

Rapid Synthesis

Creating Rapid-learning Health Systems
in Canada

10 December 2018



McMaster
HEALTH FORUM

EVIDENCE >> INSIGHT >> ACTION

**Rapid Synthesis:
Creating Rapid-learning Health Systems in Canada
90-day response**

Notes to readers

- 1) This rapid synthesis was commissioned by the CIHR Institute of Health Services and Policy Research and the Canadian Health Services and Policy Research Alliance to serve as a jumping off point for their efforts to support the creation of rapid-learning health systems across Canada. The report is meant to start a conversation about how the framework and concepts can be adapted, piloted and iteratively revised within and across Canadian jurisdictions.
- 2) The website/document reviews and key-informant interviews were designed to capture efficiently as many examples of assets as possible (and the authors apologize in advance for examples that were missed or that are not described as well as they deserve). The inventories of assets are meant to support those who are well positioned in each Canadian jurisdiction to build up a more comprehensive inventory of assets, to identify gaps that are local priorities to fill, and to connect existing assets in ways that can best support rapid learning and improvement.
- 3) The word ‘rapid’ is used to refer both to the speed with which the data collection, analysis and synthesis were undertaken to inform the report and to the speed with which rapid learning and improvement takes place. While we address the latter in the report, we note here that we used the same systematic approach in this rapid synthesis that we would have used had we had much more time, but we adopted an ‘all hands on deck’ approach that enabled a team of six experienced researchers to execute the work very quickly.

10 December 2018

McMaster Health Forum

The McMaster Health Forum's goal is to generate action on the pressing health-system issues of our time, based on the best available research evidence and systematically elicited citizen values and stakeholder insights. We aim to strengthen health systems – locally, nationally, and internationally – and get the right programs, services and drugs to the people who need them.

Authors

John N. Lavis, MD PhD, Director, McMaster Health Forum (MHF); Professor, McMaster University; and Adjunct Visiting Professor, University of Johannesburg

François-Pierre Gauvin, PhD, Senior Scientific Lead, Citizen Engagement & Evidence Curation, MHF

Cristina A. Mattison, PhD, Scientific Lead, Stakeholder Engagement and Systems Analysis, MHF

Kaelan A. Moat, PhD, Managing Director, MHF

Kerry Waddell, M.Sc., Co-Lead Evidence Synthesis, MHF

Michael G. Wilson, PhD, Assistant Director, MHF, and Associate Professor, McMaster University

Robert J. Reid, MD PhD, Chief Scientist and Senior Vice-President of Science, Trillium Health Partners

Timeline

Rapid syntheses can be requested in a three-, 10-, 30-, 60- or 90-business-day timeframe. This synthesis was prepared over a 90-business-day timeframe. An overview of what can be provided and what cannot be provided in each of the different timelines is provided on McMaster Health Forum's Rapid Response program webpage (www.mcmasterforum.org/find-evidence/rapid-response).

Funding

The rapid-response program through which this synthesis was prepared is funded by McGill University, on behalf of the CIHR Institute of Health Services and Policy Research (IHSPR), an institute hosted at McGill, and the University of Calgary, on behalf of Canadian Health Services and Policy Research Alliance. The McMaster Health Forum receives both financial and in-kind support from McMaster University. The views expressed in the rapid synthesis are the views of the authors and should not be taken to represent the views of the funders or McMaster University.

Conflict of interest

The authors declare that they have no professional or commercial interests relevant to the rapid synthesis, however, the work of their organization is sometimes cited. The funder played no role in the identification, selection, assessment or synthesis of the research evidence and or in the elicitation or synthesis of the stakeholder insights profiled in the rapid synthesis. Staff of these organizations provided feedback on our approach and on draft materials, however, the authors could act on their input at their sole discretion.

Merit review

The rapid synthesis was reviewed by a small number of policymakers, stakeholders and researchers in order to ensure its scientific rigour and system relevance.

Acknowledgments

The rapid synthesis builds on a previous rapid synthesis on creating a rapid-learning health system in Ontario, which was funded by the Ontario Ministry of Health and Long-Term Care through a Health System Research Fund grant entitled 'Harnessing Evidence and Values for Health System Excellence.' The authors wish to thank Eilish Scallane, Puru Panchal and Sabrina Lin for assistance with identifying, reviewing and synthesizing the research literature captured in the previous rapid synthesis. We are grateful to our key informants for their insights, as well as to the members of the Canadian Health Services and Policy Research Alliance's Learning Health System Working Group (chaired by Denis Roy and Tom Noseworthy and with the significant input of Diane Finegood, the Alliance's executive director) and the smaller steering committee (drawn from the Working Group) that gave feedback on our approach and on draft materials, as well as to Bob Bell, Lise Gauvin and a third, anonymous merit reviewer. The views expressed in the report are those of the authors and do not necessarily represent the views of the funders or those who provided input to or feedback on the report.

Citation

Lavis JN, Gauvin F-P, Mattison CA, Moat KA, Waddell K, Wilson MG, Reid RJ. Rapid synthesis: Creating rapid-learning health systems in Canada. Hamilton, Canada: McMaster Health Forum, 10 December 2018.

Product registration number: ISSN 2292-7999 (online)

KEY MESSAGES

Questions

- At the request of the CIHR Institute of Health Services and Policy Research and the Canadian Health Services and Policy Research Alliance, five questions are addressed in this rapid synthesis:
 - 1) What assets and gaps exist in 14 Canadian jurisdictions – a) for the health system as a whole, b) in primary care and c) for aging (or the elderly population) – for creating rapid-learning health systems?
 - 2) Where have strong connections been made among assets in these jurisdictions, and where are the greatest opportunities to better connect assets in future?
 - 3) Beyond primary care (a sector) and aging (or the elderly as a population), what other sectors or populations and what regions, conditions and/or treatments have been the focus or will be the focus of sustained efforts to create rapid-learning health systems in these jurisdiction?
 - 4) What ‘windows of opportunity’ can be capitalized on or created to stimulate the development and consolidation of rapid-learning health systems in these jurisdictions?
 - 5) What interdependencies and issue-based commonalities among jurisdictions can be used as focal points to facilitate pan-Canadian collaboration?

The jurisdictions include one federal/national/pan-Canadian, 10 provincial, and three territorial jurisdictions.

Why the issue is important

- Creating rapid-learning health systems in Canada offers the potential to:
 - 1) ‘move the dial’ for patients in their experiences and outcomes;
 - 2) enable patient-driven and data- and evidence-informed transformations at all levels of a health system;
 - 3) motivate greater collaboration among, and enable greater impacts of (and returns on investments in), all elements of the research system; and
 - 4) better leverage the quality-improvement (and other learning and improvement) infrastructure operating at the interface between the health and research systems.

What we found

- The research literature on rapid-learning health systems provides no ‘recipe’ for creating rapid-learning health systems, but many single studies point to factors or strategies that supported the creation of a rapid-learning health system in particular contexts.
- The list of assets is remarkably rich for the health system as a whole and for the primary-care sector and elderly population specifically, even in many small jurisdictions, but there are a number of notable gaps across a number of jurisdictions, such as data about patient experiences often not being linked and shared in a timely way to inform rapid learning and improvement.
- Four examples were selected to illustrate assets being well connected to enable rapid learning and improvement – 1) primary-care sector in Newfoundland and Labrador; 2) elderly population in Alberta; 3) opioid crisis in Quebec; and 4) Mississauga Halton region in Ontario – and a fifth example was selected to illustrate where assets could be better connected (prescription drugs at the pan-Canadian level).
- Some other sectors (e.g., home and community care) and populations (e.g., Indigenous peoples), many conditions (e.g., mental health and addictions) and some ‘treatments’ (e.g., surgery) have been or will be the focus of sustained efforts to create rapid-learning health systems in some jurisdictions.
- Many windows of opportunity can be identified for creating rapid-learning health systems, including the growing use of the framework and concepts in health systems such as in British Columbia (B.C.), Ontario and New Brunswick.
- A few true interdependencies (e.g., contractual arrangements for the patients in one health system to be treated in another one) and more issue-based commonalities (e.g., care for mental health and addictions) can be used as focal points to facilitate pan-Canadian collaboration on creating rapid-learning health systems. One particularly interesting issue-based commonality that was identified is the need to develop accreditation standards and other supports for rapid-learning health organizations and systems.

QUESTIONS

Five questions are addressed in this rapid synthesis:

- 1) What assets and gaps exist in 14 Canadian jurisdictions –
a) for the health system as a whole, b) in primary care and
c) for aging (or the elderly population) – for creating
rapid-learning health systems?
- 2) Where have strong connections been made among assets
in these jurisdictions, and where are the greatest
opportunities to better connect assets in future?
- 3) Beyond primary care (a sector) and aging (or the elderly
as a population), what other sectors or populations and
what regions, conditions and/or treatments have been
the focus or will be the focus of sustained efforts to
create rapid-learning health systems in these jurisdictions?
- 4) What ‘windows of opportunity’ can be capitalized on or
created to stimulate the development and consolidation
of rapid-learning health systems in these jurisdictions (in
general, for primary care, for aging (or the elderly
population), and/or for another recent or planned area of
focus)?
- 5) What interdependencies and issue-based commonalities
among jurisdictions can be used as focal points to
facilitate pan-Canadian collaboration?

For details about our approach to answering these questions,
see **Box 1** and **Box 2**.

The 14 jurisdictions include one federal/national/pan-
Canadian jurisdiction, 10 provincial jurisdictions, and three
territorial jurisdictions. The first of these jurisdictions
includes both areas of federal government responsibility for
providing healthcare – most notably for Indigenous peoples,
military personnel and veterans, and prisoners in federal
correctional facilities – and areas where national or pan-
Canadian initiatives have been developed to support
provincial and territorial health systems.

When thinking about the health system as a whole, we were
interested in assets and gaps shared by or unique to:

- sectors, namely home and community care, primary care, specialty care (including acute care),
rehabilitation care, long-term care, and public health;
- geographic regions (for jurisdictions with sub-jurisdictional health authorities);
- conditions, such as cancer, heart failure, mental health and addictions, trauma, and multimorbidity;
- treatments, such as prescription drugs and surgical services; and
- populations, such as the elderly and Indigenous peoples.

While jurisdictions may frame the focus of assets in terms of ‘problem-focused initiatives’ or initiatives
addressing recent or current health-system priorities (e.g., trauma- and heart failure-focused initiatives in
Quebec, critical care and surgical networks in Ontario), we were interested in these assets regardless of
whether or not they had previously been described using the label, concepts or framework of a rapid-learning
health system.

Box 1: Background to the rapid synthesis

This rapid synthesis addresses a set of
questions submitted to the McMaster Health
Forum’s Rapid Response program and draws
on the findings from research evidence, website
(and document) reviews, and key-informant
interviews. The rapid synthesis does not
contain recommendations, which would have
required the authors to make judgments based
on their personal values and preferences.

Rapid syntheses can be requested in a three-,
10-, 30-, 60- or 90-business-day timeframe. An
overview of what can be provided and what
cannot be provided in each of these timelines is
provided on the McMaster Health Forum’s
Rapid Response program webpage
([www.mcmasterforum.org/find-
evidence/rapid-response](http://www.mcmasterforum.org/find-evidence/rapid-response)).

This rapid synthesis was prepared over a 90-
business-day timeframe and involved four
steps:

- 1) submission of question(s) from a
policymaker or stakeholder (in this case, a
question from the CIHR Institute of
Health Services and Policy Research and
the Canadian Health Services and Policy
Research Alliance that evolved into a set of
five questions);
- 2) summarizing what’s known based on the
available research evidence, website (and
document) reviews, and key-informant
interviews;
- 3) drafting the rapid synthesis in such a way as
to present the findings concisely and in
accessible language; and
- 4) finalizing the rapid synthesis based on the
input of merit reviewers.

