Rapid Synthesis

Creating Rapid-learning Health Systems in Canada

Appendix B2: British Columbia

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EVIDENCE >> INSIGHT >> ACTION

Rapid Synthesis:
Creating Rapid-learning Health Systems in Canada
Appendix B2: British Columbia
90-day response

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Table 1: Assets and gaps at the level of British Columbia's health system

Characteristic	Examples	Health-system receptors and supports	Research-system supports
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	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: 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	• Some patients have access to their health information through a patient portal, such as: o my ehealth for lab results; o Patient access to electronic health records at several sites (BC Cancer Agency, BC Children's and Women's Hospital, Sunny Hill Health Centre for Children); and o MyHealthPortal for access to personal health information for those in the Interior Health Region • Self-management British Columbia provides supports (e.g., the Self-Management Health Coach Program) for people with chronic conditions and their family members, as well as for health professionals, to participate in self-management programs offered throughout B.C. • Decision aids and other tools to support shared decision-making are used to support informed decisions in some clinical areas (e.g., the aid to decision-making made available by the BC Prenatal Genetic Screening Program and web-based advanced care planning through BC Cancer) • All health regions use co-design approaches to some extent • The Patients as Partners Program works with patients, families and caregivers to support their participation in care, decision-making about their care, identifying how they would like to participate in decision-making, as well as in quality improvement and health-system redesign • The Patient Voices Network, which is supported by the BC Patient Safety and Quality Council, engages patient partners throughout the province to shape how care is delivered, and provides training and supports to prepare patients for engagement opportunities throughout the province • The Provincial Health Services Authority (PHSA), with input from its Patient Experience Council, recently published a plan for patient and family involvement throughout care, treatment and follow-up, and how to engage them to improve the health system, as well as a Community Inclusion Policy and toolkit (i.e., how-to-guide) that accompanies the policy to support its implementation • The First Nations Health Authority includes a First Nations Health Governance Structure that enables First Nations in B.C. to participate fully in the design and delivery of services, including a systematic approach to ensure that First Nations	• Several provincial initiatives focus on enhancing how patient-oriented research is conducted, which include the BC SUPPORT Unit, BC Primary Health Care Research Network (see Table 2 for more details about this initiative) and the SPOR Networks in Chronic Disease • Each of the SPOR initiatives listed above include patient advisory structures and capacity building initiatives • Some research groups (e.g., Institute for Community Engaged Research) also conduct citizen-engagement projects on a range of topics

Characteristic	Examples	Health-system receptors and supports	Research-system supports
		are included and engaged in processes for health-system redesign at all levels, and a process for client engagement • At a strategic level, "the Ministry of Health's Patients as Partners Initiative brings together patients, families, caregivers, health care providers, not-for-profits, health authorities, nongovernmental organizations, and universities to work together to include patients' voices, choices and representation in health care improvement" • Possible gaps o Few examples of setting and adjusting patient-relevant targets o There can be a gap between policy directions and frameworks that prioritize patient engagement, the implementation of these approaches and whether patient voices have been heard and used o Access to health records can be inconsistent even when access points to patient portals exist (e.g., after admission to hospital, all ability to get access to records ends) o Some patient engagement efforts only superficially engage patients and their families directly in their healthcare o Some initiatives, such as the First Nations Health Authority are still a work in progress (but remain a valuable approach)	
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, 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)	1) Data infrastructure (e.g., interoperable electronic health records; immunization or condition-specific registries; privacy policies that enable data sharing) 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	• The B.C. Ministry of Health (MOH) has been working with a partner since 2007 to build the infrastructure needed for interoperable electronic health records (and the BC SUPPORT Unit is engaged in a project to make more data available from electronic medical records) • The Health Data Coalition supports a network of physicians for collaborative use of data • Clinical Data Exchange provides service to distribute clinical documents between health-to-provider electronic medical record (EMR) systems, and the system allows EMR to EMR exchange • The B.C. MOH provides a data catalogue that indexes data sets about health and safety • The Data Management and Stewardship branch is responsible for processing most of the applications submitted by provincial health organizations, other public bodies, or eligible researchers • The BC Patient Safety and Quality Council collects both quantitative and qualitative data to improve quality, with a focus on several priority clinical areas (e.g., critical care, sepsis, substance use, surgery)	• Population Data BC is a multi-university, data and education resource, which manages 21 data sets from two federal and six provincial sources, and supports access to individual-level, de-identified longitudinal data about B.C. citizens for research purposes. The data included in it are linkable to each other and to external data sets across many areas (e.g., health, education, early childhood development, workplace and the environment), and training is provided to support access to and use of the data • The BC Academic Health Sciences Network brings together three provincial resources (BC SUPPORT Unit, Clinical Trials BC and Research Ethics BC) to create an environment for sharing health data to support collaborative research and analytics, including the Health Data Platform Initiative in the province

