

Finding a safe and equitable “COVID-19 exit strategy”

Reclaiming the map, the economy and our lives

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1	Executive summary	3
2	Background	5
3	A combination of “exit strategies” that could work in the shorter term.....	8
3.1	Scaling up COVID-19 diagnostic testing and contact tracing of symptomatic persons	9
3.2	Sentinel surveillance to understand the situation beyond the “tip of the iceberg”	9
3.3	COVID-19 mass screening (for regions with smaller population sizes)	10
3.4	COVID-19 targeted screening (high risk settings)	11
	i. Screening all health workers, staff and patients in health facilities	11
	ii. Screening all residents, visitors and caregivers in long term care facilities.....	12
	iii. Screening all students, teachers and staff in daycares and schools	12
	iv. Screening all residents and workers in prisons and correctional facilities	12
	v. Screening all residents and support workers in homeless shelters.....	13
3.5	COVID-19 border measures for areas (completely or mostly) “COVID-free”	13
	i. Screening all migrant workers and other travellers to Canada	14
	ii. Screening all people moving from a higher-risk to lower-risk area.....	14
3.6	Augmented contact tracing, isolation and cascade screening (ring testing).....	14
3.7	Ongoing physical distancing, respiratory etiquette, hand hygiene, and disinfection	15
4	Additional “exit strategies” that could work in the longer term	16
4.1	Antibody testing to assess levels of existing immunity	16
4.2	Mass vaccination for COVID-19	16
5	Conclusions and next steps.....	16
5.1	Ethical considerations underpinning population-level decisions	17
5.2	The best- and worst-case scenarios.....	17

1 Executive summary

COVID-19 is a novel disease that has rapidly spread around the world in a few short months with varying degrees of disruption and case fatality rates of 3% to 10% or more in many jurisdictions.¹ Public health measures to contain the spread of disease and minimize harms come at a high financial and human cost, impacting national economies and personal freedoms, and are often questioned and contested.²

In complex situations such as this, where we are protecting the population from a harmful disease still poorly understood, **the precautionary principle supports adopting broad preventive measures, placing the burden of proof on those proposing to loosen restrictions, exploring possible alternatives that maximize benefits and minimize harms, and ensuring greater public involvement in decision-making.**³ Yet, the longer we wait before reopening the more expensive the bailout measures, the greater the strain on families and businesses, and the larger our COVID-debt.

A public health ethics lens and a scientific analysis based on the best available evidence can help identify **safer approaches to maximize personal freedoms and reinvigorate economies while avoiding that the burden of harms from reopening is unjustly distributed to a small number of vulnerable groups,**⁴ such as the elderly, people with disabilities and underlying health conditions, people living in institutionalized settings (i.e. long term care, prisons, shelters), frontline health workers and caregivers, and people experiencing homelessness and living in poverty, who are hardest hit by the pandemic.⁵ Beyond distributive justice, a fair and transparent process in decision-making is critical, enabling wide public engagement, informed choice and greater agency for those directly impacted by these decisions.⁶

A number of **prerequisites for reopening** have been proposed as a minimum benchmark for jurisdictions.⁷ Loosening restrictions in areas with established community transmission will knowingly increase disease spread and lead to an exponential rise in the number of hospitalizations and deaths, potentially risking social instability and longer-term recession. Therefore, there needs to be a strategic approach to reclaiming the Canadian map from COVID, province by province, territory by territory, municipality by municipality, to more safely reopen each area, which must then remain a “closed system,” closely monitoring everyone entering the area to prevent reimportation and resurgence.

COVID-19 is a particularly difficult disease to contain due to the novelty and rapidity of spread around the world, but especially due to the wide spectrum of clinical presentations ranging from no symptoms at all to rapid onset of severe illness and death. People with COVID-19 infection can develop symptoms anywhere from 2-12 days or more after an exposure to an infected person, and unknowingly transmit the disease to others in the 48 hours before developing symptoms (presymptomatic),⁸ or when they have minimal symptoms (mildly symptomatic) or even no symptoms (asymptomatic).⁹ Once infected,

¹ <https://www.inspq.qc.ca/sites/default/files/covid/2901-caracteristiques-epidemiologiques-cliniques.pdf>

² <https://www.theglobeandmail.com/business/article-can-the-world-afford-the-cost-of-fighting-covid-19/>

³ <https://ajph.aphapublications.org/doi/pdf/10.2105/AJPH.91.9.1358>

⁴ <https://ajph.aphapublications.org/doi/10.2105/AJPH.91.11.1776>

⁵ <https://blogs.worldbank.org/voices/covid-19-will-hit-poor-hardest-heres-what-we-can-do-about-it>

⁶ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1119050/>

⁷ <https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/canadas-reponse/recommendations-lifting-restrictive-public-health-measures.html>

⁸ <https://www.nature.com/articles/s41591-020-0869-5>

⁹ <https://www.inspq.qc.ca/sites/default/files/covid/2989-asymptomatiques-potentiel-transmission-covid19.pdf>

people test positive for COVID-19 and could remain infectious for 2-4 weeks post-diagnosis, and sometimes longer.

However, by understanding better the nature of this disease, there are strategies that can be used to more safely reopen the economy, gradually releasing people from restrictions, in a way that is evidence-informed, safer and more just. While waiting for **vaccines** to be developed, which could take up to a year or more, as studies of vaccine efficacy and safety are carried out to clarify many as yet unanswered questions (e.g. could a vaccine cause “vaccine-enhanced disease” which leads to worse outcomes?). In the meantime, there is hope that **antibody testing** may identify people who are “safe” to return to work, though it is still unclear whether those with COVID-19 antibodies are protected from reinfection and more severe disease, and if so, for how long? Yet, in the shorter term, there are still other approaches that can be adopted to identify areas at lower risk and to safely reopen in a controlled way.