For the purpose of this rapid synthesis, we considered primary care, which is the focus of a separate assessment, to be “first contact, continuous, comprehensive, and coordinated care provided to populations undifferentiated by gender, disease or organ system”.⁽¹⁾ This includes care provided by family physicians, nurse practitioners and/or interprofessional primary-care teams, and not what is commonly considered to be home and community care (e.g., nursing or homemaking services in the home), care provided by community-based mental health and addictions organizations, emergency-department care (and other forms of acute care), long-term care, or public health.

We considered assets related to aging to include assets specifically targeting aging, assets targeting the elderly population (e.g., older adults and their caregivers), and assets targeted a relevant ‘problem focus,’ such as frailty.

WHY THE ISSUE IS IMPORTANT

Most Canadian health systems have both a health system and a research system that are increasingly putting patients and rapid learning and improvement at their centre. For provincial and territorial health systems, many notable examples can be given, including Alberta’s patient and family advisory councils that guide decision-making (with five operating at the provincial level, 12 covering geographic areas, one involving Indigenous peoples, and more than 100 in programs and sites) and its 16 strategic clinical networks that support learning and improvement in a defined sector, for a defined category of conditions or treatments, or for defined populations. For the research system, a notable example is Canada’s Strategy on Patient-Oriented Research (SPOR) and the provincial and territorial SPOR SUPPORT units as well as pan-Canadian networks that are key players in the strategy’s implementation.

Creating rapid-learning health systems offers the potential to:

- 1) ‘move the dial’ for patients in their experiences and outcomes in rapid-improvement cycles;
- 2) enable data- and evidence-informed transformations at all levels of a health system;
- 3) motivate greater collaboration among, and enable greater impacts of (and returns on investments in), all elements of the research system; and

Box 2: Methods used in the rapid synthesis

For our synthesis of research evidence, we updated the searches of Health Systems Evidence (for systematic reviews) and PubMed (for single research studies) that we had conducted for a previous rapid synthesis in February 2018. A systematic review is a summary of studies addressing a clearly formulated question that uses systematic and explicit methods to identify, select and appraise research studies, and to synthesize data from the included studies. In both databases we searched for “learning health” and “system.” One reviewer assessed relevance, and here we focused on documents exploring the conceptual and theoretical underpinnings of rapid-learning health systems, and on systematic reviews, primary studies and descriptive cases of rapid-learning health systems. We provide details of our approach to data extraction and quality appraisal in Appendix A.

For our website (and document) reviews, we updated the tables of assets and gaps from a previous rapid synthesis to include prompts for each of the seven characteristics of rapid-learning health systems and used search terms derived from these prompts, coupled with the name of the jurisdiction, to search Google for relevant websites (and documents). One reviewer assessed relevance for each jurisdiction, and here we focused on documenting assets and gaps for each health system as a whole, the primary-care sector, and aging (or the elderly population).

For our key-informant interviews, we interviewed 50 individuals. Our aspiration was to interview five key informants for each of the 13 jurisdictions, which typically included at least one: 1) patient or citizen; 2) provider; 3) senior policymaker or manager; and 4) researcher or research funder. We did not interview individuals from Ontario, which was captured through work completed as part of a previous rapid synthesis. We came close to reaching our goal of at least one key informant who was particularly knowledgeable about primary care in each jurisdiction, and another who was particularly knowledgeable about aging (or the elderly population). We had particular challenges in identifying willing interviewees in Nunavut, P.E.I. and the Yukon, where we interviewed zero, one and two individuals, respectively. Each of the six authors conducted all of the interviews for either two or three jurisdictions (which were the same jurisdictions for which they completed website and document reviews), using the questions at the top of each draft jurisdiction-specific table as the interview guide. Each author conducted a preliminary interview with the one key informant likely to be able to provide the most detailed response, and then proceeded to the remaining reviews using a revised set of tables. We supplemented the interview data with input received from the small number of Health System Impact Fellows who were invited to identify assets in the jurisdiction they each knew best.

We sent the penultimate set of tables to at least one key informant per jurisdiction and to the members of the working group that guided our work.

- 4) better leverage quality-improvement and other learning and improvement infrastructures operating at the interface between the health and research systems.

With concepts and frameworks related to rapid-learning health systems gaining increasing attention across Canada, CIHR's Institute of Health Services and Policy Research (IHSPR) and the Canadian Health Services and Policy Research Alliance (CHSPRA) were interested in understanding both existing assets (including connections among them) and gaps where they exist, and identifying potential focal points for pan-Canadian collaboration, among other objectives. Rapid-learning health systems is one of IHSPR's strategic priority areas. CHSPRA has created a working group to support rapid-learning health systems. This rapid synthesis responds to the questions they posed, builds on a previous rapid synthesis that examined only one province (Ontario),(2) and was conducted with the input of the CHSPRA working group.

WHAT WE FOUND

Definition of a rapid-learning health system

In our updated searches we found no new definitions of a rapid-learning health system that went substantively beyond the definition of a 'learning healthcare system' originally developed by the Institute of Medicine: a system in which "science, informatics, incentives, and culture are aligned for continuous improvement and innovation, with best practices seamlessly embedded in the delivery process and new knowledge captured as an integral by-product of the delivery experience."(3)

We noted four challenges to using this definition 'as is' in Canadian health systems:

- 1) it uses the language 'health care system' (at least in early formulations) and not 'health system' as is more commonly used in Canada and in most other countries (or health and social systems as may be more appropriate in the future as education, housing, social services and other sectors are increasingly engaged in efforts to improve health outcomes);
- 2) it is silent on how improving the patient experience needs to be considered alongside the other parts of the 'triple aim' of a health system, namely improving population health and keeping per capita costs manageable (or of the 'quadruple aim,' which adds improving the provider experience);
- 3) it focuses primarily on the clinical encounter and not the full range of self-management, clinical encounter, program, organization, regional (or provincial) health authority, and government levels that are relevant in Canada; and
- 4) it uses some labels for the categories of the characteristics of a learning health system that are not commonly used in Canada, such as informatics instead of data, science instead of (research) evidence, and incentives instead of decision supports and governance, financial and delivery arrangements.

Accordingly we propose the same definition of a rapid-learning health system that we developed in our previous rapid synthesis:(2) the combination of a health system and a research system that at all levels – self-management, clinical encounter, program, organization, regional (or provincial) health authority and government – is: 1) anchored on patient needs, perspectives and aspirations (and focused on improving their care experiences and health at manageable per capita costs and with positive provider experiences); 2) driven by timely data and evidence; 3) supported by appropriate decision supports and aligned governance, financial and delivery arrangements; and 4) enabled with a culture of and competencies for rapid learning and improvement. The concept of a rapid-learning health system at the government level has an analogue in what has been called 'radical incrementalism,' which couples small incremental policy changes that focus on improving cost-effectiveness with small-scale and tightly focused evaluations, that identifies which policy changes improved cost-effectiveness and warrant keeping.(4)

We use the word 'patients' here to mean:

- 1) patients in the usual sense of those receiving care in the health system;
- 2) potential patients who need care, whether or not they are receiving it now;
- 3) families of and caregivers to these patients or potential patients;

- 4) citizens, by which we mean all Canadians – whether as taxpayers or voters or in other roles, and regardless of their formal citizenship status and whether they may also currently be considered a patient – who should have a voice in the rapid learning about and improvements in the health system; and
- 5) communities, by which we mean groups of citizens – whether defined by geography, lived experience with particular conditions or treatments (or health determinants), ethnocultural group or other factors – who should also have a voice in the rapid learning about and improvements in the health system.

We use the term improvement not just in the sense of ensuring that care is increasingly safe and effective, but also in ensuring that care is increasingly patient-centred, timely, efficient and equitable. This broader definition of quality, which was first developed by the U.S. Institute of Medicine and later adopted by many quality councils in Canada,(5; 6) includes addressing both underuse and overuse of healthcare.

Characteristics of a rapid-learning health system

We also found no set of characteristics of a rapid-learning health system, or labels for the categories of these characteristics, that went substantively beyond those characteristics originally described by the Institute of Medicine, so we propose the same Canada-appropriate ordering and wording of the four categories and seven characteristics (and note that ‘all levels’ refers to self-management, clinical encounter, program, organization, regional (or provincial) health authority, and government levels). Those wishing to review an explicit comparison between the original Institute of Medicine (IOM) categories and characteristics, and the proposed new categories and characteristics can find them in Table 1 in our previous synthesis.(2) Those wishing to review the documents exploring the conceptual and theoretical underpinnings of rapid-learning health systems can find them in Table 1 in **Appendix A**, which is available as a separate document. The two newly identified documents can be found in the first two rows of the table.

To elaborate on the seven characteristics and to provide consistency in the prompts used by the six authors in conducting website and document reviews and key-informant interviews in the two or three jurisdictions for which they were responsible, we identified and iteratively revised potential examples of each characteristic based on our updated literature review, our experiences with having prepared four ‘assets and gaps’ tables for the Ontario health systems, and our evolving experiences with using the revised ‘assets and gaps’ for all 14 jurisdictions (**Table 1**).

Table 1: Characteristics of rapid-learning health systems (RLHS)

Category	Characteristic	Examples
Patient centred	Engaged patients: Systems are anchored on patient needs, perspectives and aspirations (at all levels) and focused on improving their care experiences and health at manageable per capita costs and with positive provider experiences	<ol style="list-style-type: none"> 1) Set and regularly adjust patient-relevant targets for rapid learning and improvement (e.g., improvements to a particular type of patient experience or in a particular health outcome) 2) Engage patients, families and citizens in: <ol style="list-style-type: none"> a) their own health (e.g., goal setting; self-management and living well with conditions; access to personal health information, including test results) b) their own care (e.g., shared decision-making; use of patient decision aids) c) the organizations that deliver care (e.g., patient-experience surveys; co-design of programs and services; membership of quality-improvement committees and advisory councils) d) the organizations that oversee the professionals and other organizations in the system (e.g., professional regulatory bodies; quality-improvement bodies; ombudsman; and complaint processes) e) policymaking (e.g., committees making decisions about which services and drugs are covered; government advisory councils that set direction for (parts of) the system; patient storytelling to kick off key meetings; citizen panels to elicit citizen values) f) research (e.g., engaging patients as research partners; eliciting patients’ input on research priorities) 3) Build patient/citizen capacity to engage in all of the above
Data and evidence driven	Digital capture, linkage and timely sharing of relevant data: Systems capture, link and	<ol style="list-style-type: none"> 1) Data infrastructure (e.g., interoperable electronic health records; immunization or condition-specific registries; privacy policies that enable data sharing)