Characteristic	Examples	Health-system receptors and supports	Research-system supports
	platform (to support patient decision-making and provider, organization and system-wide rapid learning and improvement)	• Data about patient experience have been collected in some areas (e.g., for acute inpatient care and outpatient cancer care), with laboratory services reporting patient experience data twice per year • Patient experience is captured through several mechanisms o BC is one of the five provinces that submits data to the Canadian Patient Experiences Reporting System, which receives data about patient experiences in acute care inpatient hospital stays from the Canadian Patient Experiences Survey for Inpatient Data (however, data is not yet available for public request) o Some organizations routinely capture patient experience with their programs (e.g., the BC Agency for Pathology and Laboratory Medicine which reports survey results twice per year about patient experiences with lab services, patient needs and expectations and opportunities for improvement, and BC Cancer which conducts program surveys, but with unclear reporting frequency) o Results from B.C.-based patient-experience surveys and in-depth interviews for those who received virtual care are published by Canada Health Infoway • The First Nations Health Authority has one of the richest administrative datasets available, as well as a tripartite data quality sharing agreement with the provincial and federal government, which enables it to be a steward with B.C. First Nations and undertake ethical and safe data linkages that support the visibility of First Nations populations • Possible gaps o Uncertainty regarding data-access policies because transitions in government mean that new directions in this are being shaped o While good there is coordinated data infrastructure regionally, there is limited and/or uncoordinated data infrastructure provincially because of different EMR systems between regions (but a system to reconcile data is being created) o Patient experience data is collected routinely across the province, but not reported on publicly on a routine basis o Limited capacity to analyze data in some areas o Some efforts, but inconsistent, to share local data in a timely way	
Timely production of research evidence: Systems produce,	1) Distributed capacity to produce and share research (including evaluations) in a timely way	• Some patients have developed capacity to act as champions and mentors for the conduct of patient-oriented research through the SPOR initiatives that are based in B.C. (e.g.,	• The BC Academic Health Sciences Network is focused on distributed capacity to produce (and to a lesser

Characteristic	Examples	Health-system receptors and supports	Research-system supports
synthesize, curate and share (with individuals at all levels) research about problems, improvement options and implementation considerations	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	through the BC SUPPORT Unit, BC Primary Health Care Research Network, and the SPOR Networks in Chronic Disease) - The Provincial Health Services Authority is one of the largest health science organizations in the country and has partnerships across the province - The First Nations Health Authority tripartite data quality sharing agreement also applies for the production of research, has created research chairs (e.g., in First Nations heart health and cancer and wellness) to support the ethical conduct of research with First Nations populations, and has research partnerships in place with the BC Academic Health Sciences Network and the Michael Smith Foundation for Health Research - Possible gaps o Potential for a significant amount of data to go unanalyzed because of controls and restrictions for who can access data having been significantly tightened over the last four to five years due to a previous data breach, which has increased the amount of time it takes to access data o Results of surveys that analyze patient-related experience and patient-related outcomes have been conducted, but are not always released publicly (which gives the impression that these analyses are not being done) and not provided regularly or updated (which makes it impossible to track changes over time)	extent share) research in a timely way with activities focused on: o strengthening patient-oriented research and trials in B.C. (through the BC SUPPORT Unit); o enhancing capacity and competitiveness for conducting world-class clinical trials (though Clinical Trials BC); and o streamlining and improving the research-ethics review processes (though Research Ethics BC) through the provision of "a province-wide, harmonized system for research ethics reviews of studies conducted in multiple geographic areas involving the resources, people, patients or data from more than one BC research institution." - The BC Academic Health Sciences Network also states that it seeks to support research groups to collaborate with one another, with patients, and with stakeholders and decision-makers (e.g., through fostering partnership agreements that leverage and connect provincial resources and expertise). - In addition to supporting patient engagement, the BC SUPPORT Unit provides research methods support and supports for data access and use - The BC SUPPORT Unit also offers a course called Foundations in Patient-Oriented Research, which is designed to provide researchers, patients, healthcare providers and health system decision-makers with the necessary knowledge to work in mutually beneficial partnerships doing patient-oriented research. - The Michael Smith Foundation for Health Research supports several knowledge translation (KT) initiatives, including a KT collaborative (scientists and practitioners from around the

