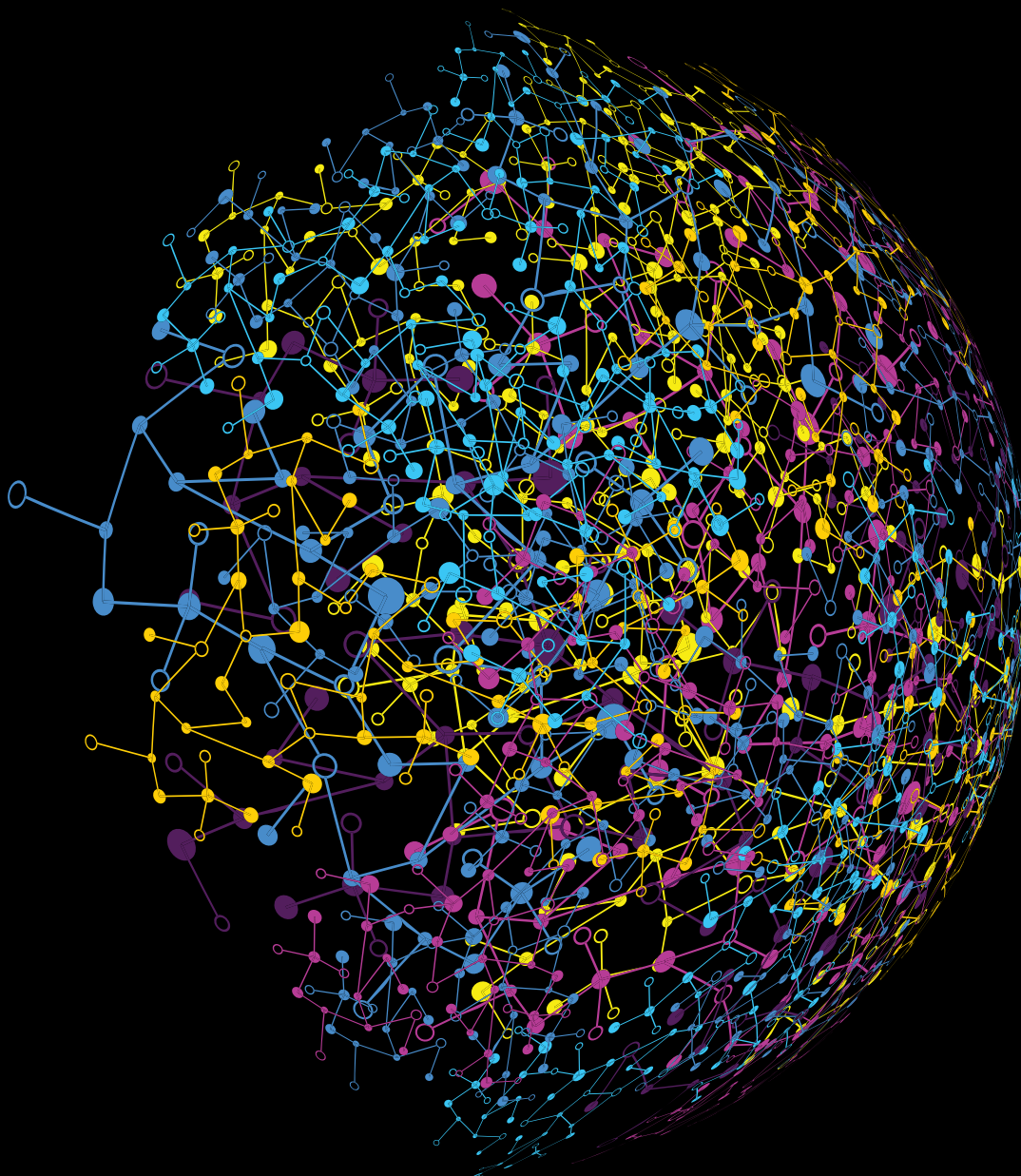


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**COVID-19**

**COVID-19 in the health sector**

A guide to reopening and recovery

As the COVID-19 pandemic continues to unfold and Canada begins to shift toward recovery, governments across the country must better coordinate efforts to address the new challenges ahead.