The first step for any jurisdiction contemplating their reopening is to be sure there is increased capacity for **diagnostic testing** of all people with possible symptoms of COVID-19 and **augmented contact tracing** of all confirmed positive cases, ensuring that cases and contacts isolate appropriately for 14 days, contacts developing symptoms are tested, and cases identified end isolation when they are proven to no longer be shedding the virus (e.g. 2 negative tests at least 24 hours apart). This is largely the currently pandemic response, but it is the bare minimum, and, it **will likely be insufficient to control a disease such as this that can spread undetected in the absence of symptoms**. Already the capacity to do even basic diagnostic testing and contact tracing is becoming overwhelmed in some places, particularly in high transmission areas and in larger cities, in part due to recent cuts to public health budgets in many jurisdictions as the memory of SARS started to fade. Therefore, this cannot remain the only strategy, especially when reopening will most certainly increase the number of cases to track and follow.

The next step before reopening is to **know how much disease transmission is occurring (often silently)** in the community. Beyond “tip of the iceberg” data collection on COVID-19 mortality, ICU admissions and hospitalizations, any jurisdiction contemplating reopening should do **sentinel surveillance** to first determine the proportion of symptomatic, mildly symptomatic, presymptomatic and asymptomatic cases across all age groups, who will rapidly fuel disease spread upon reopening. Where feasible, in locations with smaller population sizes, it would be advisable to do **mass screening** of the entire population with or without symptoms (ideally repeated a couple weeks later), which will identify the vast majority of COVID-19 cases, allowing isolation and contact tracing measures to be applied more completely, making it much safer for the rest of the population to return to work and resume their lives. Once a region or territory is largely “COVID-free” it should **remain a “closed system”** insofar as possible with **border measures** including screening and temporary isolation of all people upon entering, particularly from higher-risk, but also in general, to prevent reimportation and resurgence. Patients needing non-COVID hospital care should be sent via a corridor of “cold hospitals” in “COVID-free” zones. Eventually adjacent “COVID-free” zones can be coalesced, and contact tracing teams and capacity gets shifted to where it is needed most, until gradually the “COVID-free” zone (and encircling border) grows, while the “hot zones” get progressively smaller and smaller on the map.

Where mass screening is not feasible and for ongoing maintenance of “COVID-free” zones, to identify and help control hot-spots of infection transmission, **targeted screening of high-risk settings** is needed, including in health care facilities, daycares and schools, and residential institutions (i.e. elder care, prisons, homeless shelters), with pooling samples that can increase capacity 30-fold as needed.

Of course, it will be necessary to continue contact tracing (using automated technologies as needed to keep up), as well as **isolation measures**, and ideally **ring testing of contacts**. As well, continuing the traditional public health measures of **physical distancing at least 2 meters, respiratory etiquette, hand hygiene, wearing masks and disinfection of high use surfaces with bleach or other cleaners**.

2 Background

The purpose of this document is to outline the possible “exit strategies” from COVID-19 confinement and to highlight the pros and cons of each strategy based on the best available current evidence and taking into consideration a public health ethics lens.

COVID-19 is a serious disease (**Box 1**) but it can be prevented (**Box 2** and **Box 3**). Death rates sharply rise with age over 50 years and in patients with underlying disease,¹⁰ yet a significant number with severe illness are younger adults and people with no known risk factors.¹¹ People in their 30s and 40s have had unexpected conditions like hypercoagulability and stroke,¹² serious and long-lasting repercussions. Even children can require hospitalization, and more rarely, have died from COVID-19.¹³ Few treatments show promise beyond supportive care (i.e. respiratory support with or without mechanical ventilation),¹⁴ with modest, if any, effect of antivirals.¹⁵ Up to 1 in 5 hospitalized adults die, and among those on respirators in the ICU, well over half of adults 18-65 years die and almost all patients (97%) over 65 years die.¹⁶

While there is hope that a vaccine can be rapidly developed, which would be the safest and best way to protect the population and restart the economy, the World Health Organization predicts that this could take about 14-18 months,¹⁷ and that we are still at the beginning of the pandemic which will hit hardest the poorest and could lead to millions of deaths worldwide.¹⁸ In the meantime, people are already tiring of confinement which in itself can have negative effects, such as bringing to light and exacerbating the previously hidden violence pandemic,¹⁹ pushing people living just above the poverty line deeper into poverty,²⁰ and many other pre-existing structural challenges now being openly exposed.

Interim strategies are needed to prevent a standstill of the economy and to reduce highly restrictive measures while still protecting against the catastrophic experiences that have already occurred in some parts of the world and could be repeated.²¹ **Reducing COVID-related death and disease is a precursor to sustainably reopening the economy in the short- to medium-term**, otherwise it will reopen a few weeks until systems are overwhelmed, and panic sets in, forcing another longer shutdown.

¹⁰ <https://www.cdc.gov/mmwr/volumes/69/wr/mm6915e3.htm>

¹¹ <https://www.cdc.gov/mmwr/volumes/69/wr/mm6918e1.htm>

¹² <https://www.cmaj.ca/content/cmaj/early/2020/05/01/cmaj.200685.full.pdf>

¹³ <https://www.cdc.gov/mmwr/volumes/69/wr/mm6914e4.htm>

¹⁴ <https://www.cmaj.ca/content/early/2020/04/29/cmaj.200648>

¹⁵ [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(20\)31022-9/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)31022-9/fulltext)

¹⁶ <https://jamanetwork.com/journals/jama/fullarticle/2765184>

¹⁷ <https://www.who.int/bulletin/volumes/98/5/20-020520.pdf>

¹⁸ <https://www.who.int/bulletin/volumes/98/5/20-030520.pdf>

¹⁹ <https://www.who.int/news-room/detail/08-04-2020-joint-leader-s-statement--violence-against-children-a-hidden-crisis-of-the-covid-19-pandemic>

²⁰ <https://www.oxfamamerica.org/press/half-billion-people-could-be-pushed-poverty-covid-19/>

²¹ <https://www.nytimes.com/interactive/2020/03/27/world/europe/coronavirus-italy-bergamo.html>

A combination of public health strategies can permit a gradual reopening of the economy that will be much safer and less likely to result in mass death, widespread panic and potentially even threats to public security and social order. Adopting these safeguards will be less burdensome on the health care system, allowing people with non-COVID related disease to safely access care, and will be less unjust towards more marginalized groups including elderly people, persons with disabilities or underlying health conditions, and persons in high density living conditions (e.g. low SES neighborhoods, correctional facilities, homeless shelters, long term care, etc.).