Characteristic	Examples	Health-system receptors and supports	Research-system supports
			province focused on KT who meet every six weeks to advance and accelerate KT across B.C.) and the KT pathways project which identified the needed competencies required, interventions and strategies that can be used to reinforce KT initiatives in the province (a tool to further support this work is currently being prepared) • The Centre for Health Evaluation and Outcome Sciences designs and conducts assessments of programs and systems at all levels of the healthcare sector • The Institute for Health System Transformation and Sustainability (IHSTS) focuses on gathering, developing and sharing evidence about the B.C. health system with the aim of informing decisions that have an impact on care quality, cost and sustainability • Research chair in rural health was created, which focuses on many aspects related to learning health systems • Health Research Institute at the University of Northern British Columbia supports collaborative health-related research • The Centre for Clinical Epidemiology and Evaluation includes a focus on promoting and facilitating evidence-informed clinical, managerial and policy decision-making
Appropriate decision supports: Systems support informed decision-making at all levels with appropriate data, evidence, and decision-making frameworks	1) Decision supports at all levels – self-management, clinical encounter, program, organization, regional health authority and government – such as 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)	• A range of patient-targeted evidence-based resources are made available, including: o HealthLinkBC provides patient-targeted evidence-based (what it calls "medically approved") information about more than 5,000 health topics, symptoms, and interactive health tools, as well as tips and a search function that indexes more than 6,100 health services in communities; o the BC HealthGuide Handbook (a self-care manual that provides information about preventing illness, home treatment, emergencies and when to see a healthcare provider); and	• BC Guidelines produces clinical practice guidelines and protocols that provide recommendations to practitioners (physicians, nurse practitioners, and medical students) to provide optimal care for a range of conditions • The British Columbia Centre for Excellence in HIV/AIDS produces practice guidelines for different settings (e.g., primary care and acute care), specific populations (e.g., adults, pediatric, pregnant women), conditions

Characteristic	Examples	Health-system receptors and supports	Research-system supports
	f) quality standards g) care pathways h) health technology assessments i) descriptions of how the health system works	o HealthLinkBC files (fact sheets about health and safety topics) • BC Cancer prepares practice guidelines for a range of different types of cancer • In addition to internal evidence synthesis supports, the B.C. MOH provides funding to research groups to respond to pressing policy priorities with synthesized evidence • Some decision-support systems exist (see Table 2 for an example from primary care) and are used • As noted in the 'data' row, the BC Patient Safety and Quality Council is focused on improving quality in the health system, with a focus on several priority clinical areas (e.g., critical care, sepsis, substance use, surgery) • Doctors of BC and the B.C. MOH are developing and implementing an enhanced measurement system for physician quality improvement which includes a process to send reports based on quality indicators back to physicians • The Physician Quality Improvement Initiative provides support to physicians to lead quality-improvement projects • Several examples of care-pathway supports have been developed and implemented (e.g., Pathways is a web-based directory connecting family doctors and specialists to streamline referrals in Vancouver; and Perinatal Services BC which provides pathways and toolkits supporting evidence-based recommendations for routine care during pregnancy and birth) • BC Health Technology Assessment is a joint process between the MOH and the health authorities that is used to make evidence-informed decisions about which health technologies (devices, diagnostics and clinical procedures) should receive public funding • Health regions have developed decision-support functions along with centralized support from the MOH (e.g., using the blue matrix) • Possible gaps o Challenges in ensuring that targets or indicators are meaningful for patients o While the BC Patient Safety and Quality Council establishes some quality standards though the quality standards committee, there is no coordinated approach across the province for setting standards o While decision-support systems exist, they are typically 'siloed' (rather than part of an integrated decision-support	(e.g., acute and opportunistic infections) and types of treatments (e.g., pre-exposure prophylaxis)