Category	Characteristic	Examples
	share (with individuals at all levels) data (from real-life, not ideal conditions) about patient experiences (with services, transitions and longitudinally) and provider engagement alongside data about other process indicators (e.g., clinical encounters and costs) and outcome indicators (e.g., health status)	<ol style="list-style-type: none"> 2) Capacity to capture patient-reported experiences (for both services and transitions), clinical encounters, outcomes and costs 3) Capacity to capture longitudinal data across time and settings 4) Capacity to link data about health, healthcare, social care and the social determinants of health 5) Capacity to analyze data (e.g., staff and resources) 6) Capacity to share 'local' data (alone and against relevant comparators) – in both patient- and provider-friendly formats and in a timely way – at the point of care, for providers and practices (e.g., audit and feedback), and through a centralized platform (to support patient decision-making and provider, organization and system-wide rapid learning and improvement)
	Timely production of research evidence: Systems produce, synthesize, curate and share (with individuals at all levels) research about problems, improvement options and implementation considerations	<ol style="list-style-type: none"> 1) Distributed capacity to produce and share research (including evaluations) in a timely way 2) Distributed research ethics infrastructure that can support rapid-cycle evaluations 3) Capacity to synthesize research evidence in a timely way 4) One-stop shops for local evaluations and pre-appraised syntheses 5) Capacity to access, adapt and apply research evidence 6) Incentives and requirements for research groups to collaborate with one another, with patients, and with decision-makers <p>Note that for Indigenous peoples, this row would ideally be re-conceptualized to include traditional knowledge</p>
System supported	Appropriate decision supports: Systems support informed decision-making at all levels with appropriate data, evidence, and decision-making frameworks	<ol style="list-style-type: none"> 1) Decision supports at all levels – self-management, clinical encounter, program, organization, regional health authority and government – such as <ol style="list-style-type: none"> a) patient-targeted evidence-based resources b) patient decision aids c) patient goal-setting supports d) clinical practice guidelines e) clinical decision support systems (including those embedded in electronic health records) f) quality standards g) care pathways h) health technology assessments i) descriptions of how the health system works
	Aligned governance, financial and delivery arrangements: Systems adjust who can make what decisions (e.g., about joint learning priorities), how money flows and how the systems are organized and aligned to support rapid learning and improvement at all levels	<ol style="list-style-type: none"> 1) Centralized coordination of efforts to adapt a RLHS approach, incrementally join up assets and fill gaps, and periodically update the status of assets and gaps 2) Mandates for preparing, sharing and reporting on quality-improvement plans 3) Mandates for accreditation 4) Funding and remuneration models that have the potential to incentivize rapid learning and improvement (e.g., focused on patient-reported outcome measures, some bundled-care funding models) 5) Value-based innovation-procurement model 6) Funding and active support to spread effective practices across sites 7) Standards for provincial expert groups to involve patients, a methodologist, use existing data and evidence to inform and justify their recommendations 8) Mechanisms to jointly set rapid-learning and improvement priorities 9) Mechanisms to identify and share the 'reproducible building blocks' of a rapid-learning health system
Culture and competencies enabled	Culture of rapid learning and improvement: Systems are stewarded at all levels by leaders committed to a culture of teamwork, collaboration and adaptability	<ol style="list-style-type: none"> 1) Explicit mechanisms to develop a culture of teamwork, collaboration and adaptability in all operations, to develop and maintain trusted relationships with the full range of partners needed to support rapid learning and improvement, and to acknowledge, learn from and move on from 'failure'
	Competencies for rapid learning and improvement: Systems are rapidly improved by teams at all levels who have the competencies needed to identify and characterize problems, design data- and	<ol style="list-style-type: none"> 1) Public reporting on rapid learning and improvement 2) Distributed competencies for rapid learning and improvement (e.g., data and research literacy, co-design, scaling up, leadership) 3) In-house capacity for supporting rapid learning and improvement 4) Centralized specialized expertise in supporting rapid learning and improvement 5) Rapid-learning infrastructure (e.g., learning collaboratives)

Category	Characteristic	Examples
	evidence-informed approaches (and learn from other comparable programs, organizations, regions, and sub-regional communities about proven approaches), implement these approaches, monitor their implementation, evaluate their impact, make further adjustments as needed, sustain proven approaches locally, and support their spread widely	

Other insights from the research literature about rapid-learning health systems

We summarize the key messages from this research literature in **Appendix A**, which (as noted above) is available as a separate document. We identified only a small amount of new research literature through our updated searches:

- 1) no new systematic reviews about rapid-learning health systems;
- 2) one new primary study about rapid-learning health systems, which was focused on a Veterans Health Administration program (see the first row of Table 3 in Appendix A); and
- 3) one new descriptive case of a rapid-learning health system, which was focused on a nascent initiative in Switzerland (see the first row of table 4 in Appendix A).

We offer the following high-level observations about the existing research literature:

- 1) there is no ‘recipe’ that can be used to create rapid-learning health systems, but many single studies point to factors or strategies that supported the creation of a rapid-learning health system in particular contexts, such as the engagement of front-line clinicians;
- 2) there is much less attention given to some characteristics (e.g., engaged patients and aligned governance, financial and delivery arrangements) than others (e.g., digital capture, linkage and timely sharing of relevant data and timely production of research evidence), but a fair degree of attention to how characteristic-related assets are connected in particular contexts; and
- 3) there are many ethical issues that need to be addressed in rapid-learning health systems (e.g., confusion about which learning and improvement efforts require what types of ethical oversight).

We provide additional details about the identified literature in Tables 2-4 in **Appendix A**. We should note that we did not undertake separate searches of the research literature specific to fields that could inform particular aspects of any of the seven characteristics of a rapid-learning health system (e.g., research about patient engagement in self-management, clinical encounter, program, organization, regional health authority, government, or in research),⁽⁷⁾ which would have brought almost the entire health-systems research literature into scope.

Other relevant background to creating rapid-learning health systems in Canada

The original IOM conception of the learning health system was focused primarily at the clinical encounter, program and/or organization levels (hereafter called clinical levels) and it identified six phases of the learning health system:

- 1) identifying problems (and potentially innovative solutions) through an internal and external scan;
- 2) designing care and evaluation based on data and evidence generated locally and elsewhere;
- 3) implementing the plan in pilot and control settings;
- 4) evaluating to identify what does and does not work;
- 5) adjusting, with continuous improvement based on what was learned from the evaluation; and
- 6) disseminating the results to improve care across the system.^(8; 9)

The first four of these steps have their analogues at the health authority and government levels (hereafter called policy levels):

- 1) clarifying problems (and their causes);
- 2) selecting options;
- 3) identifying implementation considerations; and
- 4) monitoring implementation and evaluating impact.

However, at these levels, the problems and options may be clinical in nature (e.g., which individually targeted programs, services or drugs to fund?) or public health in nature (e.g., which group- or population-targeted programs or services to provide?), or involve governance, financial and delivery arrangements (e.g., who can make what decisions, how money flows, and how the delivery system is organized to get the right programs, services and products to those who need them?).

There is also an analogue at the self-management level or with the patient components of the clinical encounter level (hereafter called patient levels):

- 1) understanding their risk factors and/or conditions;
- 2) making treatment choices (as part of shared decision-making with their clinician or care team) and making decisions about how to self-manage their diseases and/or live well with their conditions;
- 3) overcoming obstacles to behaviour change and adhering to chosen courses of action; and
- 4) monitoring their condition, either alone or in partnership with their clinician or care team.

Of course, patients are optimally also partners at clinical and policy levels (e.g., as part of a team that is co-designing a program or program evaluation, a participant in a citizen panel convened to address a particular health authority-level challenge, and a member of a provincial patient and family advisory council).

To highlight the similarities and differences across these three levels, we provide in **Table 2** a direct comparison of the above wording.

Table 2: Phases in what can be considered to be a learning and improvement cycle at different ‘levels’

Patients	Clinical encounter, program & organization (IOM’s six phases)	Government (or health authority)
Understanding their risk factors and conditions	Identifying problems through an internal and external scan	Clarifying problems and their causes
Making choices about treatment and about living well with their conditions	Designing care and evaluation based on data & evidence generated locally & elsewhere	Selecting options
Overcoming obstacles to behaviour change and adhering to chosen courses of action	Implementing the plan in pilot & control settings	Identifying implementation considerations
Monitoring their condition	Evaluating to identify what does & does not work	Monitoring implementation and evaluating impact
	Adjusting, with continuous improvement based on what was learned from the evaluation	
	Disseminating the results to improve care across the system	

To illustrate the types of complementarities that exist among groups in Canadian research systems that can support three of the seven characteristics of a learning health system – data analysis, research (and evidence synthesis) production and the development and maintenance of decision supports – we provide in **Table 3** (reproduced from our previous rapid synthesis) a listing of eight types of groups and note how they focus on one or more phases of the patient, clinical or policy levels of a rapid-learning health system (and in the case of the latter, how they focus on one or more of clinical topics, public-health topics or health-system arrangements).

Table 3: Types of groups that can be involved in data, evidence and decision supports

Groups (with those using existing, synthesized research evidence marked with an asterisk)	Focus		
	Phases at the patient levels of rapid-learning health system (not counting patient roles at clinical and policy levels)	Phases at the clinical levels of a rapid-learning health system (not counting clinician roles in patient and policy levels)	Phases at the policy levels of a rapid-learning health system (and, in brackets, the nature of topics typically addressed)
Data analytics	Not applicable (n/a), although possibly a role in monitoring	Identifying problems	Clarifying problems and monitoring implementation (typically for clinical and public-health topics)
Clinical practice guidelines*	Making treatment choices (if guideline-derived patient materials produced as well)	Designing care	Selecting options (typically for clinical practice)
Health technology assessments (HTA)*	n/a	Designing care	Selecting options (typically for clinical and public-health 'technologies,' such as prescription drugs and immunizations)
Modelling	n/a	Designing care and evaluation	Selecting options (typically for reach and needs but for any topic)
Implementation research (behavioural insights)	n/a	Implementing the plan	Identifying implementation considerations (typically for clinical and public-health interventions)
Self-management and shared decision-making supports*	Understanding conditions, making treatment choices, adhering, and monitoring	n/a	n/a
Evidence-informed policymaking supports*	n/a	n/a	Clarifying problems, selecting options, and identifying implementation considerations (typically for health-system arrangements)
Evaluation	n/a	Designing evaluation and evaluating	Monitoring implementation and evaluating impact (typically for clinical and public-health interventions)

Assets and gaps in Canadian rapid-learning health systems

Many assets can be leveraged, and many gaps can be addressed, in creating rapid-learning health systems in Canada, both for each health system as a whole and for a select sector (primary care) and a select population (elderly) in each health system (recognizing that these are just two potential areas of focus among many). As noted in Box 2, we identified these assets and gaps using website (and document) reviews and key-informant interviews. One notable finding from our key-informant interviews is how diverse individuals – from patients and providers to policymakers and diverse types of researchers – can ‘see themselves’ in the characteristics of rapid-learning health systems (Table 1), and see significant value in better connecting and filling gaps in these assets to accelerate the creation of rapid-learning health systems across Canada. Over the past year, we have found the same thing with the groups that can be involved in the data, evidence and decision supports described above (Table 3).

We provide below (in **Table 4**) examples of jurisdiction-specific assets for each of the seven characteristics of a rapid-learning health system. The examples were chosen to give visibility to assets in each of the 14 jurisdictions for at least some of the characteristics, not to give visibility to each jurisdiction for each characteristic or to give visibility to all assets from a smaller number of jurisdictions.

While the list of assets is remarkably rich, some of the more notable gaps across a number of jurisdictions include:

- 1) patients are often not being meaningfully engaged in prioritizing what ‘dials to move’ (in terms of the care experiences and outcomes that are priorities for rapid learning and improvement), and don’t have many mechanisms beyond complaints and voting to register their frustration when ‘dials don’t move;’
- 2) data about patient experiences (with services, transitions and longitudinally) are often not being linked and shared in a timely way (with many jurisdictions still focused on developing a jurisdiction-wide electronic health record that will in the near term often not include key sectors like primary care, and on producing one-off or annual data reports rather than many, small, immediately actionable reports);
- 3) research evidence about priority problems and improvement options is often not produced, synthesized, curated, and shared in a timely and locally contextualized way to support rapid learning and improvement;
- 4) decision-support systems and functions are often not sufficiently oriented to meeting the needs of patients and families struggling to deal with complex health conditions or navigate a complex health system;
- 5) alignments in governance, financial and delivery arrangements to support rapid learning and improvement are often inadequate or not yet fully in place in key areas such as primary care;
- 6) a culture of rapid learning and improvement is not yet widespread across levels and across areas of focus (particularly the ‘rapid’ part); and
- 7) competencies in data analytics and research methods in general, and implementation science specifically, are often not sufficiently well distributed to support rapid learning and improvement across levels and across areas of focus.

For those who want to know more about the assets in Table 4, or about all of the assets and some of the notable gaps in specific jurisdictions, we provide (in **Appendix B**) detailed inventories of assets and gaps for each of the 14 jurisdictions, with the file for each jurisdiction available as a separate document and, within each jurisdiction-specific document, with Appendix Table 1 addressing the health system as a whole, Appendix Table 2 addressing the primary-care sector, and Appendix Table 3 addressing the elderly population. We also provide (in **Appendix C**) detailed inventories of assets and gaps for each of health systems as a whole, the primary-care sector and the elderly population and, within each of these three documents, one table for each of the 14 jurisdictions.