COVID-19 remains a serious threat to the health of Canadians. Public health bodies across Canada have been charged with the task of flattening the curve and monitoring for the emergence of a second wave of virus infection. Critical measures such as maintaining social distancing, mass production and procurement of personal protective equipment (PPE), border control and travel restrictions have been put in place and maintained for the past few months.

These stringent measures appear to have paid off as the total number of new cases has either declined or plateaued. As the current wave of the virus continues to subside, governments, employers, and citizens must align their efforts and adopt a collaborative, phased approach to reopening.

With countries around the globe entering this new phase of pandemic management, the American Enterprise Institute (AEI) recently published a report, *A Roadmap to Reopening*,<sup>1</sup> that details an approach based on four primary conditions that would need to be met prior to any restrictions being lifted. Key tenets of this approach include observing a 14-day sustained reduction in the number of new cases, observing the ability of hospitals to manage cases without being overburdened, displaying the ability to quickly test and diagnose all new cases, and the ability to effectively trace and monitor all the contacts of confirmed cases.

<sup>1</sup> National Coronavirus Response: A Roadmap to Reopening, 2020. <https://www.aei.org/wp-content/uploads/2020/03/National-Coronavirus-Response-a-Road-Map-to-Recovering-2.pdf>

As Canada also enters the reopening and recovery phases, there are six critical elements that would need to be carefully assessed and accounted for as part of any reopening strategy:

-  **PPE availability**
-  **smart quarantine policies**
-  **protection for the most vulnerable**
-  **mass testing**
-  **contact tracing**
-  **workforce management systems**

While all six elements need to be accounted for and developed in parallel, the government has made great strides in ensuring the first three elements are met during the response phase. As we enter the reopening phase, the latter three elements will be integral in the management of the virus and will require collaboration between the public and private sectors.

In assessing the current state of the latter three elements critical for reopening and recovery, mass testing and contact tracing are of particular concern. Canada's projected testing capacity has been defined at 60,000 tests per day;<sup>2</sup> currently, 25,000 tests a day have been reported—representing only 41 percent utilization. To maximize the utilization of available testing capacity, a robust contact tracing program must be in place to identify individuals potentially exposed to the virus and ensure they are tested and flagged for quarantine in order to reduce community spread.

However, establishing and maintaining a testing and contact screening program alone will not be enough for reopening. Organizations and corporations must also work in parallel and assume the responsibility of implementing workforce management systems that allow employees to routinely self-screen and assess their health status. These systems would significantly support employers during reopening by providing more sustainable solutions beyond the standard guidance on hygiene and cleaning best practices.

The speed at which we reopen businesses will also depend on the progress we make regarding vaccinations and eventual therapy distribution efforts across the country. Finally, in order to monitor and effectively account for the above solutions as they are put into action, a comprehensive and nationwide reporting infrastructure providing real-time insights must also be developed. These considerations should not be viewed as phases to be conducted in a step-wise manner but rather solutions that should be implemented in parallel.

<sup>2</sup> COVID-19 testing shortfall spurs quest for radical approaches as provinces look to reopen, 2020. <https://www.theglobeandmail.com/canada/article-COVID-19-testing-shortfall-spurs-quest-for-radical-approaches-as/>

The reopening and recovery phase of COVID-19 pandemic management will be contingent on the progress Canada makes on four critical parallel initiatives:



1

**Increasing testing** and screening capacity across the country

2

**Scaling contact tracing**

3

Developing and **mass-producing vaccinations** and antibody testing

4

Implementing an **insightful reporting** and analytics system



## 1

## Increasing testing and screening capacity across the country

**Increasing testing and screening capacity** will allow public health bodies to account for symptomatic and asymptomatic individuals during reopening.

**Overview:** As previously indicated, Canada is currently not leveraging its full testing capacity. Provinces such as Ontario have worked diligently to increase their testing capacity, and can now offer wide-spread testing, expanding the previously narrow criteria that qualified an individual for a test. As Canada looks to reopen, mass testing efforts will be a delicate balancing act between optimizing the costs associated with wide-scale testing, and the benefits of identifying and screening at-risk or asymptomatic carriers.