Box 1: How serious is COVID-19 infection and who is most at risk of severe illness/death?

- a. For every 100 confirmed COVID-19 cases, about 85% will have milder symptoms (e.g. cough, fever, sore throat, runny nose), 15% will be hospitalized (with pneumonia and severe respiratory illness), 5-7% will need ICU admission, and over 2-3% will die.²²
- b. Of the 5-7% with severe disease admitted to ICU, less than half recover, and the length of hospital stay is often many weeks. There is no known effective treatment (though many research trials are underway), and supportive care is currently the main therapy.²³
- c. People more likely to have severe disease and die from COVID-19 include older people 50 years and over (increasing exponentially with increasing age), as well as people with underlying health conditions (e.g. heart disease, diabetes, lung disease, etc.).²⁴
- d. There are as yet no proven therapies for COVID-19 treatment beyond supportive care, with the possible exception of Remdesivir which has marginal benefit.²⁵
- e. It is not possible to predict entirely who will have only mild illness versus who will get very sick and die from COVID-19, and there are examples, of apparently healthy younger people in their 20s, 30s and 40s who became very sick, were hospitalized and died.²⁶
- f. Younger children are mostly spared from experiencing severe illness, but if enough people are infected, data from China and the US has shown that even some children have required hospitalization and ICU admission and a small number have died.²⁷

If no public health action is taken (i.e. no physical distancing, no hygiene measures, no testing, no contact tracing, etc.), with a population of about 37 million Canadians, and the assumption that 1) people who recover from COVID-19 infection develop immunity (which is as yet unclear), 2) if 60-80% of the population recovered from COVID-19 infection this could create “herd immunity” (which is also

²² <https://www.cdc.gov/mmwr/volumes/69/wr/pdfs/mm6915e3-H.pdf>

²³ <https://jamanetwork.com/journals/jama/fullarticle/2765184>

²⁴ <https://www.cdc.gov/mmwr/volumes/69/wr/mm6912e2.htm>

²⁵ <https://www.nih.gov/news-events/news-releases/nih-clinical-trial-shows-remdesivir-accelerates-recovery-advanced-covid-19>

²⁶ https://www.cdc.gov/mmwr/volumes/69/wr/mm6918e1.htm?s_cid=mm6918e1_w

²⁷ <https://www.cdc.gov/mmwr/volumes/69/wr/mm6914e4.htm>

unclear), and 3) that 3% of people infected with the disease will die (which is a conservative estimate based on international experience thus far),²⁸ the best case scenario of a “laissez faire” approach is that there would be over half a million deaths across Canada during several “waves” of infection lasting several months or more until the situation would stabilize. Once viral spread starts to occur unchecked in the community it will be difficult to catch up and contain it, therefore heightened public health measures are urgently needed to get COVID-19 under control to then be able to safely reopen.

Box 2: Who is at risk of COVID-19 infection and how can they protect themselves?

- a. People more likely to become infected with COVID-19 include household contacts of a confirmed COVID-19 case (i.e. people living under the same roof),²⁹ attendees of family gatherings, people living in residential facilities, as well as health care workers and other close caregivers of COVID-19 patients who are most exposed to the disease.
- b. Specific settings more at risk of COVID-19 outbreaks include long-term elder care facilities, other institutionalized residential facilities (e.g. prisons, homeless shelters),³⁰ and health care facilities (e.g. hospitals, rehabilitation centres, outpatient clinics, etc.).³¹
- c. Data has clearly shown that when all people in a high risk setting with a known COVID-19 case are systematically screened, there are significant proportions of persons (up to one third or one half) who never had any symptoms who test COVID-19 positive.³²
- d. The World Health Organization recognizes that during the 2-3 days before a person develops symptoms (i.e. the pre-symptomatic stage), they can shed the virus, they are contagious, and they can transmit COVID-19 infection to others.³³
- e. The only way to know whether a person is a COVID-19 case if they are asymptomatic, pre-symptomatic or have only very minimal upper respiratory tract infection symptoms (e.g. cough, sore throat, runny nose) is to screen for COVID-19 using a laboratory test.³⁴
- f. People can protect themselves from infection by staying home as much as possible, postponing non-urgent medical appointments as well as work-related or social engagements, by physical distancing (keeping at least 2 meters apart from other people), frequent handwashing or using alcohol-based hand rub, and disinfecting high-use surfaces like door handles with bleach-containing cleaning products.³⁵

²⁸ <https://www.inspq.qc.ca/sites/default/files/covid/2901-caracteristiques-epidemiologiques-cliniques.pdf>

²⁹ <https://www.sciencedirect.com/science/article/pii/S1473309920302875>

³⁰ https://www.cdc.gov/mmwr/Novel_Coronavirus_Reports.html

³¹ [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(20\)30917-X/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)30917-X/fulltext)

³² <https://www.cdc.gov/mmwr/volumes/69/wr/mm6912e1.htm>

³³ <https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200402-sitrep-73-covid-19.pdf>

³⁴ <https://www.nejm.org/doi/full/10.1056/NEJMe2009758>

³⁵ <https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/prevention-risks.html>

With warmer summer weather approaching it will be difficult to keep people confined. Success in controlling COVID-19 spread will enable more rapid “return to normal” or a “new normal for now.” A few additional weeks putting necessary safeguards in place prior to reopening could make all the difference to contain disease transmission, ensure the health system has ongoing capacity to care for people with and without COVID-19, as well as implementing added protections for high risk settings.³⁶