The caveats that need to be considered when reviewing the jurisdiction-specific or issue-specific inventories include:

- 1) lists of assets may reflect more the richness of available websites and documents (which can put new efforts at a disadvantage in terms of visibility) and the ability of key informants to concisely summarize a complex landscape (which was particularly challenging for the one key informant for primary care and for the elderly in each jurisdiction, for the jurisdictions like P.E.I., Yukon and Nunavut where we were not successful in interviewing many key informants, and for areas of focus where senior policymakers may not have felt comfortable discussing unpublished research that was commissioned to inform program development), than the full range of actual assets, and does not identify the sub-set of assets currently being used consistently and rigorously for rapid learning and improvement; and
- 2) lists of gaps were not explicitly ‘tested’ during the interviews (given the time constraints that precluded circling back to more than one key informant in most jurisdictions), did not explicitly take into consideration what may be appropriate in large health systems like those in Alberta and Quebec compared to in small health systems like those in P.E.I or the territories, and may best be re-assessed and adapted in each jurisdiction.

We encourage readers to see the inventories as a starting place for confirming or filling gaps and for connecting assets. In the next sub-section, we provide a third ‘way in’ to these rich data, namely figures depicting notable examples of assets being well connected to enable rapid learning and improvement.

Table 4: Examples of jurisdiction-specific assets for creating rapid-learning health systems, by characteristic and area of focus

Characteristic	Examples of jurisdiction-specific assets
Engaged patients: Systems are anchored on patient needs, perspectives and aspirations (at all levels) and focused on improving their care experiences and health at manageable per capita costs and with positive provider experiences	<p>For the health system as a whole</p> <ul style="list-style-type: none"> • National: Patient Advisors Network supports a membership-based community of independent advisors – both patients and caregivers – who use lived experiences (and build capacity among those with lived experiences) to improve healthcare across Canada • BC: Patients are engaged in co-design approaches to some extent in all regions, and patient engagement is supported through four province-wide initiatives (Patients are Partners Program, Patient Experience Council, Patient Voices Network, and First Nations Health Authority) • AB: A provincial patient and family advisory group guides decision-making at Alberta Health Services (AHS), multiple such groups operate within the five zones, and more than 100 such groups operate in programs and sites, while citizens (public members) are part of four provincial advisory councils (one involving Indigenous peoples) and 12 geographic health advisory councils • SK: Patients and family members are supported by the First Nations and Métis Health Service's health navigators, and traditional supports, advocacy and other services • MB: Indigenous knowledge keepers and elders guide the work of Ongomiiwin – Indigenous Institute of Health and Healing • ON: Patient and family advisory councils or their equivalent help to set direction at the ministry, in Local Health Integration Networks, and for select sectors (e.g., specialty hospital care and long-term care), conditions (e.g., cancer and mental health and addictions) and treatments (e.g., prescription drugs) • QC: Patient partnership is promoted in provider training, clinical care, applied research, and quality improvement, and with support from a provincial patient-partnership framework • NB: Patient engagement is assessed and reported on by the New Brunswick Health Council • NS: Patients and families are engaged in community health boards in 37 communities • YT: Council of Yukon First Nations acts as a convenor when First Nations groups meet collectively and with government • NT: Patients are regularly surveyed about their experiences by the Department of Health and Social Services <p>In primary care</p> <ul style="list-style-type: none"> • BC: Patient engagement in primary-care research is supported by the BC Primary Health Care Research Network • MB: Patients are able to coordinate their care and manage their health records through Home Clinic, and community needs are used to tailor the interprofessional primary care delivered through My Health Teams • QC: Patient partners are increasingly engaged in governance structures and processes of academic family practice groups (i.e., Groupes de médecine de famille universitaire) • NB: Patients assess research proposals for the New Brunswick SPOR Network in Primary and Integrated Health Care Innovations • NF: A co-design process is used by the Department of Health and Community Services for new models of care and patient pathways in primary care <p>For aging (or the elderly population)</p> <ul style="list-style-type: none"> • BC: A council of 30 seniors guides the Office of the Seniors Advocate • QC: Groups regularly measure client satisfaction and empowerment among older adults, as well as caregiver burden • NF: A provincial advisory council engages patients and citizens in advising government on issues related to aging and seniors • YT: Patients and families have a voice in planning and care through the Yukon Council on Aging, Summit on Aging in Yukon, and resident and family councils in long-term care facilities
Digital capture, linkage and timely sharing of relevant data: Systems capture, link and share (with individuals at all levels) data (from real-life, not ideal conditions) about patient experiences (with services,	<p>For the health system as a whole</p> <ul style="list-style-type: none"> • National: A SPOR national data platform will soon be launched to provide a single point of timely access to a broad range of harmonized healthcare data • BC: Many access points and supports are in place for linked health- and social-systems data (e.g., through Population Data BC), and a tripartite data-sharing agreement supports the ethical use of First Nations data • AB: Data Integration and Management Repository (DIMR) maintains a rich variety of data assets, analytic tools and dashboards that can be accessed by staff and leaders • SK: Administrative Information Management System (AIMS) provides an integrated data system • MB: Manitoba Centre for Health Policy captures, links, analyzes and shares reports about data from multiple sectors

Characteristic	Examples of jurisdiction-specific assets
<p>transitions and longitudinally) and provider engagement alongside data about other process indicators (e.g., clinical encounters and costs) and outcome indicators (e.g., health status)</p>	<ul style="list-style-type: none"> • ON: Institute for Clinical Evaluative Sciences provides a data management and analytics platform, as well as a data and analytic service, to respond to data requests (including for data linkage) • QC: Dossier Santé Québec is operational and an agreement is in place to support access to and analysis of the clinical administrative data it contains • NB: New Brunswick Institute for Research, Data and Training offers administrative data-access services for qualified researchers • NS: A survey regularly collects data about patient experiences in primary care, hospital and rehabilitation settings • PE: Drug Information System captures all dispensed medications and can be accessed by all providers • NF: Pharmacy Network gives providers access to patient medication profiles, reminders and alerts • YT: eHealth Yukon provides a strong data infrastructure • NT & NU: Both territories are close to having a system-wide electronic health record available at most points of care <p>In primary care</p> <ul style="list-style-type: none"> • National: Canadian Primary Care Sentinel Surveillance Network collects and reports health information drawn from the electronic medical records of participating primary-care providers • SK: BestPractice panel reports provide family physicians with information about their patient population • ON: Health Quality Ontario's MyPractice reports provide practice-level performance data for primary-care providers • QC: Recommendations have been developed about the use of electronic health record data to conduct research and continuously improve primary-care services • NB: New Brunswick Health Council assesses and reports on primary-care service experiences <p>For aging (or the elderly population)</p> <ul style="list-style-type: none"> • National: Canadian Longitudinal Study on Aging collects and shares data on a large cohort of older Canadians to improve our understanding of why some people age in a healthy way while others do not • SK: Connected Care Strategy uses computer modelling to test possible interventions to improve patient flow and transitions from hospital to community care • ON: Health Quality Ontario provide various performance measures on long-term care and home care • QC: SICHELD and ICLSC capture and share data about service requests and use for adults (primarily older adults) receiving services from or in different organizations • NS: Maritime Data Centre for Aging Research and Policy Analysis collects data on the use of services by older adults and the health workforce dedicated to older adults, and uses this information to predict future home-care needs
<p>Timely production of research evidence: Systems produce, synthesize, curate and share (with individuals at all levels) research about problems, improvement options and implementation considerations</p>	<p>For the health system as a whole</p> <ul style="list-style-type: none"> • National: CIHR's Strategy for Patient-Oriented Research, including its national networks and provincial SPOR SUPPORT Units, support patient-oriented research • BC: Province-wide collaborative research is supported by the B.C. Academic Health Sciences Network, Michael Smith Foundation for Health Research, and Provincial Health Services Authority • MB: Research Improvement Through Harmonization in Manitoba (RITHiM) will provide one-stop ethical approval for and access to data • ON: Ontario SPOR Support Unit funds a joined-up approach across 12 research groups to support rapid learning and improvement • QC: Several organizations conduct evidence syntheses, rapid-cycle evaluations, and health technology assessments • NS: Nova Scotia Health Research Foundation's REAL Evaluation Service Program provides rapid program evaluations • NF: Contextualized Health Research Synthesis Program synthesizes research evidence on topics prioritized by health-system leaders <p>In primary care</p> <ul style="list-style-type: none"> • National: Pan-Canadian SPOR Network in Primary and Integrated Health Care Innovations supports the development, evaluation and scale-up of new approaches to the delivery of integrated services • BC: BC Primary Health Care Research Network acts as a hub for the production of patient-engaged, collaborative research about primary care • ON: INSPIRE (Innovations Strengthening Primary Healthcare through Research) and BeACCoN (Better Access and Care for Complex Needs), both funded by the ministry, conduct research in primary care and use 25% of their funds to respond to emerging research requests by decision-makers • QC: Quebec's SPOR support unit focuses on primary-care research and the health region that includes Quebec City is supporting the creation of a rapid-learning primary-care system • NS: Building Research for Integrated Primary Healthcare Network pilots and evaluates programs for complex health needs, produces knowledge syntheses, and conducts comparative analyses

Characteristic	Examples of jurisdiction-specific assets
	<ul style="list-style-type: none"> NF: Atlantic Practice Based Research Network supports primary-care providers to conduct and participate in clinical and delivery research <p>For aging (or the elderly population)</p> <ul style="list-style-type: none"> National: Networks of Centres of Excellence (NCE) program funds two NCEs focused on aging: 1) AGE-WELL, which focuses on technologies that can optimize the well-being of older adults; and 2) Canadian Frailty Network, which focuses on improving care for frail older adults QC: Aging research has been prioritized by Quebec's research-funding body NB: Pilot projects to support healthy aging are being launched and evaluated NS: Nova Scotia Centre on Aging conducts applied research on aging-related issues NF: A Health Research Exchange group focused on aging supports those engaged in aging-related research to identify funding opportunities, collaborate, and share their findings
<p>Appropriate decision supports: Systems support informed decision-making at all levels with appropriate data, evidence, and decision-making frameworks</p>	<p>For the health system as a whole</p> <ul style="list-style-type: none"> National: Canadian Agency for Drugs and Technologies in Health prepares health-technology assessments (for drugs, diagnostic tests, devices and procedures), which complements similar bodies operating in provincial and territorial health systems and in select hospitals BC: Resources to support evidence-informed decision-making are available for patients (e.g., HealthLinkBC), providers (e.g., BC Guidelines) and health-system leaders (e.g., BC Health Technology Assessment) ON: Many groups use rigorous and participatory approaches to make recommendations to providers and healthcare institutions about optimal care QC: Many groups make recommendations to patients and providers about optimal care (e.g., decision aids and guidelines) NB: Community health needs assessments are conducted and shared NS: Drug Evaluation Alliance of Nova Scotia supports patients, providers and decision-makers to make informed choices about prescription drugs PE: Patient navigator helps patients and families to access services <p>In primary care</p> <ul style="list-style-type: none"> National: College of Family Physicians of Canada maintains 'The Patient's Medical Home' website to support family physicians in self-assessing and improving their patients' medical home, and it is developing a Canada-wide 'Research Ready' certification to encourage primary-care practices to participate in and support research BC: Physician Quality Improvement Initiative supports primary-care physicians leading quality-improvement projects QC: Computerized care pathways are being designed for interprofessional primary care <p>For aging (or the elderly population)</p> <ul style="list-style-type: none"> National: McMaster Optimal Aging Portal provides patient-targeted, evidence-based resources to support self-management and shared decision-making BC: Several organizations provide patient-targeted decision aids (e.g., Seniors BC), system-navigation resources (e.g., Office of the Seniors Advocate), and care-planning supports (e.g., Advanced Care Planning Initiative) relevant to older adults QC: A needs-assessment tool is used to guide decisions for patients who have lost their autonomy YT: Palliative-care framework includes patient decision supports and care pathways NU: Nunavut Seniors' Health Information Handbook describes how the health and social system works and the range of programs and services available to older adults
<p>Aligned governance, financial and delivery arrangements: Systems adjust who can make what decisions (e.g., about joint learning priorities), how money flows and how the systems are organized and aligned to support rapid learning and improvement at all levels</p>	<p>For the health system as a whole</p> <ul style="list-style-type: none"> National: Federal government has agreed to work with provincial and territorial governments to improve access to treatment services, among other approaches, to address the opioid crisis BC: Several organizations can help to coordinate efforts for rapid learning and improvement (e.g., Provincial Health Services Authority, First Nations Health Authority, B.C. Patient Safety and Quality Council, and B.C. Academic Health Sciences Network) ON: New financial arrangements are beginning to or have the potential to incentivize rapid learning and improvement (e.g., Quality-Based Procedures, bundled care models) and to focus attention on patient-reported outcome measures QC: A population-based accountability approach is being used to guide health-system transformations, and many problem-focused initiatives are seeking greater alignment among existing arrangements (e.g., to address the opioid crisis and trauma) NB: Government has identified a priority-delivery unit (to drive and increase accountability for improvement) and created strategic learning units and networks (to support improvement) NF: Leaders in the Department of Health and Community Services, regional health authorities and Centre for Health Information meet regularly

