



OPERATIONALIZING INTEROPERABILITY IN CANADA

Executive Summary

Across Canada, health information flows unevenly. Some organizations are mature and deeply digital; others still rely on manual workflows, PDFs, and fax. Patients feel this fragmentation every time they are asked to repeat their history, carry results between providers, or wait while clinicians search for information that should already be at their fingertips. Providers feel it in the form of administrative burden and the constant uncertainty of incomplete records. And the system absorbs it as inefficiency, duplication, and avoidable risk.

Interoperability has become the foundational capability the Canadian health system must solve - not simply to improve data exchange, but to reduce clinician burnout, support responsible Artificial Intelligence, strengthen public health readiness, allow Canadians to take control of their health data and ensure equitable care across all communities, including Indigenous Peoples and rural and remote populations.

This white paper offers a practical blueprint for moving Canada from its current patchwork of systems to a genuinely connected data fabric. It builds on the national direction established through the Shared Pan-Canadian Interoperability Roadmap, while going deeper into how provinces, territories, providers, vendors, and pan-Canadian organizations can collectively operationalize the vision.

Why Interoperability Now?

Over the last decade, the health system has invested heavily in Electronic Medical Records (EMRs), digital diagnostics, virtual care, and electronic prescribing. Yet digitization alone has not delivered the seamless continuity patients expect. The problem is not that the system lacks data- it's that the data can't move.

The cost of this fragmentation is real. When information cannot be shared easily, clinicians spend more time reconciling and less time caring. Tests are repeated because results cannot be retrieved. Medications are re-prescribed because histories are incomplete. Emergency departments operate under constant strain when a patient's past treatments, diagnoses, or medications are effectively a black box. Public health operates with lagging indicators. And Artificial Intelligence (AI) models trained on inconsistent, siloed data become harder to trust in safety-critical environments.

At the same time, Canadians are demanding and federal and provincial governments are committing to better access, more transparency, and more mobility of their health information. The policy environment has never been more aligned around the need for action.

Interoperability is the bridge: the capability that transforms digital assets into a connected system of care and allows data to turn into information whenever needed.

A Vision for Connected Canada

The future Canadian health system should feel consistent regardless of where someone receives care. A clinician in a family practice should be able to view a patient's recent lab results from an acute facility as easily as if they were generated locally. Pharmacists should have access to a reconciled medication list. Patients should be able to see their own information in a consistent, bilingual format, without navigating six different portals. Indigenous communities should be full partners in governing how their data flows.

Achieving this vision does not require a single national system. It requires a common set of rails that allow diverse systems to exchange information safely, consistently, and predictably.

A modern, federated interoperability framework would bring together four key capabilities:

- **A shared trust** model for identity, authentication, authorization, and audit
- **Standardized** content and terminology to ensure every receiving system interprets information in the same way
- **Reliable** exchange patterns - real-time APIs, event notifications, bulk routes, and structured documents
- **Strong** data quality and observability to ensure integrity, reduce drift, and support continuous improvement

With these foundational elements in place, provinces and territories can maintain autonomy over their systems and data while still contributing to and benefiting from a coherent national architecture. A federated model does not require uniform technology or centralized control; instead, it creates a shared set of standards, trust mechanisms, and exchange patterns that allow diverse systems to communicate while each jurisdiction retains full stewardship of its environment.

International experience reinforces the strength of this approach. In the United States, for example, state-level health information exchanges and independent hospital networks have successfully connected to national exchange frameworks under common agreements and standards. Networks such as Sequoia have demonstrated that large collections of independently governed organizations can exchange information reliably without ceding control of their internal systems. What unites them is not technology uniformity, but adherence to shared specifications, trust frameworks, and certification processes.

A similar model—adapted for Canada's governance, privacy, linguistic, and data sovereignty requirements—could form the backbone of a truly pan-Canadian health data fabric. Such a fabric would be governed, interoperable, and flexible, enabling information to follow patients wherever they receive care across the

country. By allowing jurisdictions and organizations to integrate at a pace aligned with their readiness; while still aligning to common national rails, Canada can achieve a more connected and resilient health system without imposing disruptive, large-scale system replacements.

What Architecture Looks Like in Practice

Most interoperability frameworks falter either by being too conceptual or too rigid. Canada's reality demands something more balanced: a structure that is well-designed but flexible enough to support regional contexts.

At its core, a Canadian interoperability architecture should support four types of interactions:

- **Pull-based queries:** A primary care system retrieving the latest discharge summary or imaging report. Similar to the Integrating the Healthcare Enterprise (IHE) query and retrieve profiles but based on a modern resource-based architecture like Fast Healthcare Interoperability Resources (FHIR).
- **Push-based events:** A laboratory system sending a real-time notification when a new result is finalized or a central entity brokered notification to the family physician when a patient of concern is admitted in Emergency Room.
- **Document exchange:** Clinical summaries, consultation notes, and care plans shared in standard formats.

- **Bulk, privacy-protected data:**

Aggregated datasets for quality improvement, equity analysis, and public health

A Flow Example: Results into Primary Care

When a laboratory result is finalized, the laboratory system packages it using standardized laboratory codes (Logical Observation Identifiers Names and Codes, or LOINC) and consistent units of measure. The result is validated against a provincial Fast Healthcare Interoperability Resources (FHIR) profile and exposed through the exchange layer. The patient's primary-care Electronic Medical Record (EMR) retrieves it automatically after identity, authorization, and consent checks are applied. The Laboratory Information System (LIS) retains stewardship of the data and shares it because the trust conditions—identity verification, consent, and authorization—have been met. The clinician sees the result in their usual workflow with consistent labels and reference ranges, avoiding manual reconciliation and duplicate testing.