3 A combination of “exit strategies” that could work in the shorter term

No single strategy will work on its own, but the following is a potential roadmap for a safer reopening. Several steps need to be in place BEFORE measures are loosened (**Box 3**), since the exponential spread will be too rapid to catch up afterwards. Then, even once a region succeeds in becoming (completely or mostly) “COVID-free,” which makes reopening the economy within that region much safer, there still needs to be the same ongoing measures in place AFTER reopening to rapidly detect reimportation or resurgence of disease and to contain it at the source to prevent mass spread, hopefully avoiding further lockdowns. **Since COVID-19 is a disease that can be transmitted by persons who are mildly symptomatic, presymptomatic or asymptomatic, screening needs to be a major component of the efforts to get COVID-19 under control before re-opening, and to keep it under control afterwards.**

Box 3: Measures that should be in place BEFORE and AFTER reopening

- a. Scaling up diagnostic testing and contact tracing of persons testing positive (the basics)
- b. Sentinel surveillance to understand the situation beyond the “tip of the iceberg”
 - Has the region contemplating reopening “passed the peak”?
 - Is there evidence of ongoing community transmission or hotspots?
 - Has it been at least 2 weeks or more since the last new case identified?
- c. Mass screening (feasible for regions with smaller population size)
- d. Targeted screening of high-risk settings (i.e. getting COVID “hotspots” under control)
 - Health care facilities
 - Daycares and schools
 - Long term elder care
 - Homeless shelters
 - Prisons and correctional facilities
- e. Border measures to keep “COVID-free” regions safe by making them “closed systems”
 - National borders
 - Inter- and intra-provincial/territorial borders
- f. Augmented contact tracing, isolation and cascade screening (ring testing)
- g. Ongoing physical distancing, respiratory etiquette, hand hygiene and disinfection

³⁶ <https://www.cbc.ca/news/health/testing-and-contact-tracing-is-canada-ready-1.5547281>

3.1 Scaling up COVID-19 diagnostic testing and contact tracing of symptomatic persons

- PROS: Testing people with symptoms of COVID-19, with or without a history of exposure to a confirmed/probable COVID-19 case and/or travel to an area with community transmission, has been **one of several mainstays of the global and Canadian pandemic response to date.**³⁷ It is believed that COVID-19 tests are the most likely to identify the disease in the first 48 hours after developing symptoms when viral load is considered to be highest and in the first 7 days of symptoms, though sometimes tests can be falsely negative initially and become positive later, so clinical judgement, and retesting when indicated, remains important.³⁸ Those who test positive can then be isolated at home (and if needed hospitalized for supportive care) until ideally they have 2 negative tests at least 24 hours apart and no further symptoms, to be considered no longer infectious and released from isolation, which generally can take 2-6 weeks, or in some cases even longer. To further reduce disease spread, public health authorities also do contact tracing for every confirmed case, and these close contacts (e.g. household members, unprotected health workers, other caregivers) also self-isolate for 14 days, monitor for symptoms, and are tested if/when they become symptomatic.
- CONS: There is growing evidence that COVID-19 has a very wide range of clinical presentations (ranging from no symptoms to rapid decompensation and death) and that asymptomatic or presymptomatic “silent carriers” can also shed the virus and spread disease.³⁹ **Testing only symptomatic patients will miss a significant proportion of COVID-19 cases who are either asymptomatic, presymptomatic or develop only minimal symptoms, and is unlikely to be successful in eradicating this disease, or allowing for a safe reopening of the economy, but continues to be an important strategy in combination with other approaches described below.**

3.2 Sentinel surveillance to understand the situation beyond the “tip of the iceberg”

- PROS: As there is now a strong body of evidence that a proportion of COVID-19 cases are asymptomatic/presymptomatic “silent carriers” who play a role in the spread of the disease,⁴⁰ beyond counting the number of deaths, ICU admissions, hospitalizations, and symptomatic people testing positive (which is greatly influenced by the restrictiveness and capacity of the local testing policy in place), and **before deciding whether or not a given jurisdiction is ready to gradually reopen, decision-makers and the public need to have a better sense of how many “submerged cases” are hidden in the community which can be achieved by “sentinel surveillance.”** In this way, a small sample of the community gets tested,⁴¹ whether or not they present with symptoms, often using “high probability” settings for sampling like health facilities or daycares and schools to provide

³⁷ <https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/health-professionals/national-case-definition.html>

³⁸ <https://www.bloomberg.com/news/articles/2020-04-11/false-negative-coronavirus-test-results-raise-doctors-doubts>

³⁹ <https://www.nature.com/articles/s41591-020-0869-5>

⁴⁰ <https://www.inspq.qc.ca/sites/default/files/covid/2989-asymptomatiques-potentiel-transmission-covid19.pdf>

⁴¹ <https://www.cdc.gov/mmwr/volumes/69/wr/mm6914e3.htm>

a better assessment of the readiness for reopening, and after reopening, to ensure an ongoing “early warning system” is in place to rapidly detect when COVID-19 re-enters the region, before high rates of hospitalization, ICU admissions and deaths occur.