Characteristic	Examples of jurisdiction-specific assets
	<ul style="list-style-type: none"> • YT: Health and Social Services Performance Measure Framework is grounded in a learning process and identifies measures that can guide financial and delivery arrangements to meet evolving care needs • NT: A similar framework was established in this territory to ensure the accountability of government for achieving stated health-system goals <p>In primary care</p> <ul style="list-style-type: none"> • BC: Primary-care strategy seeks to enhance team-based care and build primary-care networks • AB: Primary Care Network Governance Framework will support primary-care networks to undertake joint service planning within a provincial framework • SK: A new co-designed primary-care delivery model in Prince Albert and Shellbrook aims to achieve the ‘quadruple’ aim • ON: Interprofessional team-based primary-care organizations are now required to prepare, share and report on quality-improvement plans • QC: Interprofessional team-based primary-care organizations produce and share quality-improvement plans • NB: Regional health networks are giving greater attention to alignments in primary care (and in home and community care) • NS: 50 collaborative-practice teams provide interprofessional primary care • NF: Family Practice Renewal Program provides a legislative mandate and honorariums for physicians to collaborate with regional health authorities on primary-care reform <p>For aging (or the elderly population)</p> <ul style="list-style-type: none"> • National: Government of Canada has a National Seniors Council that provides advice on seniors’ health and well-being, five national organizations have called for a national seniors strategy, and many provinces and territories have • BC: Office of the Seniors Advocate has a mechanism to set rapid learning and improvement priorities through its seniors council • AB: Alberta Health Services’ provincial ‘seniors health’ program has a mandate for standardization across the zones, and both direct operational connections to the zones and direct policy connections with a dedicated branch in Alberta Health • SK: Connected Care supports team-based care for older adults in the community • QC: First government policy on aging will support greater alignment • NB: Council on Aging is guiding the development of an aging strategy that will support greater alignment • NF: Office of the Seniors’ Advocate identifies problems in, and proposes solutions for, seniors care, and the centralization of seniors programs and services in one government portfolio allows for improved coordination between health and social systems
<p>Culture of rapid learning and improvement: Systems are stewarded at all levels by leaders committed to a culture of teamwork, collaboration and adaptability</p>	<p>For the health system as a whole</p> <ul style="list-style-type: none"> • National: Accreditation Canada uses accreditation and related tools to develop and sustain a culture of improvement in health and social services • BC: A collaborative culture is being built through the coordination efforts noted above (for B.C.) and through the Joint Collaborative Committees that engage physicians and policymakers in improvement • SK: Continuous quality-improvement initiative focuses on a patient-first health system, uses lean methodology, and includes 1,500 improvement projects • QC: New director of innovation in the ministry will contribute to a culture of rapid innovation adoption in health and social services • NB: One health region (Vitalité) is considering adopting a rapid-learning system approach • YT: Yukon Health and Social Services fosters a culture of rapid learning and improvement across sectors and through connections to provinces <p>In primary care</p> <ul style="list-style-type: none"> • BC: Thirty-five divisions of family practice (representing 230 communities and >90% of family physicians) focus on collaborating with partners to achieve system-level goals • QC: One quality-improvement advisor and several quality-improvement officers seek to instil a culture of improvement in academic family practice groups • NF: Family Practice Networks, through Collaborative Service Committees, provide a mechanism for addressing common practice and patient needs • YT: Collaborative-care models are a system-wide priority <p>For aging (or the elderly population)</p> <ul style="list-style-type: none"> • NB: Growing coalition of stakeholder organizations support a shift in culture (and changes to policy and strengthening of capacity) to support healthy aging • NS: GovLab will pilot innovative policies and prototypes for supporting the aging population • YT: Yukon Council on Aging and Summit on Aging in Yukon contribute to a culture of engagement and collaboration

Characteristic	Examples of jurisdiction-specific assets
Competencies for rapid learning and improvement: Systems are rapidly improved by teams at all levels who have the competencies needed to identify and characterize problems, design data- and evidence-informed approaches (and learn from other comparable programs, organizations, regions, and sub-regional communities about proven approaches), implement these approaches, monitor their implementation, evaluate their impact, make further adjustments as needed, sustain proven approaches locally, and support their spread widely	For the health system as a whole <ul style="list-style-type: none"> Five federally funded pan-Canadian health organizations develop competencies and use an array of other approaches to support improvement in select areas 1) Canadian Foundation for Healthcare Improvement and Canadian Patient Safety Institute support the spread of healthcare innovations and increases in patient safety, respectively (and the former has supported learning collaboratives in a number of areas) 2) Mental Health Commission of Canada and Canadian Centre on Substance Use and Addiction support the spread of evidence-based programs and tools in the area of mental health and addictions, respectively 3) Canadian Partnership Against Cancer supports the spread of evidence-based practices and policies in cancer BC: B.C. Academic Health Sciences Network will help to build the competencies needed for rapid learning and improvement AB: 16 strategic clinical networks have a mandate to scale up effective clinical practices to the provincial level SK: Many staff have competencies in 'lean' methods and some have competencies in co-design and other forms of patient engagement ON: Many organizations in the specialty (acute) care sector have business intelligence, clinical informatics, decision support, and quality improvement staff who can support different aspects of rapid learning and improvement QC: Four integrated academic health networks support specialized care, medical education and medical research NB: Investments in research capacity are being made in the two health regions (including in primary care) PE: Masters of Applied Health Services Research program develops local research capacity YT: Yukon Health and Social Services is building analytic capacity among its staff In primary care <ul style="list-style-type: none"> MB: College of Family Physicians of Canada supports a provincial practice-improvement initiative to improve front-line care using data, research and quality-improvement approaches ON: Ontario College of Family Physicians has supported communities of practice and mentorship networks focused on opioid management and medical assistance in dying QC: Communities of practice support capacity building in primary care (in the region that includes Quebec City) and for patients with multimorbidity For aging (or the elderly population) <ul style="list-style-type: none"> QC: Ministry's network on aging and demographic changes supports capacity building in these two areas

Assets and gaps could similarly be documented for sectors other than primary care (e.g., home and community care), for populations other than the elderly (e.g., Indigenous peoples), for regions (where sub-provincial health authorities operate), for prioritized categories of conditions (or health determinants, such as housing), and for prioritized categories of treatments (e.g., prescription drugs), while keeping in mind what's needed at self-management, clinical encounter, program and organization levels. Rapid-learning health systems in Canada will almost certainly take the form of a great many, inter-connected rapid-learning health (and social) systems even within a single jurisdiction. Such assessments need to be updated periodically, and steps need to be taken to better connect existing assets, which is the topic to which we turn next.

Connections among assets for rapid-learning health systems

Some strong connections have been made among assets in these jurisdictions (**Table 5**), although frequently the connections were among assets linked to a single characteristic of rapid-learning health systems (not among assets linked to many different characteristics), and rarely were the connections made explicitly to support rapid learning and improvement. While opportunities could be identified to better connect assets in future, many were again focused on single characteristics and/or with a rapid-learning-and-improvement orientation. The caveats that need to be considered when reviewing the connections, as well as in each of the sub-sections that follow this one, include:

- 1) lists rely more heavily on the key-informant interviews than the lists of assets, many of which could be identified through websites and documents;

- 2) lists rely even more on the ability of key informants to concisely summarize a complex set of considerations in a short period of time (near the end of each interview); and
- 3) lists were created to give visibility to examples in each of the 14 jurisdictions when taking tables 5-8 as a whole (so a particular jurisdiction may be represented two or three times across Tables 5-8, not in each table).

Table 5: Connections among assets for rapid-learning health systems, by area of focus

Connections among assets		
For the health system as a whole	In primary care	For aging (or the elderly population)
<p>Areas where strong connections have been made</p> <ul style="list-style-type: none"> Some regional or provincial health authorities (or their equivalent) have joined up assets very purposefully (e.g., B.C.'s provincial and First Nations health authorities, Alberta Health Services, Quebec's Montréal region, Ontario's Mississauga Halton region, and Newfoundland and Labrador's Eastern Health region), while others are explicitly using a rapid-learning systems framework to guide their efforts to join up assets (e.g., New Brunswick's Vitalité region) – see figures 2 below (for elderly in Alberta) and 4 (for Ontario) Some jurisdictions have joined up assets to respond rapidly to new crises (e.g., opioid overdoses) or to keep getting better in addressing emergencies (e.g., natural disasters in Alberta) – see figure 3 below (for the opioid crisis in Quebec) Some jurisdictions (e.g., New Brunswick) have joined up data assets to provide access to a more fulsome picture Some SPOR SUPPORT units (e.g., Ontario and Northwest Territories) have joined up research assets to support more timely and more impact-oriented, patient-oriented research <p>Greatest opportunities to connect assets</p> <ul style="list-style-type: none"> Advisory Council on the Implementation of National Pharmacare could make recommendations that would support rapid learning and improvement in the coverage and use of prescription drugs - see figure 5 below Pan-Canadian health organizations could support rapid learning and improvement more purposefully Platforms (or registries) could provide greater degrees of timely access to a greater richness of harmonized healthcare data about specific categories of conditions or treatments, as well as benchmarks Amalgamations of regional health authorities in some jurisdictions (e.g., Saskatchewan and Northwest Territories) and planned efforts in some jurisdictions to centralize data assets (e.g., Newfoundland and Labrador) and research capacity (e.g., Nova Scotia) could be a spur to greater alignments in support of rapid learning and improvement 	<p>Areas where strong connections have been made</p> <ul style="list-style-type: none"> Some jurisdictions (e.g., Quebec) have created and joined up assets, such as reflexive reports to improve physicians' understandings of their practices (Rapport de votre offre de services en établissement et hors établissement - ROSEH) and learning collaboratives to improve primary-care services and to better prevent and manage chronic diseases (Collectif pour les meilleures pratiques et l'amélioration des soins et services de première ligne en prévention et en gestion des maladies chroniques - COMPAS) Some regional or provincial health authorities have joined up primary-care assets very purposefully – see figure 1 below (for primary care in Newfoundland and Labrador) Canadian Primary Care Sentinel Surveillance Network collects and reports health information drawn from the electronic medical records of participating primary-care providers from across Canada <p>Greatest opportunities to connect assets</p> <ul style="list-style-type: none"> SPOR Primary and Integrated Health Care Innovations Network can do even more now that it is supported by a national coordinating office One-stop shops for interprofessional primary care in some rural communities (e.g., Saskatchewan) are well positioned to support rapid learning and improvement 	<p>Areas where strong connections have been made</p> <ul style="list-style-type: none"> Some groups and programs have identified opportunities in provincial and territorial health systems to work collaboratively on a targeted issue, with each adding value in their respective areas of strength and connecting to national or pan-Canadian assets when appropriate (e.g., Networks of Centres of Excellence like the Canadian Frailty Network with clinical and research expertise working with Canadian Institute for Health Information for data about problems, Canadian Agency for Drugs and Technologies in Health for assessments of potential solutions, and Canadian Foundation for Healthcare Improvement for collaboratives to support implementation) <p>Greatest opportunities to connect assets</p> <ul style="list-style-type: none"> Interface between health and social care (or social systems more generally) could be a particularly important area to support rapid learning and improvement Age-friendly municipality designation can be a spur to greater alignments in support of rapid learning and improvement

As noted above, a third 'way in' to the rich data on assets and connections among them is through figures depicting notable examples of assets being well connected to enable rapid learning and improvement. We have selected five examples of such connections among assets (or in the case of the last example, where there is great potential for connections among assets), each of which has a different area of focus:

- 1) a sector (primary care) in Newfoundland and Labrador;
- 2) a population (elderly) in Alberta;
- 3) a category of conditions (addictions and the opioid crisis specifically) in Quebec;
- 4) a region (Mississauga Halton) in Ontario; and
- 5) a category of treatments (prescription drugs) at the federal, pan-Canadian and provincial/territorial levels.

