service providers and researchers to engage Indigenous patient-partners in research and quality improvement initiatives (eg, Indigenous cultural safety training)				
3.2	Ongoing evaluations are undertaken of systematic barriers and facilitators to achieving high-value care, followed by renewed efforts to address barriers and enable facilitators				
3.3	Ongoing efforts are taken to measure, map and monitor patient-provider relationships to identify strengths, gaps and strategies for improvement				
3.4	Clinicians and other stakeholders are engaged in learning health system processes to assess programme progress throughout the learning cycle				
3.5	Ongoing Indigenous community stakeholder engagement processes are undertaken to understand how patient-centredness is perceived by the communities served				
4.	Clinical educators				
4.1	All planning for health services and programmes are evidence informed				
4.2	Collaborative training on learning health systems is available for health service providers and incentives are provided to complete trainings				
4.3	Training programmes are available to clinicians to develop skills for quality improvement methods and statistical analysis				
4.4	Health equity and Indigenous cultural safety trainings are delivered to all healthcare providers				
4.5	Indigenous patient-partners are engaged in capacity building projects.				

+, and those with disabilities must be considered as they were clearly absent in the LHS literature that was reviewed. The made-vulnerable populations will benefit greatly from LHSs if they are included from the outset.

TABLE 3 Recommendations from the literature.

Learning health systems (LHS) dimension	Recommendations from literature and gap analysis
Data system and infrastructure	• Standardize data collection processes to ensure high data quality[33] • Data collection should not be burdensome for health professionals as this could discourage standardized procedures from being followed • Incorporate advanced statistical methods and develop formal processes and ethical committees to monitor the processing of data in artificial intelligence applications[49] • Involve a multidisciplinary team of health surveillance and research leaders in data-sharing to advance partnerships[50] • Incorporate the principles of ownership, control, access, and possession (OCAP) or other locally identified Indigenous ethics frameworks if collecting data on Indigenous peoples[51]
Patient centred	• Actively engage patient-partners in research and quality improvement processes[17] • Examine ways to link the logistics of patient engagement (ie, data infrastructure, privacy, and data-sharing-agreements) with the social aspects (culture, trust, and leadership)[52] • Indigenous community partnership should be at the core of any LHS development or modification to ensure the work is culturally safe and effective
System supported	• Define the various roles and responsibilities of the actors involved at different levels of an LHS[16] • Develop frameworks and evaluation models that guide transparency in decision-making processes to promote trust and cooperation among stakeholders[2] • All members of the governance body must complete Indigenous cultural safety training
Culture and competencies enabled	• Establish centralized forms of communication and knowledge-sharing among stakeholders, such as digital platforms that provide resources and showcase new methodologies (see example in Britto et al.[53]) • Incentives for stakeholders and physicians to engage in an LHS, such as paid time for learning and knowledge translation, to encourage their participation[3]
Learning health system	• Develop strategies to implement LHSs at different levels (micro, meso, and macro) and to evaluate existing LHS models[3] • Incorporate process and outcome evaluations to develop a more robust understanding of the optimal conditions and social contexts for LHSs[16] • Evaluations of LHSs should provide progress measurements on clinical outcomes, patient and healthcare provider experiences, and economic analyses[3] • Funding for such evaluations should target multidisciplinary teams

7.1 | Limitations

This environmental scan was limited by lack of time to consult with key stakeholders to inform the findings. Given the recent emergence of LHSs into the literature, stakeholders and early adopters may hold the majority of the knowledge on this topic through practice. In addition, the findings were limited to English literature and were not assessed for quality, which may have led to the exclusion of new findings or bias in the narrative presented. Analysis was limited given the context of the environmental scan within the larger anti-racism project, and therefore each framework, tool, training and evaluation was critically examined within its pillar and used as a building block for the larger narrative format.

8 | CONCLUSION

This environmental scan gathered existing frameworks, trainings, and evaluations on LHSs in Canada and the United States to examine to their potential to address health inequities in Ontario, by dynamically and systematically mobilizing internal data, centering patient needs and enabling culture and competencies. However, a review of the current literature demonstrates significant conceptual and practical gaps in achieving these aims. The gap analysis highlights a need for guidance on LHS evaluation and implemention across different contexts. Existing LHS literature also endorses the extraction of knowledge from community which contradicts best practices of co-creation with FNIM peoples. Instead, high quality, LHSs must be integrated ethically, transparently, and in partnership with Indigenous communities. Future research can build on these frameworks, trainings, and evaluations to fill existing knowledge gaps and to design, implement and evaluate LHSs in Ontario to improve healthcare for FNIM peoples.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

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