- CONS: The hidden cases of COVID-19 are often unlikely to become highly symptomatic and in need of supportive care in hospital, therefore highly symptomatic patients need to be the priority when testing resources are scarce, and similarly high-risk settings as described below should also be prioritized. Nonetheless, **if sentinel screening is not done, decisions are made based on data from the “tip of the iceberg” and on projections and assumptions based on this limited picture, rather than a more complete representation of what is actually occurring in the community.**

3.3 COVID-19 mass screening (for regions with smaller population sizes)

- PROS: Screening is a well-established, evidence-based public health strategy used for many decades to identify and prevent diseases before symptoms arise or in the absence of symptoms (e.g. screening for high blood pressure to prevent strokes, screening for diabetes to prevent amputation and kidney failure, screening for cancer to prevent death, etc.).⁴² Since a proportion of COVID-19 cases are asymptomatic/presymptomatic “silent carriers” who play a role in the spread of disease,⁴³ and there exists a fairly reliable test to identify COVID-19 cases, as well as a known management strategy that works (i.e. isolate confirmed cases until no longer contagious and do contact tracing to isolate close contacts and test those developing symptoms), therefore the Wilson and Jungner criteria in support of screening are met.⁴⁴ **There are examples of communities who have succeeded in completely eliminating COVID-19 using the mass screening approach where everyone in the entire population with or without symptoms was tested.**⁴⁵ Screening may need to be repeated over several weeks or months to be sure there are no further cases, and borders would need to remain closed (with screening prior to entry and self-isolation for 14 days) to prevent re-introduction of cases.
- CONS: When screening people who are asymptomatic, there is a chance that the person may be at an early stage of incubating the disease and therefore test negative, but a few days or a week later they may test positive or they may be exposed to the virus after their test and still could develop the disease in future. **A negative result when an asymptomatic person is screened is not an “all clear,” and if the person had a high-risk exposure they will still need to remain on isolation for 14 days and monitor for symptoms, and if they develop new symptoms (with or without known exposure) they will still need diagnostic testing,**⁴⁶ and even if they remain asymptomatic, rescreening periodically may be needed until COVID-19 rates in the population are reduced close to zero. The other challenge with mass screening is having sufficient capacity to reach the

⁴² <https://canadiantaskforce.ca/about/>

⁴³ <https://www.inspq.qc.ca/sites/default/files/covid/2989-asymptomatiques-potentiel-transmission-covid19.pdf>

⁴⁴ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2647421/>

⁴⁵ <https://www.bmj.com/content/368/bmj.m1165>

⁴⁶ https://www.inesss.qc.ca/fileadmin/doc/INESSS/COVID-19/COVID-19_INESSS_detection_moleculaire_individus_asymptomatiques.pdf

entire population, process all the tests, and follow-up with the results, do the contact screening of all positive cases, etc. Particularly in highly populated areas, like large cities, or in sparsely populated remote areas, it may not be technically or logistically feasible to screen everyone, but **mobile screening vans to reach people in rural areas or inner city communities, as well as new technologies such as pooled-sample analysis to process a batch of tests simultaneously,⁴⁷ that could increase capacity by 30-fold,⁴⁸ as well, API-based automated cell-phone apps can assist with contact tracing on a large scale.⁴⁹**

3.4 COVID-19 targeted screening (high risk settings)

- PROS: Even if mass screening may not be feasible in some contexts, it is nonetheless important to screen higher risk groups as there is increased benefits of screening, higher test validity in high prevalence populations, fewer feasibility concerns and greater cost-effectiveness.⁵⁰ Unlike diagnostic testing for symptomatic persons, **targeted screening in higher-risk settings is unrestricted (all people with or without symptoms) and is the only way to find “hidden cases” and slow the silent spread of the virus.**

i. **Screening all health workers, staff and patients in health facilities**

There is growing awareness that in areas with ongoing community transmission, hospitals and other health care facilities are hotspots for COVID-19 transmission and can be used as a “litmus test” of how much disease is spreading, in spite of personal protective equipment use (such as masks, visors, gowns, and gloves) which depends on the skill of the user and is often scarce.⁵¹ In one example, all pregnant mothers admitted to hospital were screened, and 1 in 6 tested positive, of which only a small minority had symptoms, demonstrating that without screening, the maternity ward would rapidly become contaminated risking transmission of COVID-19 to newborn infants or infecting other patients, health workers and staff.⁵² Workers may import the virus from home or from other facilities where they work (e.g. as a result of shift work in long-term care facilities or on COVID wards).⁵³ While COVID-19 leads to many sick or older workers isolating and doing telework from home, shift-work and moving between facilities should be strongly discouraged to prevent intra- and inter-facility spread which will only compound the problem. **Increasingly a case is being made to screen all persons in health care settings as the best way to prevent the hidden transmission of disease, protect patients and health workers, as well as their families, and prevent further community spread.⁵⁴**

⁴⁷ https://www.researchgate.net/publication/340388619_Pooled-sample_analysis_strategies_for_COVID-19_mass_testing_a_simulation_study

⁴⁸ [https://www.thelancet.com/journals/laninf/article/PIIS1473-3099\(20\)30362-5/fulltext](https://www.thelancet.com/journals/laninf/article/PIIS1473-3099(20)30362-5/fulltext)

⁴⁹ https://www.researchgate.net/publication/340653410_Strategies_for_mobile-phone_contact-tracing_to_eradicate_SARS-CoV-2

⁵⁰ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2860823/#!po=28.8462>

⁵¹ <https://www.nejm.org/doi/full/10.1056/NEJMe2009758>

⁵² <https://www.nejm.org/doi/full/10.1056/NEJMc2009316>

⁵³ <https://www.cdc.gov/mmwr/volumes/69/wr/mm6912e1.htm>

⁵⁴ <https://www.thelancet.com/action/showPdf?pii=S0140-6736%2820%2930917-X>

ii. **Screening all residents, visitors and caregivers in long term care facilities**