In each of the following figures, we present visually how one or more groups took action to connect assets, with the assets organized by the seven characteristics of a rapid-learning health system (i.e., in the seven ‘rows’ in the figure) and with ‘earlier’ or more ‘upstream’ actions preceding ‘later’ or more ‘downstream’ actions (i.e., the ‘columns’ in the figure). A dotted line simply signals that the line passes through another description of an action taken to connect assets (to allow so much to be captured in a single figure). What the figures do not convey is the iterative nature of the problem identification, design of potential solutions, implementation and evaluation of these solutions, adjustments based on what was learned, and then supports for scale and spread (as captured in Table 2), which is a key feature of rapid learning and improvement.

Figure 1: Connections among assets in Newfoundland’s health system to support rapid learning and improvement in the primary-care sector



Figure 2: Connections among assets in Alberta's health system to support rapid learning and improvement for the elderly population

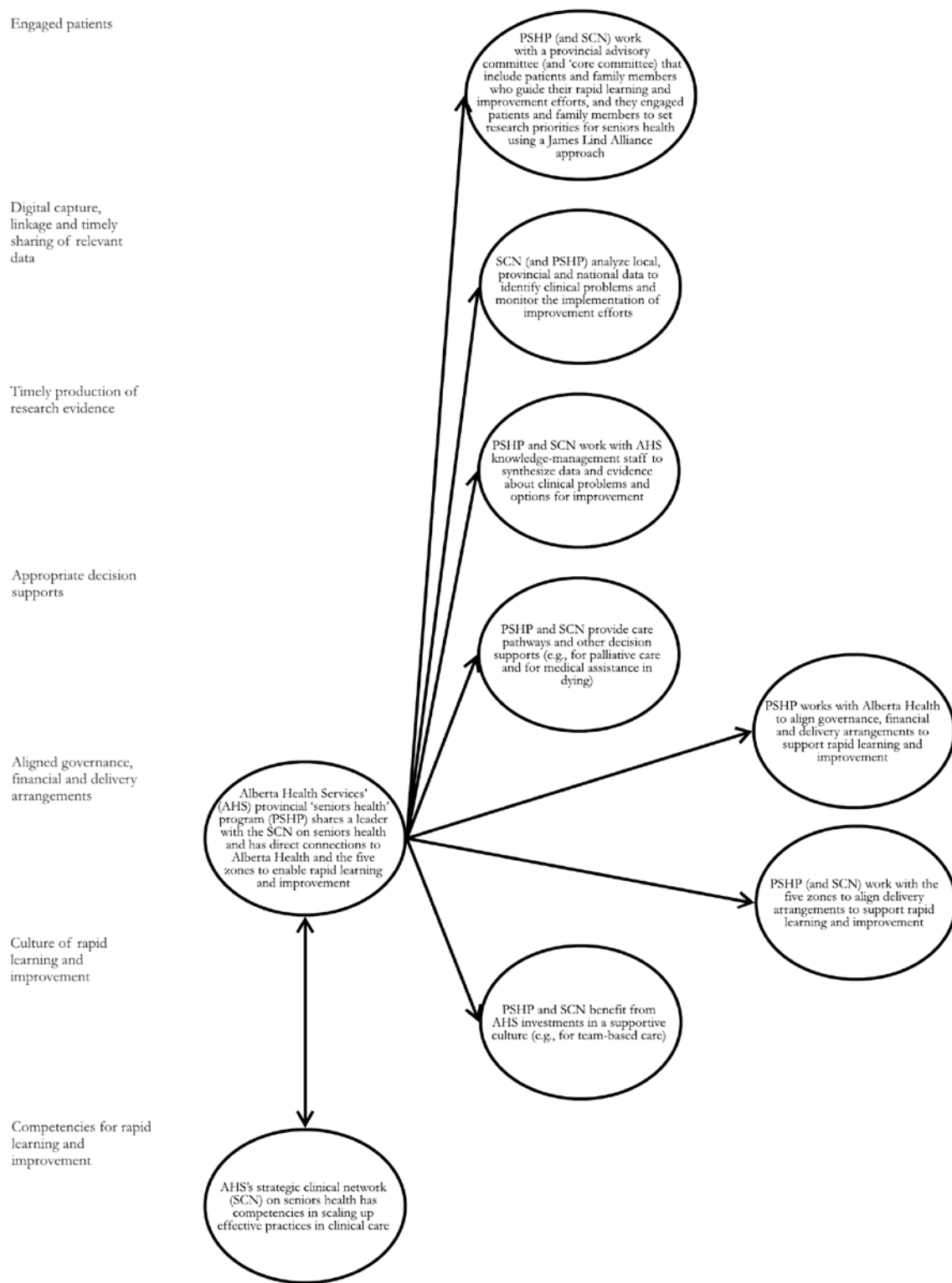


Figure 3: Connections among assets in Quebec’s health system to support rapid learning and improvement to address the opioid crisis

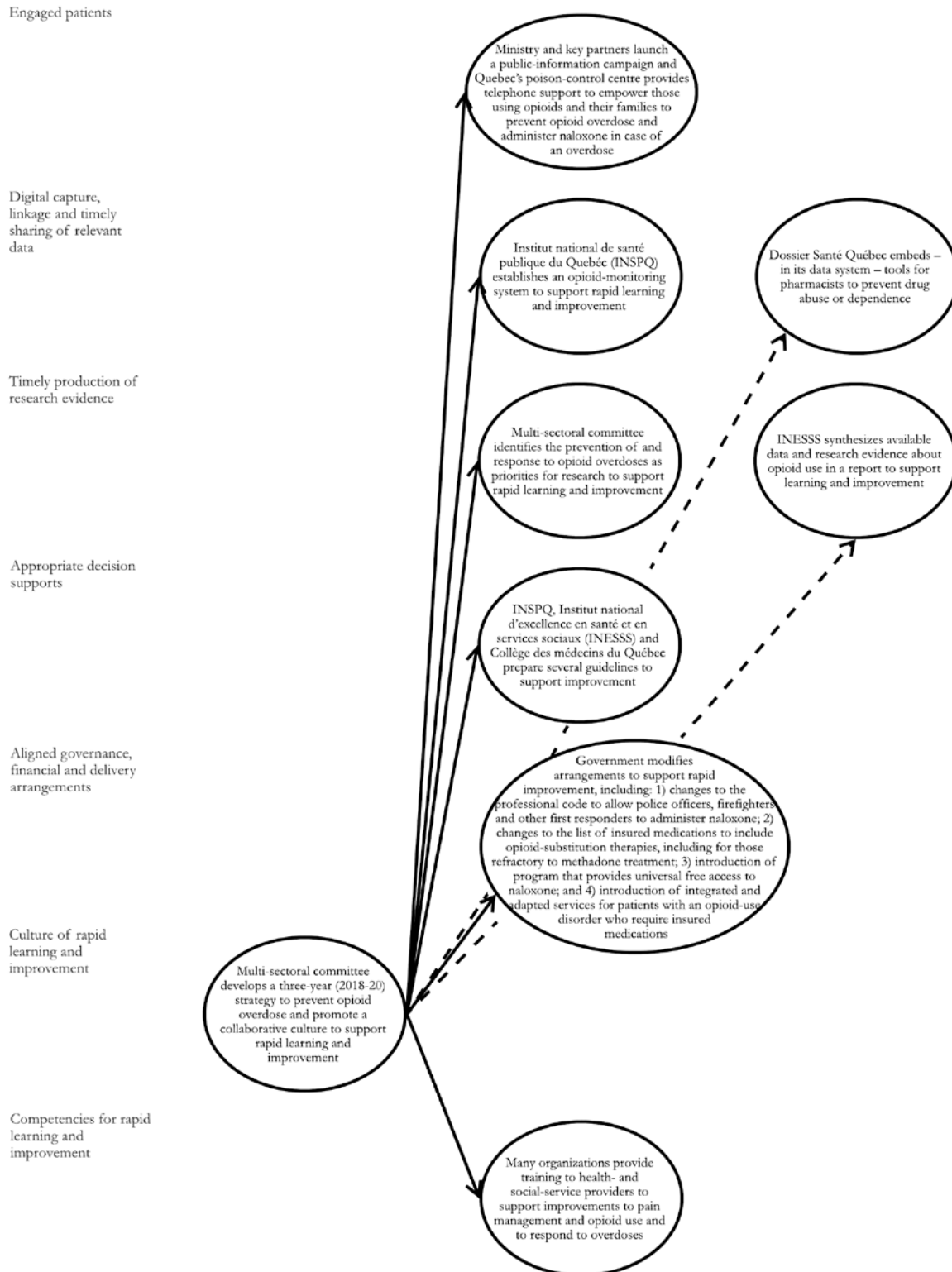


Figure 4: Connections among assets in Ontario's health system to support rapid learning and improvement in the Mississauga-Halton region