**Approach:** To provide provinces with the opportunity to ensure their unique needs and circumstances are considered in the response to COVID-19, each one has been charged with the responsibility of developing a comprehensive testing strategy with federal government support and guidance. As a result of this, each province has implemented varying levels of testing capacity: Ontario has ramped up its testing for those in long-term care facilities and shelters, BC has recommended testing for anyone with symptoms, and Alberta has expanded its testing to include asymptomatic close contacts of positive cases and asymptomatic workers, for example. While each province takes critical steps, mass testing has remained of particular concern among the Canadian medical community.

A recent Canadian Medical Association survey of 2,500 physicians revealed that 84 percent of respondents cite a lack of testing as a major pain point in the battle against COVID-19. As we move toward easing physical distancing restrictions, this concern will only be further amplified as thousands of daily tests will be required to provide confidence in our understanding of the prevalence of COVID-19 in the community, and the associated risks of relaxing preventative measures during reopening.

**Solution:** Any reopening strategy will require a ramped up testing and screening process, including increased capacity and real-time data on barriers to meeting testing projections (i.e., lack of materials, lack of workers). Technologies that can expand current testing capacity, such as automated genetic barcoding, which runs millions of genetic testing assays, are currently under review.

Expanding testing and screening efforts will ensure that any new outbreaks are detected early, with associated contacts identified and quarantined/tested before additional community spread can occur. Sentinel testing, which is the random testing of individuals across communities, will be a key strategy for the early detection of new cases in communities. New Zealand recently established sentinel community testing centres to randomly test volunteers with no previous symptoms of COVID-19. The advantages of these testing centres lies in the identification of asymptomatic individuals and potential community transmission early on. Furthermore, sentinel testing provides a national data pool of information, providing better understanding of virus spread within communities.

Perhaps one of the most prominent shortfalls highlighted by the COVID-19 pandemic is the lack of accessible, real-time data regarding patient cases and symptoms, laboratory equipment, and resources. As COVID-19 provides the necessary permissions to collect critical health data, self-assessment tools can indicate whether an individual should be sent for testing while also delivering valuable information about the state of health of a given community. As employers look to play a critical role in reopening, regular self-assessment tools can be leveraged as part of a workforce management system and replace some of the more manual processes related to screening.

A high-performing and comprehensive screening and surveillance program should include widespread and rapid testing. The collected data can then be leveraged for real-time reporting, providing healthcare officials and contact tracing investigators with the information they need to make informed decisions that support reopening.

## 2 Scaling contact tracing

**Efficiently accounting for COVID-19 cases and the ability to effectively trace all new outbreaks** is critical for the reopening strategy. The selected approach must be scaled from the individual level to a more population-based level, accommodating thousands of daily cases and contacts.