Characteristic	Examples	Health-system receptors and supports	Research-system supports
		system operating across the health system or across health and social systems)	
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	1) Centralized coordination of efforts to adapt a rapid-learning health system 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	• The Provincial Health Services Authority focuses on ensuring "that BC residents have access to a coordinated provincial network of high-quality specialized health-care services", and collaborates/partners with several agencies across the province (BC Cancer, BC Centre for Disease Control, BC Children's Hospital Sunny Hill Health Centre for Children, BC Emergency Health Services, BC Mental Health & Substance Use Services, BC Renal Agency, BC Transplant, BC Women's Hospital and Health Centre, Cardiac Services BC and Perinatal Services BC) • The BC Patient Safety and Quality Council has a focus on quality improvement in the province (e.g., through education and a range of quality-improvement tools) and supports change management • The BC Medical Quality Initiative focuses on advancing medical quality across the province with a focus on medical-imaging quality improvement, multi-professional quality improvement, physician quality improvement and quality assurance • The Provincial Health Services Authority and its agencies undergo accreditation through Accreditation Canada • The governance structure of the First Nations Health Authority that includes four components (First Nations Health Authority, First Nations Health Council, First Nations Health Directors Association and the Tripartite Committee on First Nations Health) is a possible opportunity for a centralized coordination point for a rapid-learning health system • Health authorities are funded through a needs-based formula, which is reviewed and adjusted (if needed) annually and some examples of pay-for-performance have been used in the province (e.g., for reducing emergency department length-of-stay) • The First Nations Health Authority is creating a shared forum for decision-making (e.g., through the creation of partnership accords and joint health and wellness plans) and, through its integration with the MOH and as a funder of First Nations communities, can rapidly redistribute resources to implement changes in response to sub-optimal outcomes • The recently released British Columbia Procurement Strategy has four goals, which collectively place emphasis on ensuring value through: 1) ensuring value and increased benefits to citizens to improve social and environmental outcomes and to	• In addition to their focus on data and analytics, the BC Academic Health Sciences Network is an example of centralized coordinated efforts to adopt a rapid-learning health system approach through its focus on efforts targeted at health-system improvement in five priority areas (team-based primary care, strengthened services for seniors, rural and remote care, mental health and addictions, and surgery) through four activities: o "brokering collaboration to leverage processes/resources for knowledge translation, scale up and spread of research and best practices; o creating opportunities for development, evaluation, and adoption of innovation; o identifying and removing barriers that impede change at the system level; and o incorporating and building on patients' voices"

Characteristic	Examples	Health-system receptors and supports	Research-system supports
		promote innovation; 2) making it easier to do business; 3) creating opportunity for business of all sizes; and 4) building greater capacity for procurement in the public services through enhanced training and support • Joint Collaborative Committees are comprised of equal representation from Doctors of BC and the B.C. government with a focus on improving the health system and the quality of care through four committees: o General Practice Service Committee; o Shared Care Committee; o Specialist Services Committee; and o Joint Standing Committee on Rural Issues • Possible gaps o There are no explicit mandates in place for reporting on quality-improvement plans o Uncertainty about the policy framework for developing and implementing the primary-care networks	
Culture of rapid learning and improvement: Systems are stewarded at all levels by leaders committed to a culture of teamwork, collaboration and adaptability	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'	• Putting Our Minds Together: Research and Knowledge Management Strategy affirms the MOH's "commitment to use research evidence in health care policy development, implementation and evaluation. It recognizes that research evidence, increasingly and where appropriate, will be developed by and with researchers in partnership with clinicians, policy makers and patients" • The Research and Knowledge Management Strategy also identified 10 research-related gaps in the province for supporting evidence-informed decision-making, along with strategies for addressing them • The BC Patient Safety and Quality Council supports a culture for rapid learning and improvement (e.g., through the Release Time to Care program, which supports teams to take actions to improve outcomes related to improving patient safety and reliability of care, patient experience, staff well-being and efficiency of care) • The First Nations Health Authority has a framework that supports rapid learning and improvement and is creating a shared forum (as noted in the row above) for decision-making (e.g., through the creation of partnership accords and joint health and wellness plans) • Joint Collaborative Committees (as noted in the previous row) are comprised of equal representation from Doctors of BC and the B.C. government and contribute to a rapid-learning and improvement culture through their focus on improving the health system and the quality of care	• The culture for a rapid-learning health system in B.C. in the research system has been fostered through the BC Health Research Strategy that identified actions to achieve three strategic directions that focus on: 1) developing and enhancing key foundations that support the creation and use of knowledge; 2) creating a culture of inquiry and innovation across sectors that encourages health research and its use; and 3) making B.C. a hub for world-class research that makes a difference • There are several examples of either organizations or initiatives within organizations focused on building a culture of rapid learning and improvement (many of which stem directly from the above research strategy), including: o the BC Academic Health Science Network (as outlined in previous rows it has a focus on supporting a learning health system through a variety of activities related to health-system improvement and data and analytics,