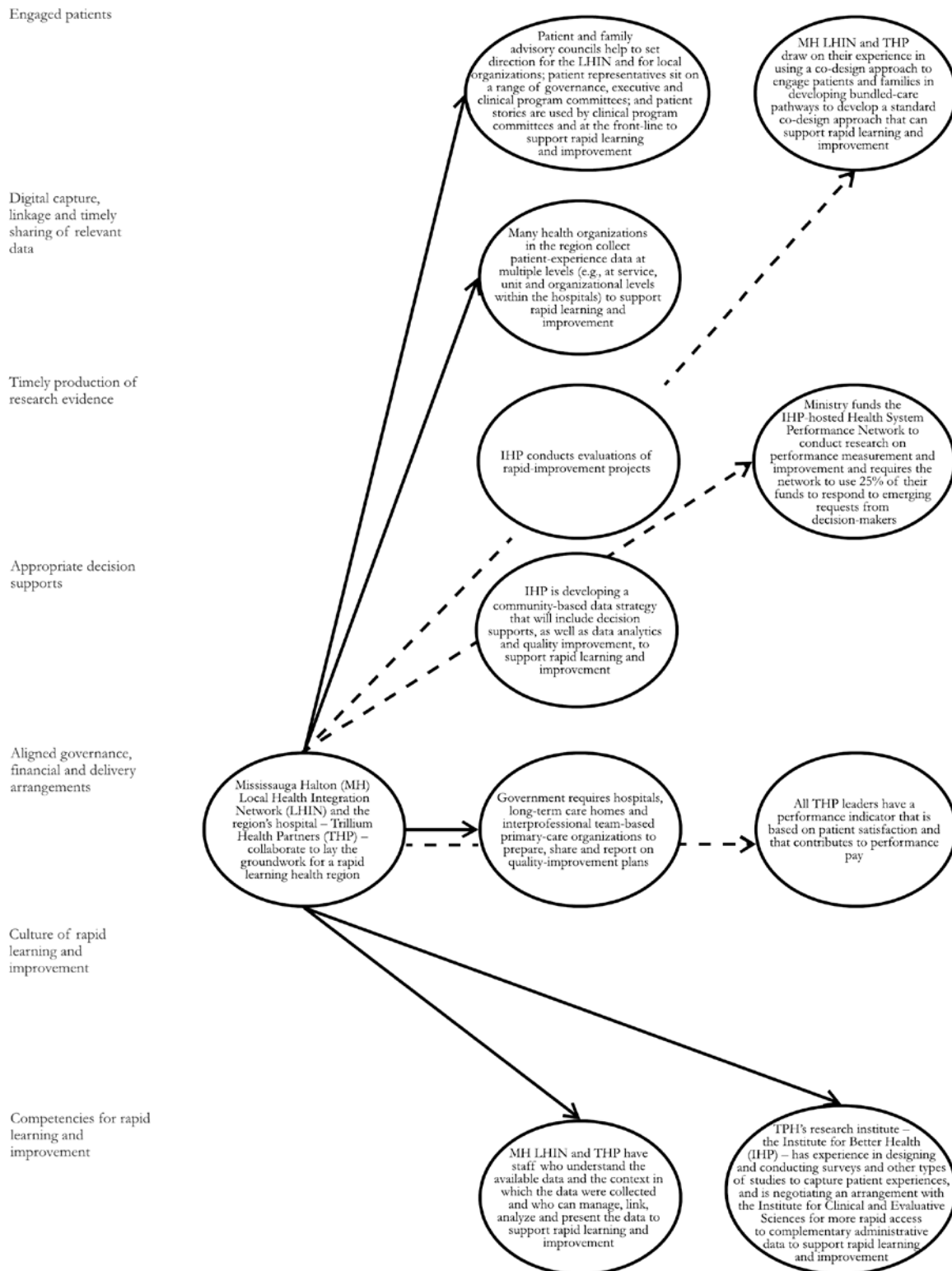


Figure 5: Potential connections among assets at the federal, national or pan-Canadian level to support rapid learning and improvement in the coverage and use of prescription drugs

Engaged patients

Digital capture,
linkage and timely
sharing of relevant
data

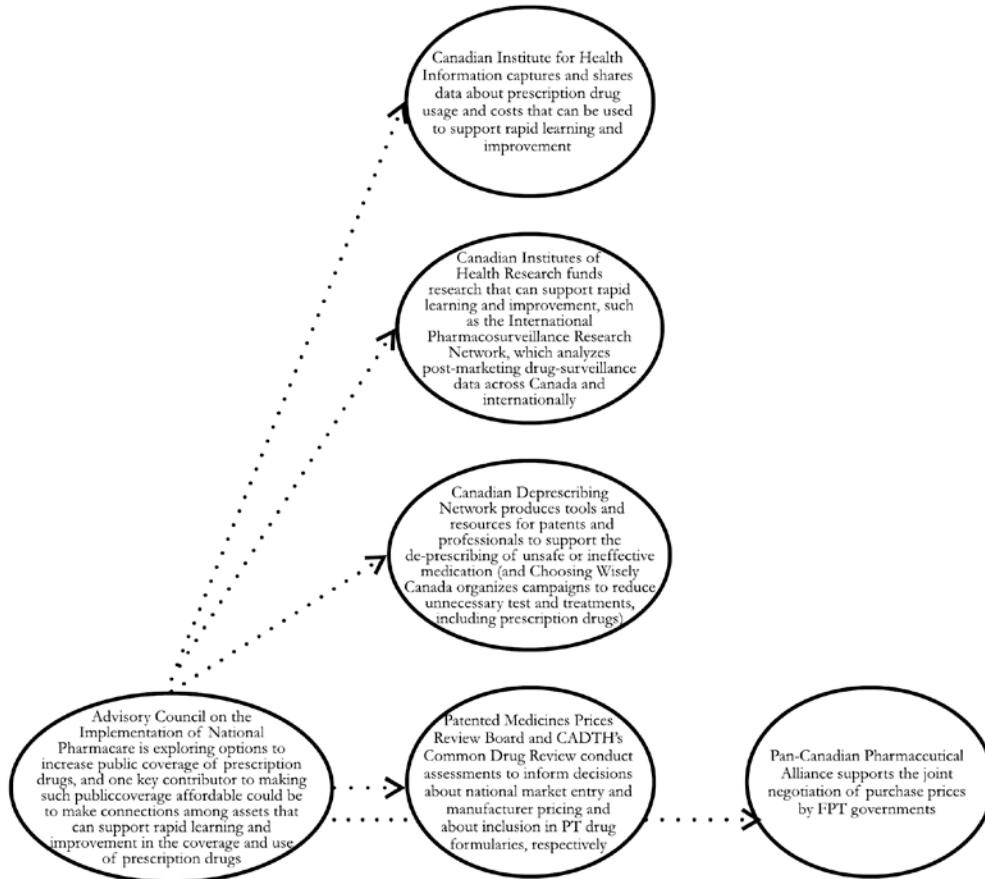
Timely production of
research evidence

Appropriate decision
supports

Aligned governance,
financial and delivery
arrangements

Culture of rapid
learning and
improvement

Competencies for rapid
learning and
improvement



Other areas of focus for rapid-learning health systems

Beyond primary care (a sector) and aging (or the elderly as a population), some other sectors (e.g., home and community care) and populations (e.g., Indigenous peoples), and some conditions (e.g., mental health and addictions in general and opioid use in particular) and/or treatments (e.g., prescription drugs) have been the focus or will be the focus of sustained efforts to create rapid-learning health systems in some jurisdictions (**Table 6**). Patient safety is an area of focus in one jurisdiction (New Brunswick), which cuts across these categories and hence doesn't appear in Table 6.

Table 6: Other areas of focus for rapid-learning health systems, by broad category of areas

Areas of focus				
For sectors other than primary care	For regions (if applicable)	For conditions	For treatments	For populations other than older adults
<p>Areas that have been a focus</p> <ul style="list-style-type: none"> Home and community-care sector in many provinces and territories (PTs) <p>Areas that will be a focus</p> <ul style="list-style-type: none"> Long-term care sector in Nova Scotia 	<p>Areas that have been a focus</p> <ul style="list-style-type: none"> Emergency disaster management in Alberta Health Services <p>Areas that will be a focus</p> <ul style="list-style-type: none"> Amalgamated health authority in Saskatchewan 	<p>Areas that have been a focus</p> <ul style="list-style-type: none"> Mental health and addictions, including the opioid crisis, in many PTs Dementia in Nova Scotia HIV in Saskatchewan Kidney disease in Manitoba Trauma in Quebec and accidents and injuries in P.E.I. <p>Areas that will be a focus</p> <ul style="list-style-type: none"> Chronic-disease prevention and management in P.E.I. and Newfoundland 	<p>Areas that have been a focus</p> <ul style="list-style-type: none"> Prescription drugs in many PTs (e.g., antibiotics in Newfoundland and Labrador) Surgery in B.C. <p>Areas that will be a focus</p> <ul style="list-style-type: none"> Medical assistance in dying in Alberta 	<p>Areas that have been a focus</p> <ul style="list-style-type: none"> Indigenous peoples in B.C., Alberta, Saskatchewan, Manitoba and Yukon (where the focus has been topics like traditional knowledge in SK and data integration in MB) New immigrants in Saskatchewan <p>Areas that will be a focus</p> <ul style="list-style-type: none"> None identified

‘Windows of opportunity’ for rapid-learning health systems

Some ‘windows of opportunity’ that were identified can be capitalized on to stimulate the development and consolidation of rapid-learning health systems in some of the jurisdictions (**Table 7**). Some ‘windows,’ such as recent and upcoming elections, can be seen as an opportunity (e.g., in Quebec where there was significant centralization of authority and a hesitancy around data sharing) or as a potential disruption to significant movement towards a rapid-learning health system (e.g., in Alberta where there has been policy stability for some time now).

Table 7: Windows of opportunity for creating rapid-learning health systems, by area of focus

Windows of opportunity			
For the health system as a whole	In primary care	For aging (or the elderly population)	For another recent or planned area of focus
<ul style="list-style-type: none"> • Growing use of the framework and concepts in health systems (e.g., B.C., Ontario and New Brunswick), including among supporting bodies (e.g., B.C. Academic Health Sciences Network and Canadian Health Services and Policy Research Alliance) • Re-configuring of pan-Canadian health organizations • New Canadian Institutes of Health Research president and strategic planning process (including the possibility of SPOR renewal) • Growing roles of patient and family advisors • Growing capacity for responsive and timely health-systems research • Amalgamation of regional health authorities (e.g., Saskatchewan and Northwest Territories) • New governing parties that may support the type of decentralized decision-making needed for rapid learning and improvement (e.g., Quebec) 	<ul style="list-style-type: none"> • Nascent engagement mechanisms for and data sharing with family physicians (e.g., B.C. and Newfoundland and Labrador) 	<ul style="list-style-type: none"> • Aging population coupled with growing public demand that health systems better meet patients' needs • New funding to pilot and evaluate ways to support healthy aging (e.g., New Brunswick) 	<ul style="list-style-type: none"> • Proposal being developed for the implementation of national pharmacare • Greater societal commitment to reconciliation and more mechanisms for Indigenous leaders to make decisions for their peoples

While not a question posed to us directly, we repeat below some of the factors identified in our previous rapid synthesis that might 'close' windows of opportunity:

- 1) health-system leaders make one-time-only decisions that do not push each health system down a path of increasingly become a rapid-learning health system (much as accreditation failures often focus the attention of organizations for only the brief period required to address deficiencies, rather than stimulate the routinization of rapid-learning and improvement processes);
- 2) advocates for investments in data only, rapid primary research only or investigator-driven research only encourage decisions that do not ensure an appropriate balance among timely data sharing, timely primary research, and timely syntheses of existing research evidence (or an appropriate balance between supporting the conduct and use of data, research and evidence syntheses); and
- 3) quality-improvement leaders seek to 'own' the whole process in a way that does not develop and sustain decentralized capacity for rapid learning and improvement across both health and research systems.

More generally, the one area where there were marked differences of opinion among key informants was in the use of the word 'rapid.' Some expressed skepticism that learning and improvement would ever happen rapidly. One member of the writing team of the original rapid synthesis responded: "it's relative – it should happen faster than the glacial pace of learning and improvement we have now." Others suggested that we should strive for learning and improvement that happens as rapidly in a given area as we would want it to happen if we or a family member were an affected patient. Others expressed concern that rapid, particularly on the research side, would mean consistently lower quality, but ideally the trade-offs between speed and quality should be discussed explicitly in each circumstance.

Focal points for pan-Canadian collaboration in creating rapid-learning health systems

A few true interdependencies (e.g., contractual arrangements for the patients in one health system, such as those requiring highly specialized care or living in border communities, to be treated in another one) and more issue-based commonalities can be used as focal points to facilitate pan-Canadian collaboration (**Table 8**). One particularly interesting issue-based commonality that was identified is the need for developing accreditation standards and other supports for rapid-learning health organizations and systems.