There are many examples of long-term care facilities that have sustained major COVID-19 outbreaks.⁵⁵ Not only are residents living in close proximity, but they are also more likely to have underlying health conditions, and in rehabilitation and elder care facilities, residents are generally over 65 years of age, placing them at greatly increased risk of severe disease and death.⁵⁶ There are many examples of screening in these high-risk settings identifying residents, visitors and workers who are positive (many of whom were asymptomatic or minimally symptomatic) as **one of the only ways to get a handle on the situation that can rapidly spin out of control** and put measures in place that keep at home all visitors and workers who test positive, and isolate or transfer elsewhere residents who test positive to avoid cross-contamination. The only other alternative that could work would be to remove any entry or exit from such facilities before widespread community transmission occurs, making these settings into “closed systems” where staff live-in and do shift work from within the institution.⁵⁷

iii. **Screening all students, teachers and staff in daycares and schools**

While children under age 18 have been relatively spared from severe disease, we are continually learning about COVID-19. As the number of cases increase, it has been shown that even children can be hospitalized, admitted to ICU and die from COVID-19.⁵⁸ When schools reopen, many children with COVID-19 infection will have very mild to no symptoms, yet it has been shown that they can have similar viral loads as compared with adults, and therefore may be as infectious and able to silently transmit the disease.⁵⁹ This could put some children at risk of severe disease, but even more likely, put at risk the people living in the households of the other students, as well as teachers, school staff and people living in their households. **The only way to avoid silent transmission aside from daycare and school closures would be to screen regularly** (e.g. weekly or every couple of weeks). Physical distancing of young children or toddlers in a group setting is highly challenging,⁶⁰ and while there may be some measures that can attempt to reduce contact, it will not eliminate exposure and rapid disease spread in these high-risk settings, as existing examples demonstrate.⁶¹

iv. **Screening all residents and workers in prisons and correctional facilities**

Prisons are often very crowded and have also experienced major outbreaks, in one facility there were over 2,000 COVID-19 positive cases out a total number of

⁵⁵ <https://www.nejm.org/doi/pdf/10.1056/NEJMoa2005412?articleTools=true>

⁵⁶ <https://www.cdc.gov/mmwr/volumes/69/wr/pdfs/mm6915e3-H.pdf>

⁵⁷ <https://www.sherbrookerecord.com/staff-moves-into-manoir-stanstead/>

⁵⁸ <https://www.cdc.gov/mmwr/volumes/69/wr/pdfs/mm6914e4-H.pdf>

⁵⁹ https://zoonosen.charite.de/fileadmin/user_upload/microsites/m_cc05/virologie-ccm/dateien_upload/Weitere_Dateien/analysis-of-SARS-CoV-2-viral-load-by-patient-age.pdf

⁶⁰ <https://bmcpublihealth.biomedcentral.com/track/pdf/10.1186/s12889-018-5302-3>

⁶¹ <https://montrealgazette.com/news/local-news/coronavirus-12-children-four-employees-infected-at-mascouche-daycare>

2,500 persons incarcerated.⁶² As with other facilities where people live in close quarters, screening of all workers, visitors and residents would be important, and special attention is needed for discharge from such facilities to ensure that people leaving have a place outside the facility with sufficient food supplies and proper explanation to self-isolate safely for 14-days and ideally to be tested 5-7 days after departure which is the most likely incubation period when a test may become positive after leaving. In the absence of such planning people may inadvertently import COVID-19 into already at-risk homeless shelters.

v. **Screening all residents and support workers in homeless shelters**

It is well known that persons experiencing homelessness often have difficulty accessing care, suffer from chronic physical and mental health conditions, and have lower life expectancy.⁶³ It is therefore not surprising that there have been major outbreaks of COVID-19 reported in homeless shelters,⁶⁴ and that when screening was done, between 15% and 65% of people screened (including residents and staff) tested positive.⁶⁵

- **CONS:** The shortcomings of screening in high-risk settings is that it does not prevent people re-entering and re-importing the virus from the community back into these settings the next day or the day after that (e.g. workers who go home, pick it up from someone in their household and bring it into the high-risk setting in the following days). **Unless these high-risk settings are made into “closed systems” (see example for long-term elder care) the risk of reintroduction is ongoing,** but at least all newly identified positive cases can be safely managed and contained. Screening is therefore not a one-time solution, but an ongoing strategy.

3.5 COVID-19 border measures to maintain “COVID-free” zones as “closed systems”

- **PROS:** Even if a region becomes completely or mostly “COVID-free” it will not remain so for long if people entering the region unknowingly reimport the disease, and weeks of silent spread may occur before new hospitalizations and deaths signal the resurgence. Therefore, measures need to be in place, labour-intensive and obtrusive though they may be, to ensure that all the hard-work clearing COVID-19 from a region is not wasted. Ideally, people traveling into the region should be on isolation for 7 days prior to arrival and undergo a screening test on day 5-7 to have the best chance of identifying asymptomatic or presymptomatic cases, and those with a negative test and no symptoms entering the “COVID-free” zone should continue to isolate 7 more days and monitor for symptoms. Failure to do so could lead to a silent resurgence that will spread very quickly once the economy is reopened and people are no longer on confinement.

⁶² <https://www.thelancet.com/action/showPdf?pii=S0140-6736%2820%2930984-3>

⁶³ <https://www.bmj.com/content/339/bmj.b4036>

⁶⁴ <https://www.cdc.gov/mmwr/volumes/69/wr/pdfs/mm6917e2-H.pdf>

⁶⁵ <https://www.cdc.gov/mmwr/volumes/69/wr/pdfs/mm6917e1-H.pdf>

i. **Screening all migrant workers and other travellers to Canada**

While Singapore initially had succeeded in containing COVID-19 and was hailed as a success story, later spread of the disease in the cramped quarters of migrant workers led to a resurgence or “second wave” of the disease.⁶⁶ It is important to pay close attention to marginalized populations and to ensure that they receive testing, screening, and other protection measures with instructions translated into their native language, both for the protection of their own health and for the health of others. Low-income neighborhoods with higher rates of recent immigrants and overcrowding can quickly become disease hotspots.⁶⁷

ii. **Screening all people moving from a higher-risk to lower-risk area**

When reopening gradually some areas will have higher rates of COVID-19 and others lower to no COVID-19 cases. To be sure not to reintroduce the virus into areas that are safe and can more freely reopen their economy it would be important to be very cautious to screen and ensure a 14-day self-isolation period for all people entering the lower risk area, since even within the country some locations are high risk, and particularly people who were in any of the above settings in a location with high levels of community transmission.