Characteristic	Examples	Health-system receptors and supports	Research-system supports
			including organizations in its network such as the BC SUPPORT Unit); and - the Michael Smith Foundation for Health Research through its focus on knowledge translation, including the KT Collaborative and opportunities to share findings and support collaboration such as the Health Xchange and other conferences/meetings
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	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)	- The BC Patient Safety and Quality Council has taken a community-development approach to do the type of work required for rapid learning and improvement where the leadership and ownership is from within regions and then the council focuses on building their capacity - BC Divisions of Family Practice (as noted in Table 2) is a key support for some of the activities for competencies for rapid learning and improvement in primary care - Possible gap - Lack of public-reporting mechanisms for rapid learning and improvement (including patient-experience surveys that are conducted but not made public)	- The focus and activities of the nascent BC Academic Health Sciences Network are designed to support activities 2-5 under the ‘examples’ column

Table 2: Assets and gaps in the primary-care sector in British Columbia

Characteristic	Examples	Health-system receptors and supports	Research-system supports
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	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: 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	• Several of the initiatives listed in Table 1 focused on engaging patients, families and citizens apply to primary care, including: o my ehealth for lab results; o Patient access to electronic health records at several sites (BC Cancer Agency, BC Children's and Women's Hospital, Sunny Hill Health Centre for Children); o MyHealthPortal for access to personal health information for those in the Interior Health Region; o Self-management British Columbia (e.g., the Self-Management Health Coach Program for people with chronic conditions); o BC Prenatal Genetic Screening Program for decision aids; o Patient Partners Program which convenes Regional Engagement Tables on a range of topics, including "access to primary care, challenges and opportunities for rural and remote communities; urgent primary care centres and shared care plans; access to health for urban indigenous people; and person- and family-centred care" o Patient Voices Network through the BC Patient Safety and Quality Council for patient engagement in organizational decision-making and policymaking; o Patient Experience Council from the PHSA • The primary-care networks (which have been recently announced) are engaging patients in planning processes • The BC Rural Health Network engages rural community groups involved in health and wellness advocacy • Possible gaps o There are some local and regional initiatives setting and adjusting targets (e.g., blended funding model for specific diseases in Fort St. John), but these are regional and not system wide o The process of setting targets is important, but centrally setting targets is challenging given the need to be attentive to health equity o There seem to be few examples of capacity building for patients/citizens	• The BC Primary Health Care Research Network (BC-PHCRN) is focused on supporting evidence-informed transformation of the delivery of primary and integrated healthcare and supports patient engagement in primary-care research (e.g., by supporting collaborations between government, health authorities, health professionals, patients and researchers, and by convening a patient advisory council to provide "input on research projects based on their personal experience as patients, share information with their networks, and support and advise the Advisory Committee and the BC-PHCRN leadership". • The central goals of the PREFeR Project, which is part of the BC-PHCRN, are to "identify patient-generated priorities for primary care research in BC, and compare patient and clinician perspectives".