Table 8: Focal points for pan-Canadian collaboration in creating rapid-learning health systems, by area of focus

Interdependencies and issue-based commonalities			
For the health system as a whole	In primary care	For aging (or the elderly population)	For another recent or planned area of focus
<p>Interdependencies</p> <ul style="list-style-type: none"> • (Lack of) Interoperable and comprehensive electronic health records • Planned SPOR national data platform that would permit benchmarking, the evaluation of natural experiments, etc., as well as other national SPOR assets • Shared specialty-care arrangements across jurisdictions (e.g., for highly specialized care or for those living in small jurisdictions or near borders) <p>Issue-based commonalities</p> <ul style="list-style-type: none"> • Care for mental health and addictions, including the opioid crisis • Home care • eHealth-enabled care delivery • Care in rural and remote communities 	<p>Interdependencies</p> <ul style="list-style-type: none"> • Physician training <p>Issue-based commonalities</p> <ul style="list-style-type: none"> • Physician payment 	<p>Interdependencies</p> <ul style="list-style-type: none"> • None identified <p>Issue-based commonalities</p> <ul style="list-style-type: none"> • Care for those with complex conditions and/or multiple conditions (i.e., multimorbidity) 	<p>Interdependencies</p> <ul style="list-style-type: none"> • Prescription drugs, including potential for national pharmacare • Care by and for Indigenous peoples (and note that this is a system-wide imperative in the territories especially) <p>Issue-based commonalities</p> <ul style="list-style-type: none"> • None identified

Conclusion

A rapid-learning health-systems framework (and related concepts) has the potential to provide a ‘way in’ for all those seeking to ‘move the dial’ for patients and families, regardless of the sector where their care is being provided, their conditions, their treatments or the ‘population’ from which they’re drawn. Health systems across Canada have many existing assets that can be strengthened, connected and used to support rapid learning and improvement.

Creating or consolidating a move towards rapid-learning health systems likely requires, within any given health system, both:

- 1) some degree of central coordination (e.g., in the office of an assistant deputy minister for strategic policy or a senior executive in a provincial health authority) of efforts to:
 - a) use the framework,
 - b) document and periodically update assets and gaps at different levels (self-management, clinical encounter, program, organization, regional (or provincial) health authority, and government) and across areas of focus (sectors, conditions, treatments and populations),
 - c) incrementally join up assets and fill gaps, and
 - d) ensure strong connections between policy/strategy and operations; and
- 2) a fair degree of decentralization of efforts to support rapid learning and improvement at different levels and in different domains in light of local needs, capacities and constraints; and
- 3) regular convening of (and ideally creating a community of practice involving) key focal points from different levels and domains, as well as from the healthcare organizations that are investing in creating rapid-learning health organizations and contributing to cultural change in their local areas.

Such a move also likely requires structured lesson-drawing, sharing best practices and other supports that operate across health systems. Organizations like CIHR’s Institute of Health Services and Policy Research and the Canadian Health Services and Policy Research Alliance are well positioned to play such a role.

REFERENCES

1. Starfield B. Is primary care essential? *Lancet* 1994; 344(8930): 1129-33.
2. Lavis J, Gauvin F, Reid R, Bullock H, Wodchis W, Hayes A. Rapid synthesis: Creating a rapid-learning health system in Ontario. Canada: McMaster Health Forum; 2018.
3. Institute of Medicine. The Learning Health System and Its Innovation Collaboratives: Update Report. Washington, DC: National Academies Press; 2011.
4. Halpern D, Mason D. Radical incrementalism. *Evaluation* 2015; 21(2): 143-149.
5. Institute of Medicine Committee on Quality of Health Care in America. Crossing the Quality Chasm: A New Health System for the 21st Century. Washington (DC): National Academies Press (US), National Academy of Sciences; 2001.
6. Health Quality Ontario's System Quality Advisory Committee. Quality matters: Realizing excellent care for all. Toronto: Health Quality Ontario; 2017.
7. CMAJ. Engaging patients in health research: The Ontario experience. *Canadian Medical Association Journal* 2018; 190(Issue Supplement).
8. Greene SM, Reid RJ, Larson EB. Implementing the learning health system: From concept to action. *Annals of Internal Medicine* 2012; 157(3): 207-210.
9. Institute of Medicine Roundtable on Evidence-Based Medicine. The National Academies Collection: Reports funded by National Institutes of Health. In Olsen LA, Aisner D, McGinnis JM (editors). The Learning Healthcare System: Workshop Summary. Washington (DC): National Academies Press (US), National Academy of Sciences; 2007.

APPENDIX A

- Insights from the research literature about rapid-learning health systems
- Methods and tables underpinning these insights
 - Table 1: Summary of findings from documents exploring the conceptual and theoretical underpinnings of rapid-learning health systems
 - Table 2: Summary of findings from systematic reviews about rapid-learning health systems
 - Table 3: Summary of findings from primary studies about rapid-learning health systems
 - Table 4: Summary of findings from descriptive cases of rapid-learning health systems

APPENDIX B

Appendix B1: Federal, national and/or pan-Canadian

- Table 1: Assets and gaps at the level of the federal government and national or pan-Canadian initiatives
- Table 2: Assets and gaps in the primary-care sector at the level of the federal government and national or pan-Canadian initiatives
- Table 3: Assets and gaps in the area of aging (or for the elderly population or a relevant ‘problem focus,’ such as frailty) at the level of the federal government and national or pan-Canadian initiatives

Appendix B2: B.C.

- Table 1: Assets and gaps at the level of B.C.’s health system
- Table 2: Assets and gaps in the primary-care sector in B.C.
- Table 3: Assets and gaps in the area of aging (or for the elderly population or a relevant ‘problem focus,’ such as frailty) in B.C.

Appendix B3: Alberta

- Table 1: Assets and gaps at the level of Alberta’s health system
- Table 2: Assets and gaps in the primary-care sector in Alberta
- Table 3: Assets and gaps in the area of aging (or for the elderly population or a relevant ‘problem focus,’ such as frailty) in Alberta

Appendix B4: Saskatchewan

- Table 1: Assets and gaps at the level of Saskatchewan’s health system
- Table 2: Assets and gaps in the primary-care sector in Saskatchewan
- Table 3: Assets and gaps in the area of aging (or for the elderly population or a relevant ‘problem focus,’ such as frailty) in Saskatchewan

Appendix B5: Manitoba

- Table 1: Assets and gaps at the level of Manitoba’s health system
- Table 2: Assets and gaps in the primary-care sector in Manitoba
- Table 3: Assets and gaps in the area of aging (or for the elderly population or a relevant ‘problem focus,’ such as frailty) in Manitoba

Appendix B6: Ontario

- Table 1: Assets and gaps at the level of Ontario’s health system
- Table 2: Assets and gaps in the primary-care sector in Ontario
- Table 3: Assets and gaps in the area of aging (or for the elderly population or a relevant ‘problem focus,’ such as frailty) in Ontario

Appendix B7: Quebec

- Table 1: Assets and gaps at the level of Quebec’s health system
- Table 2: Assets and gaps in the primary-care sector in Quebec
- Table 3: Assets and gaps in the area of aging (or for the elderly population or a relevant ‘problem focus,’ such as frailty) in Quebec

Appendix B8: New Brunswick

- Table 1: Assets and gaps at the level of New Brunswick's health system
- Table 2: Assets and gaps in the primary-care sector in New Brunswick
- Table 3: Assets and gaps in the area of aging (or for the elderly population or a relevant 'problem focus,' such as frailty) in New Brunswick

Appendix B9: Nova Scotia

- Table 1: Assets and gaps at the level of Nova Scotia's health system
- Table 2: Assets and gaps in the primary-care sector in Nova Scotia
- Table 3: Assets and gaps in the area of aging (or for the elderly population or a relevant 'problem focus,' such as frailty) in Nova Scotia

Appendix B10: P.E.I.

- Table 1: Assets and gaps at the level of P.E.I.'s health system
- Table 2: Assets and gaps in the primary-care sector in P.E.I.
- Table 3: Assets and gaps in the area of aging (or for the elderly population or a relevant 'problem focus,' such as frailty) in P.E.I.

Appendix B11: Newfoundland and Labrador

- Table 1: Assets and gaps at the level of Newfoundland and Labrador's health system
- Table 2: Assets and gaps in the primary-care sector in Newfoundland and Labrador
- Table 3: Assets and gaps in the area of aging (or for the elderly population or a relevant 'problem focus,' such as frailty) in Newfoundland and Labrador

Appendix B12: Yukon

- Table 1: Assets and gaps at the level of Yukon's health system
- Table 2: Assets and gaps in the primary-care sector in Yukon
- Table 3: Assets and gaps in the area of aging (or for the elderly population or a relevant 'problem focus,' such as frailty) in Yukon

Appendix B13: Northwest Territories

- Table 1: Assets and gaps at the level of the Northwest Territories' health system
- Table 2: Assets and gaps in the primary-care sector in the Northwest Territories
- Table 3: Assets and gaps in the area of aging (or for the elderly population or a relevant 'problem focus,' such as frailty) in the Northwest Territories

Appendix B14: Nunavut

- Table 1: Assets and gaps at the level of Nunavut's health system
- Table 2: Assets and gaps in the primary-care sector in Nunavut
- Table 3: Assets and gaps in the area of aging (or for the elderly population or a relevant 'problem focus,' such as frailty) in Nunavut

APPENDIX C

Appendix C1: Health system as a whole

- Table 1: Assets and gaps at the federal, national and/or pan-Canadian level
- Table 2: Assets and gaps in B.C.'s health system
- Table 3: Assets and gaps in Alberta's health system
- Table 4: Assets and gaps in Saskatchewan's health system
- Table 5: Assets and gaps in Manitoba's health system
- Table 6: Assets and gaps in Ontario's health system
- Table 7: Assets and gaps in Quebec's health system
- Table 8: Assets and gaps in New Brunswick's health system
- Table 9: Assets and gaps in Nova Scotia's health system
- Table 10: Assets and gaps in P.E.I.'s health system
- Table 11: Assets and gaps in Newfoundland and Labrador's health system
- Table 12: Assets and gaps in Yukon's health system
- Table 13: Assets and gaps in Northwest Territories' health system
- Table 14: Assets and gaps in Nunavut's health system

Appendix C2: Primary-care sector

- Table 1: Assets and gaps at the federal, national and/or pan-Canadian level
- Table 2: Assets and gaps in B.C.'s health system
- Table 3: Assets and gaps in Alberta's health system
- Table 4: Assets and gaps in Saskatchewan's health system
- Table 5: Assets and gaps in Manitoba's health system
- Table 6: Assets and gaps in Ontario's health system
- Table 7: Assets and gaps in Quebec's health system
- Table 8: Assets and gaps in New Brunswick's health system
- Table 9: Assets and gaps in Nova Scotia's health system
- Table 10: Assets and gaps in P.E.I.'s health system
- Table 11: Assets and gaps in Newfoundland and Labrador's health system
- Table 12: Assets and gaps in Yukon's health system
- Table 13: Assets and gaps in Northwest Territories' health system
- Table 14: Assets and gaps in Nunavut's health system

Appendix C3: Elderly population

- Table 1: Assets and gaps at the federal, national and/or pan-Canadian level
- Table 2: Assets and gaps in B.C.'s health system
- Table 3: Assets and gaps in Alberta's health system
- Table 4: Assets and gaps in Saskatchewan's health system
- Table 5: Assets and gaps in Manitoba's health system
- Table 6: Assets and gaps in Ontario's health system
- Table 7: Assets and gaps in Quebec's health system
- Table 8: Assets and gaps in New Brunswick's health system
- Table 9: Assets and gaps in Nova Scotia's health system
- Table 10: Assets and gaps in P.E.I.'s health system
- Table 11: Assets and gaps in Newfoundland and Labrador's health system
- Table 12: Assets and gaps in Yukon's health system
- Table 13: Assets and gaps in Northwest Territories' health system
- Table 14: Assets and gaps in Nunavut's health system



McMaster
HEALTH FORUM

>> Contact us
1280 Main St. West, MML-417
Hamilton, ON, Canada L8S 4L6
+1.905.525.9140 x 22121
forum@mcmaster.ca

>> Find and follow us
mcmasterforum.org
healthsystemsevidence.org
mcmasteroptimalaging.org

• • • mcmasterforum

FORUM+