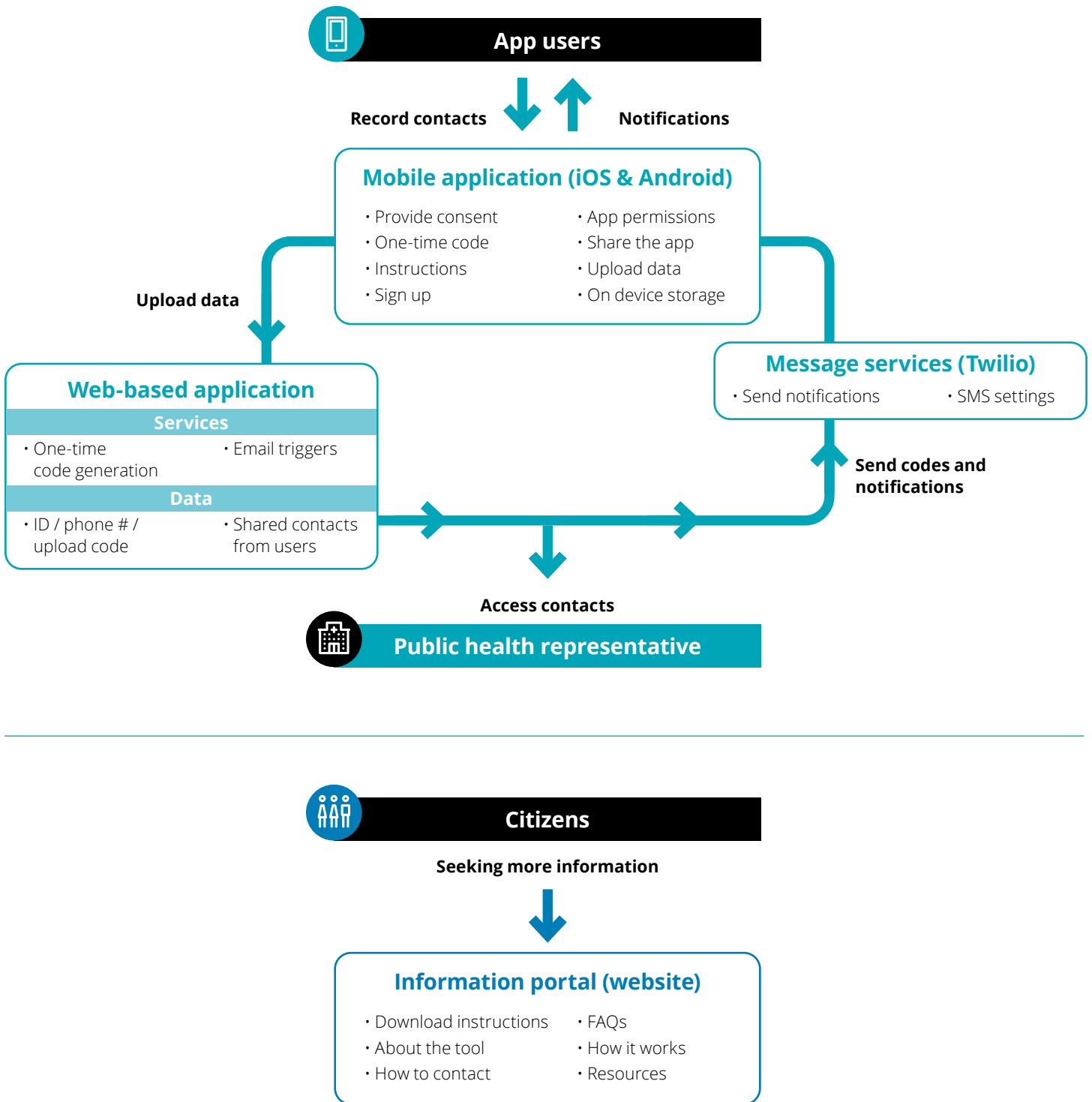
**Overview:** Contact tracing is the process of identifying, informing, and monitoring individuals who might have come into contact with someone infected with the virus. Starting with a positive test, public health personnel then begin the investigative process of tracing down the origin and time of the virus acquisition as well as who else might have been infected. Integral to reopening, a comprehensive contact tracing system must be in place to minimize the spread of the virus.

**Approach:** Traditionally, contact tracing has been manually completed by public health staff in a process that includes contacting all the individuals an infected individual can recall coming into contact with. While the traditional method is characterized by manual effort and the possibility of human error, there has been global momentum towards using mobile contact tracing apps as an effective way to augment the process, while respecting personal privacy. The main functionality of these apps is to track and record who infected individuals were in close contact with in the days before being diagnosed. Many countries and global organizations have begun to implement contact tracing solutions that rely on either GPS or Bluetooth technology to locate other phones nearby that are running the same application. With privacy being of utmost importance, companies such as Google and Apple are currently working to create a “decentralized” app to assist in applying consistent approaches with interoperability as a core principle.

**Solution:** Contact-tracing applications have largely shifted towards using Bluetooth technology as it permits direct communication between devices in close proximity and prevents the collection of location-based information. Alberta’s recent implementation of its own contact-tracing app, ABTraceTogether, uses the same Bluetooth technology used in Singapore’s app, TraceTogether. The app is first downloaded by users on their phones, where they are then prompted to continue with the set-up steps, such as providing their phone numbers and providing informed consent. Users then allow Bluetooth signals to be exchanged between phones that also have the app and are in close proximity. Information is securely stored on the phone and cross-checked. In the case of ABTraceTogether, users who test positive for COVID-19 are asked to provide the data from the app to their local health authorities. Upon receiving this data, local health authorities can then follow-up with other users who may have been exposed in proximity, and then subsequently track those respective users’ movements and outcomes on an individual basis.