Characteristic	Examples	Health-system receptors and supports	Research-system supports
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, 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)	1) Data infrastructure (e.g., interoperable electronic health records; immunization or condition-specific registries; privacy policies that enable data sharing) 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)	• The Health Data Coalition is "physician-led data sharing platform that enables collaborative quality improvement in primary care" • Possible gaps o While efforts such as the Clinical Data Exchange (noted in Table 1) and the General Practice Services committee provide support to look at EMR data, they are local in nature and are not joined up despite being funded centrally	• The BC-PHCRN houses the British Columbia – Canadian Primary Care Sentinel Surveillance Network (BC-CPCSSN), an initiative focused on primary care, which is designed to enable secure collection and reporting of data from electronic health records to allow family physicians, other health professionals and decision-makers to analyze service use for patients who access primary care in the province, with the goal of providing timely feedback through quality-improvement tools (see the 'national' tables for more detail about the CPCSSN)
Timely production of research evidence: Systems produce, synthesize, curate and share (with individuals at all levels) research about problems, improvement options and implementation considerations	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	• Doctors of BC set up regional nodes and fund research assistants to support locally-driven and clinically relevant research	• The BC-PHCRN is the main hub for production of research evidence about primary care • The British Columbia Rural Scholars Program funds rural clinicians to develop skills in scholarship and leadership in discovery, integration, application/engagement and education • Gaps may include that the role of the BC-PHCRN in the timely production of research evidence is unclear beyond providing an incentive for collaboration between researchers, patients and decision-makers
Appropriate decision supports: Systems support informed decision-making at all levels with appropriate data, evidence, and	1) Decision supports at all levels – self-management, clinical encounter, program, organization, regional health authority and government – such as a) patient-targeted evidence-based resources b) patient decision aids	• BC Divisions of Family Practice (which has 35 divisions representing 230 communities and over 90% of family physicians engaged in a division) has selected UpToDate as its clinical decision support system of choice, but as noted in Table 1 the implementation and integration with other areas remains unclear	• BC Guidelines produces several practice guidelines relevant to primary care (e.g., diagnosis and management of opioid use disorder in primary care), and the British Columbia Centre for Excellence in

Characteristic	Examples	Health-system receptors and supports	Research-system supports
decision-making frameworks	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	- The Practice Supports Program from the General Practice Service Committee provides educational services and practice-based supports to improve quality of care - Pathways (a web-based directory connecting family doctors and specialists to streamline referrals in Vancouver) and Perinatal Services BC (which provides pathways and toolkits supporting evidence-based recommendations for routine care during pregnancy and birth) are examples of care pathways relevant to primary care - The BC Emergency Medicine Network (and others) provide clinical resources, continuing professional development and real-time support - Possible gaps o The development and implementation of patient-targeted evidence-based resources, patient decisions aids and patient goal-setting supports is ad hoc o There is some quality feedback but only in key areas (e.g., pap smear rates and prescribing practices) and coordinated at a system level	HIV/AIDS has also published an HIV-focused practice guideline for primary care - BC-PHCRN enables 'sentinel' physicians to explore their electronic medical record data to enhance services and practice operation through two tools: 1) InQuIRE, which provides web-based descriptive reports about a physician's patient panel using information from electronic medical records; and 2) the Data Presentation Tool which is being developed to enable practice reflection, analysis, reporting and patient recall
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	1) Centralized coordination of efforts to adapt a rapid-learning health system 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	- The primary-care strategy, which was recently announced (spring 2018), has the potential to contribute to the type of alignment between governance, financial and delivery arrangements needed to support a rapid-learning health system in primary care through its focus on enhancing team-based care and primary-care networks - The Joint Collaborative Committees included in Table 1 (particularly the Collaborative Services Committee) are emerging as a governance structure for the new primary-care networks - The Shared Care Committee supports family and specialist physicians to enhance the coordination of care from primary to specialist services	- None identified

Characteristic	Examples	Health-system receptors and supports	Research-system supports
	9) Mechanisms to identify and share the 'reproducible building blocks' of a rapid-learning health system		
Culture of rapid learning and improvement: Systems are stewarded at all levels by leaders committed to a culture of teamwork, collaboration and adaptability	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'	• The BC Divisions of Family Practice consists of groups of family physicians in communities throughout B.C. which collaborate towards achieving common goals in the health system, work collaboratively with partners in the community and other sectors, and are structured as non-profit groups that provide infrastructure to address priorities such as through the Collaborative Services Committee, which fosters collaboration between physicians and health-system stakeholders by engaging the divisions, regional health authorities, General Practice Service Committee and the B.C. MOH)	• None identified
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	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)	• As outlined in the previous row, the BC Divisions of Family Practice is a key support for some of the activities for competencies for rapid learning and improvement (e.g., leadership, in-house capacity for supporting rapid learning, centralized expertise and infrastructure through an existing collaborative)	• None identified

Table 3: Assets and gaps in the area of aging (or for the elderly population) British Columbia