Standardizing Content and Terminology

Standardization focuses on a small set of high value data types where inconsistency causes the most problems. For laboratory results, using common codes and units ensures results look the same no matter where they are produced. For medications, standardized ingredient names and descriptions reduce errors during medication reconciliation. For clinical problems and procedures, shared clinical terminology ensures information is interpreted consistently by receiving systems. Documents such as discharge summaries and consultation notes follow agreed upon content structures. Applying these standards at the point of exchange allows data to move reliably across organizations and jurisdictions.

Consent and Trust Model

A common consent and trust model underpins all data exchange. Access is governed by the role of the user and the purpose for which data is being used, aligned to provincial and territorial privacy

legislation. Patient preferences can be honoured where required, and all access is logged for accountability. Indigenous data governance requirements are respected by ensuring communities retain authority over how their data is shared and used. Importantly, this model is applied consistently across exchange patterns—query, push, document, and bulk—while allowing jurisdictions to maintain control of their own systems and policies.

These interactions are stitched together by shared services: a national terminology service, a policy-aware consent model, secure identity frameworks, and an observability layer that can track throughput, latency, success rates, and data quality across jurisdictions.

This is not a theoretical construct. It is a practical one—and the system of technology to enable it exists today.

Where to Begin: High-Value Early Use Cases

Canada's interoperability journey must start where the value is immediate and measurable.



Results and reports are the most obvious starting point. Lab and imaging results are among the most frequently accessed data types, and ensuring they can flow seamlessly to primary care would significantly improve clinical continuity.



Medication safety is another urgent priority. A single, reliable medication profile with event notifications when medications are added or changed—would dramatically reduce reconciliation errors. Equally important is the broader adoption of electronic prescribing. When prescriptions are generated digitally, not only for controlled substances but for all medication orders, the data becomes structured, traceable, and readily queryable. This shift unlocks the ability to conduct deeper analytics on medication trends, adherence patterns, and population level consumption, ultimately strengthening both clinical decision making and public health insight.



Referrals and transitions of care are the third win. Standardizing referral payloads and enabling real-time status updates would reduce delays and enhance collaboration across providers.

These early use cases don't just demonstrate value; they establish reusable patterns that other workflows—eConsult, chronic disease pathways, long-term care transitions can build upon.

Governance for a Federated Country

Unlike countries with centralized health systems, Canada requires a federated governance model that respects provincial authority while enabling pan-Canadian coordination.

A lightweight Pan-Canadian Interoperability Council—comprising provinces and territories, pan-Canadian health organizations, Indigenous partners, clinicians, and patient representatives—can set direction, manage standards, align terminology, and oversee conformance.

Provinces and territories, as the primary delivery operators, would lead implementation and onboarding.

Health organizations and vendors would execute integration, testing, and data quality improvements.

Indigenous communities would govern how their data flows, where it resides, and under what conditions it is shared.

This model respects jurisdictional autonomy while still ensuring consistency where it matters most. A federated approach allows provinces

and health organizations to adopt a common, aggregable data-exchange standard without requiring them to surrender control over their systems or data assets. By meeting data holders where they are—technically, operationally, and politically, the model encourages greater participation and accelerates adoption. The result is a collaboration framework that delivers system-wide value at a significantly lower cost, while enabling every participant to move at a pace that aligns with their own readiness and priorities.



Measuring what Matters

A transformation of this scale must be anchored in outcomes. Success cannot be measured solely by whether data flows between systems, but by the improvements it enables in real-world care. Faster access to discharge summaries and diagnostic results, fewer duplicate tests, meaningful reductions in medication discrepancies, and a better experience for both patients and clinicians are tangible indicators of progress. Timely and more complete public-health reporting, stronger equity insights enabled by better data disaggregation, and visible improvements in data quality and conformance across systems further demonstrate that interoperability is working. When tracked transparently, these measures build trust across jurisdictions and help sustain momentum.

The consequences of not having interoperable systems have already been made clear. During the COVID-19

pandemic, provinces and national agencies were forced to rapidly assemble parallel solutions—systems built under intense pressure to handle vaccine tracking, case reporting, and public-health surveillance. These emergency tools were necessary only because Canada lacked a consistent, interoperable foundation capable of supporting standardized datasets from the outset. The costs of these gaps were substantial: slower public-health response, duplicated investments, operational inefficiencies, and, most importantly, avoidable risks to population health. Interoperability is not simply a technology aspiration, it is a prerequisite for a resilient, coordinated, and equitable health system.

Once the foundational rails are in place, Canada will be positioned to build a true Interoperable Health System—one where high quality, privacy protected data continually informs improved care pathways, supports real world evidence, and enables responsible AI. What begins

as interoperability becomes the backbone of a more responsive, equitable, and intelligent health system.

Conclusion

Canada already has the policy alignment, the federal investment, the national roadmap, and the technological capability. What is needed now is execution: coordinated, consistent, and grounded in real value.

By starting with a thin but powerful shared rail, focusing on a small number of high-impact use cases, and building incrementally with strong governance, Canada can move from fragmentation to connection—without waiting for wholesale system replacement.

A connected health system is not only possible. It is necessary.



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