Wide-scale adoption is critical to ensure the effectiveness of a digital contact tracing solution. With smartphone usage fragmented across different communities, including the elderly and other vulnerable populations, it will be critical to understand the penetration of the application in the community so as to ensure the data is reliable and comprehensive. As privacy is paramount, Alberta has worked to address some of the concerns including encrypting data and only maintaining local data on phones for 21 days. Nonetheless, provinces and territories need to align on the core principles and foundations of contact tracing (irrespective of the program selected) which should take into consideration user privacy and interoperability between technical solutions that already exist.

Contact tracing solution—A Canadian solution adapted from Singapore



## 3 Developing and mass-producing vaccinations and antibody testing

**Vaccination and antibody testing** should be conducted in parallel to testing and screening efforts with the aim of identifying protected populations, and implementing eventual therapies.

**Overview:** The race to develop a safe and effective COVID-19 vaccine has resulted in billions of dollars being invested by governments, pharmaceutical companies, and research institutions. This is further amplified by an aggressive and shortened clinical trials timeline, highlighting the global priority of developing a viable vaccine. The initial phases of vaccine development require extensive laboratory testing within a controlled environment, so that researchers are confident in the vaccine's properties and potential prior to it being tested on humans. Serology-based tests, also known as antibody tests, are conducted using blood samples to identify specific proteins (i.e., antibodies) made in response to an infection/virus. Such tests are integral to the vaccine development process and for validating the properties of a viable candidate vaccine that can then be tested on humans. All tests that are conducted and carried out in the validation of a vaccine are centered on measuring and establishing its effectiveness against the virus and its safety. The process of mass production and distribution under tight timelines, as well as ensuring equitable access, are important considerations once a viable vaccine has been identified.

**Approach:** Serological testing can be leveraged to identify populations that have been exposed and could be protected from subsequent virus waves. Serology can also aid us in identifying the vulnerable populations (i.e., those who have not been infected), as well as those who are immune. The need for a national immunization program is paramount, with systems that can capture, track, and confirm immunity to COVID-19. Confirmation of immunity, through solutions such as digital immunity passports, will affect the readiness to return to work, and allow several other elements of the economy to return to a more normal state, safeguarding both those protected and those still susceptible to infection.

Research has begun in Canada to identify potential therapies using blood samples and antibodies from recovered individuals. To effectively coordinate and maximize research potential, all work should be conducted in parallel (not in silos) to the current testing, screening and contact-tracing efforts underway. This will ensure an iterative approach that provides reliable and up-to-date information that reflects the evolution of the situation.

**Solution:** Serological assays exist, however not at the scale that is currently needed for research and development purposes. Health Canada is currently reviewing applications for products that could be used as assay tools and most recently approved the first COVID-19 antibody serological test for use in the country. The new tool will test for antibodies specific to the virus using one million Canadian blood samples collected over the next two years to monitor the virus within the general population.

In terms of clinical trials underway, Health Canada has approved its first trial for a COVID-19 vaccine, promising aggressive timelines. Like most clinical trials, the approved trial will be conducted in three phases. Phase one administers the vaccine to a small group of health volunteers to ensure there are no major safety issues, and obtains preliminary evidence that the vaccine can help prevent COVID-19. In phase two, a larger group of individuals will be enrolled in the trial, with a focus on proving the effectiveness at preventing disease and determining the effective dose. Finally, phase three trials are conducted on approximately 1,000 individuals to demonstrate safety in a typical patient likely to take the vaccine, confirm effective dosage, identify side effects, and build knowledge about the effectiveness of the vaccine. Once a vaccine has been established as being both safe to use in humans and effective against the virus, ensuring the distribution of the vaccine to all affected populations and, most importantly, to vulnerable groups will be critical.

Organizations such as the Bill and Melinda Gates Foundation have recognized the importance of identifying global financing tools to support manufacturing capabilities in both developed and under-developed countries as early as possible. Manufacturing capabilities could include reskilling/training of health workers, building factories for the purpose of manufacturing a critical vaccine, and supporting the supply chain to distribute it at a global level. Global organizations such as the World Health Organization and the Gates Foundation have committed to identifying a plan for worldwide distribution of the vaccine in an equitable manner, balancing countries' desire to ensure their citizens have access with the need to manage global distribution.