Characteristic	Examples	Health-system receptors and supports	Research-system supports
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	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: 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	• The Office of the Seniors Advocate tracks concerns from seniors, quality indicators related to seniors care (e.g., hospitalization rates) and other indicators (e.g., volume and types of home and community care provided) on a yearly basis to inform future work • The Office of the Seniors Advocate is also guided by a diverse council of 30 seniors from B.C., who have the role of providing advice and feedback about seniors-related issues in the province to the office • The Advanced Care Planning Initiative from the BC Centre for Palliative Care was co-designed with key stakeholders across the province, including representatives from all regional health authorities, the Ministry of Health, healthcare professionals, provincial and local community and professional organizations, and the public • Gaps may include few coordinated programmatic efforts to engage patients and their families in their own health, their own care and in research, as well as capacity building	• None identified
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, transitions	1) Data infrastructure (e.g., interoperable electronic health records; immunization or condition-specific registries; privacy policies that enable data sharing) 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	• Survey BC Seniors (a project of the British Columbia Office of the Seniors Advocate) conducts surveys with seniors and their families to get feedback about the quality of residential care and accommodations, and uses and reports on data from the MOH (at the system level) and health authorities (for regional level indicators) • One potential gap is that there is a significant amount of data available, but it is not being used	• None identified

Characteristic	Examples	Health-system receptors and supports	Research-system supports
and longitudinally) and provider engagement alongside data about other process indicators (e.g., clinical encounters and costs) and outcome indicators (e.g., health status)	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	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	• None identified	• None identified
Appropriate decision supports: Systems support informed decision-making at all levels with appropriate data, evidence, and decision-making frameworks	1) Decision supports at all levels – self-management, clinical encounter, program, organization, regional health authority and government – such as 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	• Seniors BC, HealthLinkBC and Healthy Families BC provide a number of patient-targeted evidence-based resources, decision aids and goal-setting supports for seniors' health, including for advanced care planning, Alzheimer's disease and dementia, cataract surgery, disease screening, elder abuse, emergency preparedness, flu, healthy eating, hearing loss, heart disease, high blood pressure, osteoporosis, Parkinson's disease, falls prevention, and stroke • The Office of the Seniors Advocate provides decision supports primarily through care pathways in the form of information and referrals for those navigating seniors' services • The BC Seniors' Guide is one form of a description of how the system works, as it provides a compilation of information and resources focused on supporting healthy aging, which includes planning for healthy aging, health	• BC Guidelines has produced a practice guideline on early identification and management of frailty in older adults.

Characteristic	Examples	Health-system receptors and supports	Research-system supports
		and safety, housing, home and community care, transportation and financial and legal matters • The Advanced Care Planning Initiative from the BC Centre for Palliative Care is an example of decision supports for a particular form of care for older adults, which has focused on empowering communities to promote advanced care planning (e.g., through a training curriculum, a toolkit for community volunteers and organizations to facilitate and host Advance Care Planning sessions for the public, and advanced care planning tools) • One potential gap is that while the BC Seniors' Guide provides information and resources about the system, it has not been produced in a way that the public is embracing	
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	1) Centralized coordination of efforts to adapt a rapid-learning health system 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	• The Office of the Seniors Advocate is mandated to report to the Minister of Health each year about the activities of the office and on issues that have been identified through its work • The Office of the Seniors Advocate also has a mechanism to jointly set rapid learning and improvement priorities through its seniors' council	• None identified
Culture of rapid learning and improvement: Systems are stewarded at all levels by leaders committed to a	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	• The Office of the Seniors Advocate can draw on several mechanisms (outlined in this table) as part of its mandate to monitor and analyze seniors' services and issues in B.C., and to make recommendations to government and service providers to address systemic issues	• None identified

Characteristic	Examples	Health-system receptors and supports	Research-system supports
culture of teamwork, collaboration and adaptability	improvement, and to acknowledge, learn from and move on from 'failure'	- The BC Palliative Care Initiative activities appear to use mechanisms to support a culture of rapid learning and improvement such as the array of community- and stakeholder-engagement processes for developing and implementing its goals, providing "seed grants" to support community organizations to implement projects that are potentially sustainable and scalable, building a network of "master trainers," and conducting policy reviews and identifying gaps for improvement	
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	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)	- The Office of the Seniors Advocate has responsibility for monitoring and analyzing services and issues for seniors in B.C. in five areas (healthcare, housing, income supports, personal supports and transportation) and uses that information to provide recommendations to government and service providers about addressing system-level issues - The BC Centre for Palliative Care may also contribute to competencies for rapid learning and improvement (e.g., through the network of master trainers and centralized support for reviewing policies), by identifying gaps and identifying quality indicators to measure progress	- None identified

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