- **CONS:** As mentioned previously, if a person is traveling from a high risk setting or an area with high prevalence, and is tested in the absence of symptoms, there is a possibility that the test result could be a falsely negative, therefore some positive cases could still be missed, but this would be a far more robust system than symptom screening which has been largely used until now.

3.6 Augmented contact tracing, isolation and cascade screening (ring testing)

- **PROS:** Once a person who is COVID-19 positive is identified (with or without symptoms), isolation is critical in controlling the spread of the disease. People can either isolate at home with a separate bedroom/bathroom and strict handwashing and disinfection practices, otherwise moving temporarily to dedicated housing for people on COVID-19 isolation can help prevent household transmission of the virus.⁶⁸ In addition to the person identified as COVID-19 positive, it is also important for all close contacts to isolate as well for 14 days and monitor for symptoms, and ideally be screened on day 7 after exposure whether or not they have symptoms, a strategy known as ring testing or cascade screening.
- **CONS:** One of the challenges when there are a large number of people testing positive is that public health departments can rapidly become overwhelmed by the sheer numbers and are unable to do contact tracing for every case, needing to abandon a proportion of

⁶⁶ <https://www.nature.com/articles/d41586-020-00938-0>

⁶⁷ <https://www.cbc.ca/news/canada/montreal/montr%C3%A9al-nord-covid-19-highest-rate-1.5548712>

⁶⁸ <https://www.thelancet.com/action/showPdf?pii=S0140-6736%2820%2931016-3>

these to focus only on high-risk settings and COVID-19 hotspots that threaten much wider spread. However, this is dangerous as there are missed opportunities for prevention and reducing spread in the community at large. In situations like these, though contact tracing is specialized work that cannot simply be replaced by technology,⁶⁹ many countries are turning to Bluetooth enabled cellphone apps (APIs) to help track, identify and notify contacts, which may be a useful adjunct to other public health measures above, but not without potential pitfalls and concerns.⁷⁰

3.7 Ongoing physical distancing, respiratory etiquette, hand hygiene, and disinfection

- PROS: In addition to the above, individual measures will continue to be required. COVID-19 virus is spread by droplets created when an infectious person coughs or sneezes, therefore remaining at least 2 meters away from others,⁷¹ and wearing a cloth mask in public to avoid coughing or sneezing and spreading the virus unsuspectingly. Droplets can land on surfaces like tables or get onto a person's hands, and from hands can spread to doorknobs and light switches, and are then called "fomites," which are detectable on surfaces and may remain infectious for several hours or longer.⁷² If a person touches the contaminated surface and then touches their mouth, nose or eyes, they can potentially infect themselves. Fortunately, hands can be cleaned by thorough handwashing or using alcohol-based hand rub.⁷³ Contaminated surfaces can be disinfected killing the virus using diluted bleach,⁷⁴ or other recommended cleaning agents.⁷⁵ Ongoing physical distancing, respiratory etiquette (ie. cough into your sleeve or tissue), washing hands often,⁷⁶ wearing a mask, and regularly disinfecting surfaces is recommended.⁷⁷
- CONS: These measures, while important and effective, rely heavily on human factors, and therefore may not occur diligently during every interaction. Many community leaders have been discouraged and frustrated when people do not understand the risks and openly defy preventive measures,⁷⁸ not realizing that they can feel safe because these measures are in place. Diagnostic testing and screening are still needed to identify as many of the positive cases as possible to ensure isolation and contact tracing, which is critical to reducing community transmission, which largely occurs through household spread, travelling together and frequent contact with the index case,⁷⁹ as well as "superspreading events" such as family gatherings and communal meals.⁸⁰

⁶⁹ <https://www.cdc.gov/coronavirus/2019-ncov/php/principles-contact-tracing.html>

⁷⁰ <https://www.brookings.edu/techstream/inaccurate-and-insecure-why-contact-tracing-apps-could-be-a-disaster/>

⁷¹ [https://www.ajemjournal.com/article/S0735-6757\(20\)30178-9/fulltext](https://www.ajemjournal.com/article/S0735-6757(20)30178-9/fulltext)

⁷² <https://www.nejm.org/doi/pdf/10.1056/NEJMc2004973?articleTools=true>

⁷³ https://wwwnc.cdc.gov/eid/article/26/7/20-0915_article

⁷⁴ [https://www.journalofhospitalinfection.com/article/S0195-6701\(20\)30046-3/fulltext](https://www.journalofhospitalinfection.com/article/S0195-6701(20)30046-3/fulltext)

⁷⁵ <https://www.canada.ca/en/health-canada/services/drugs-health-products/disinfectants/covid-19/list.html>

⁷⁶ <https://www.canada.ca/content/dam/phac-aspc/documents/services/diseases-maladies/reduce-spread-covid-19-wash-your-hands/eng-handwashing.pdf>

⁷⁷ <https://www.cdc.gov/coronavirus/2019-ncov/community/disinfecting-building-facility.html>

⁷⁸ <https://www.youtube.com/watch?v=KxtGJsnLgSc>

⁷⁹ <https://www.sciencedirect.com/science/article/pii/S1473309920302875>

⁸⁰ <https://www.thelancet.com/action/showPdf?pii=S0140-6736%2820%2930462-1>

4 Additional “exit strategies” that could work in the longer term

4.1 Antibody testing to assess levels of existing immunity

- PROS: There is hope that antibody testing for COVID-19 could be a useful way to assess who is safe to return into the community to work without risk of severe disease or death.⁸¹ Those with high antibody titres would be presumed “safe” and those who do not have evidence of prior exposure to COVID-19 would be considered at much higher risk and advised to take greater precautions to protect themselves.
- CONS: There are still many unknowns and concerns raised regarding the validity and utility of antibody testing.⁸² If a person has a high antibody titre, does this confer complete or partial protection from developing severe disease? Does immunity wane over time? How long does this protection last? Will the person need to further boost their immunity (e.g. repeat vaccination)? There is a great deal of promise, but many questions remain, and need to be answered to know how to interpret these results.