## 4

## Implementing an insightful reporting and analytics system

**There is a critical need to collect data and analytics** to accurately reflect the current state of virus spread by community, region, province, and at a national level

**Overview:** The importance of a repository of comprehensive data that can be shared with relevant parties is not only critical for understanding the current landscape but will also support efforts to prepare for the next COVID-19 wave or any future pandemics. As we move to increase our screening and diagnostics processes, emphasis should also be placed on evolving the data infrastructure and associated data governance. With robust, consistent data governance and infrastructure, data can be collected in a consistent manner across all data sources, standardizing taxonomy and documentation at a national level to support the use of data for decision-making.

The data collected will represent consolidated metrics from across distributed data sources, including variables such as incidence and prevalence of the disease, morbidity and mortality, testing volumes, results and COVID-19 hotspots. Through the implementation of standardized infrastructure and governance processes, the quality of data collected and leveraged for analysis can be addressed. The data collected from the screening and testing efforts could then be leveraged for real-time reporting, providing healthcare officials and contact tracing investigators with the information they need to inform and guide action.

**Approach:** In Ontario, a daily COVID-19 epidemiological status summary is shared with the public. The data is collected from 36 public health units across Ontario and consolidated with the province's Public Health Information System (iPHIS). The daily report provides high-level information regarding the number of new cases, the number of deaths, the severity of cases, the cases by health units, and the reported outbreaks in hospitals and long-term care homes.

While the information may be effective and relevant in the current disease wave, as the province and country move towards reopening and recovery, additional metrics and analysis are needed. Canada is made up of a largely decentralized health care system, including provincially led health care structures, each with their own data collection and reporting processes. The challenge arises as we move to align on common metrics and reporting processes across the different systems. It will be imperative to align on a foundational set of requirements when it comes to reporting on screening and contact tracing efforts, especially in the context of a nationwide reporting structure and response strategy.

**Solution:** Coordinating health data assets and data infrastructures across the country will help to enable a synchronized response and, in the long run, deliver meaningful insights. Significant opportunities are present in using federated data and analytics platforms that can enable organizations to collect, store, analyze, and share their data, resulting in a faster, evidence-based response. This includes more accurate capacity and demand models and more robust predictions for disease outbreaks that can inform reliable mitigation strategies to improve population health. Analytics must be embedded in the reopening and recovery phase to ensure governing bodies can make informed decisions.

Data collected should be real-time and encompass the different populations. Important metrics that should be incorporated into an analytics engine include:

- How effective public health interventions and policies have been in slowing down the spread of infection—this can be assessed via data collected from surveys and testing and screening efforts
- Identification of high-risk populations (e.g., the elderly and vulnerable populations) for targeted and immediate action, including monitoring COVID-19 hotspots or creating profiles for at-risk patients and tracking specific metrics
- Developing models of the spread of the disease, both on a local, geographic, and population-based level within high-risk populations using existing data assets and historical data to create a model that can forecast the virus spread and the projected impacts of public health interventions
- Creating simulation models on resource requirements and providing forecasts on future needs (i.e., PPE demand, hospital bed capacity, and health care worker availability) using historical data collected from screening and testing processes and creating projected forecasts based on the inputted data

# Canada's success in the reopening and recovery phase of COVID-19 pandemic management will be contingent on the ability to work together to advance as a nation.

Providing each province with the levers and authority to make decisions that reflect their individual circumstances will be paramount, along with ensuring the investment in solutions and application of policy aligns with national efforts.

Governments, employers, and citizens should all look to identify the role they can play in the following areas in order to support reopening and recovery:

- An integrated and consistent national approach to contact tracing
- A scaled-up national and provincial strategy for increasing laboratory testing capacity
- A comprehensive and evidence-based framework for vaccine allocation and registration
- Alignment between public and private bodies on the return-to-work approach

Reopening businesses and the economy will require a comprehensive set of actions to be planned and accounted for, and broader metrics that represent current testing and contact tracing results. To avoid over-burdening our health care infrastructure and having to shut down again, efforts must be made to continue to evolve and refine the reopening strategy. This strategy needs to outline processes for accelerating current testing capacity, digitizing contact tracing, continuing vaccine development, and using a comprehensive, future-focused reporting infrastructure.

We must be better prepared to make informed, data-backed decisions come reopening, to support the journey to the "new normal."

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