4.2 Mass vaccination for COVID-19

- PROS: Mass vaccination for COVID-19 would in principle be the safest option to confer protection from this disease, minimize deaths and disruption to the health system, and ensure that people with non-COVID related health needs can continue to access care safely. There are over 100 different candidate vaccines under development around the world,⁸³ and many are entering into the clinical trial phase.⁸⁴
- CONS: The challenge is that it will take many months and more than a year to develop a vaccine with proven efficacy and safety required prior to mass deployment. Though many clinical trials are underway, there remains many unknowns, including concerns about the possibility of “vaccine-enhanced disease.” Even after a safe and effective vaccine is developed, there will still be issues around production to scale, acquisition, mass distribution and administration to achieve herd immunity.

5 Conclusions and next steps

Many countries have been trying to find approaches to loosen the restrictions that have been implemented to protect the population from COVID-19 related death and disease as these same

⁸¹ <https://www.mcgill.ca/newsroom/channels/news/canada-launches-serological-testing-initiative-help-manage-covid-19-321802>

⁸² <https://jamanetwork.com/journals/jama/fullarticle/2764954>

⁸³ <https://www.who.int/ictcp/en/>

⁸⁴ <https://www.research.ox.ac.uk/Article/2020-04-23-oxford-covid-19-vaccine-begins-human-trial-stage>

measures can also be detrimental to the economy, to people's mental health and well-being, and to civil liberties, thus requiring a complex balancing of multiple considerations.⁸⁵

Many provinces across Canada are also contemplating what measures need to be in place to allow for a gradual reopening.⁸⁶ These plans all have one thing in common, they are gradual and multi-staged.⁸⁷ However, while discussing what sectors will reopen and when, more information is needed on the safeguards that will be in place before, during and after the gradual reopening.⁸⁸

5.1 Ethical considerations underpinning population-level decisions

There has been a great deal written on the ethical approaches to protecting populations whereby there is a ladder of intervention whereby restrictions on the individual or society must be proportional to the risk of population harm.⁸⁹ Any intervention, including the intervention to relax confinement measures, should strive to maximize benefits, minimize harms, and importantly, consider the distribution of benefits and harms to avoid some groups getting most of the benefits (e.g. young and healthy people returning to work and school), while others are burdened with most of the harms (e.g. people living in long term elder care facilities, people in prisons or homeless shelters, people living with disabilities or other underlying health conditions, health workers and their families, other essential workers and their families, and people needing regular medical follow-up unrelated to COVID-19 who are unable to avoid going into hospital settings, becoming infected and dying in greater numbers).⁹⁰

5.2 The best- and worst-case scenarios

The best-case scenario would be a reopening after the threat of COVID-19 spread has passed or been eliminated (e.g. by vaccine administration, by testing widely for natural immunity post-exposure, by extensive screening and augmented contact tracing efforts as described above), thereby allowing the economy and people to flourish safely. The success of such an approach would be measured by **(Box 4)** fewer COVID-19 positive cases in spite of widespread screening of symptomatic, mildly symptomatic and presymptomatic/asymptomatic people including those living in high-risk settings and in the population at large; fewer hospital admissions and deaths; less economic and human burdens and disruptions; as well as a decision-making process based on complete data (beyond the "tip of the iceberg"), with widespread agreement among experts, the general public and groups that stand to be harmed the most by the reopening.

The worst-case scenario would be a premature reopening in the absence of sufficient capacity for diagnostic testing, widespread screening (at least in high-risk settings), rapidly isolating positive cases,

⁸⁵ <https://www.isglobal.org/en/-/isglobal-lanza-una-serie-de-documentos-analizando-la-estrategia-de-desconfinamiento-ante-la-covid-19>

⁸⁶ <https://www.saskatchewan.ca/government/news-and-media/2020/april/23/reopen-saskatchewan-plan>

⁸⁷ <https://files.ontario.ca/mof-framework-for-reopening-our-province-en-2020-04-27.pdf>

⁸⁸ <https://www.quebec.ca/en/health/health-issues/a-z/2019-coronavirus/gradual-resumption-activities-covid19-related-pause/>

⁸⁹ <https://www.nuffieldbioethics.org/publications/public-health>

⁹⁰ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1446875/>

and contact tracing for every single positive test result. It is now widely recognized that many people with COVID-19 infection have few or no symptoms that contributes to “silent spread” and they can test positive for 2-4 weeks or more, leading to a high death toll and excessive pressure on the health care system, as we have already seen in some countries, without bringing much economic revival or benefit.

Therefore, many safeguards would need to be in place before any decision to go ahead with reopening and these safeguards must also remain in place during and afterwards to provide ongoing control of the spread of disease and prevent aftershocks.

Box 4: Process and outcome measures to gauge a safe and just reopening

Process measures

- High level of public health expert consensus on readiness for reopening
- High level of population engagement and support for communal decisions
- Completeness of data for decision-making (e.g. beyond tip of the iceberg data)
- Hearing the voices of various population subgroups, including those who are more marginalized and could sustain the most harms from early reopening
- Transparency in communicating the rationale underlying decision-making

Outcome measures

- Fewer COVID-19 hotspots and outbreaks
- Fewer asymptomatic and symptomatic COVID-19 positive cases
- Fewer hospitalizations and ICU admissions
- Reduced overall mortality and long-term morbidity from COVID-19
- Reduced burden on health system and health workers
- Minimize and shorten the duration of economic and service disruption
- Reduced burden on individuals and families due to confinement measures
- Reduced burden on businesses and workers
- Reduced costs for governments of economic bailout measures
- Reduced inequities for specific population subgroups (e.g. low SES, elderly, racialized minorities, people living with disabilities or other underlying health problems requiring ongoing care, people experiencing homelessness, etc.)