

Corona -19 Pandemic Real Estate

Risk Management APRIL UPDATE

2020 rv1.1

APRIL 10 2020

AMGhome +JV

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CRISIS PLAN



It is April 10, 2020. The reality has set in for society that it will not be negotiating a way out of this pandemic. The science of the virus is still being discovered. What we do know; it does not care about political narratives or economic models. Decisions need to be made based on science and facts rather than convenience and expediency.

Provincial shutdown measures have increased as hospital admissions have edged the population closer to current ICU bed capacities in both Ontario and Quebec. By the end of this week, citizens will have access to essential services only in Ontario. These were the necessary steps in containing COVID-19 and buying the province time; to produce equipment, medicines, therapies and an eventual vaccine. With Canada looking at 20% contraction in GDP for this year, the Canadian government is injecting 1.9 billion dollars in the economy. These are the facts.

With these uncertain times, we present these series of whitepapers with our research to help protect our tenants, clients, and assets.

**“It is our goal to prevent, protect and preserve the communities
where we live and invest.”**

This is what we do. *Know, learn, communicate and execute.* Should you have any question in regards to our operations and analysis, do not hesitate to contact us.

Sincerely

Michael Chan B.Arch, PMP, MRAIC
Managing Partner
AMGhome +asset management

Three Principals Analysis

Where are we now?

The three main principals/policies that are being developed and enacted in Canada. Our guidance are based on these policies.

1. *Social Distancing + Mask (Mitigating Asymptomatic Virus Spread)*

The Canadian government will be very cautious to remove restrictions as the healthcare will still be in recovery mode for provinces of Quebec and Ontario. While there is a critical supply shortage of equipment/medicine, this caution will definitely remain. The next several months will see a resupplying of hospitals, long term care homes and clinics so they can resume clinical operations which they have suspended. Pg.16 and 26

2. *Surveillance and Isolation (Containing Infection and Contact Tracing)*

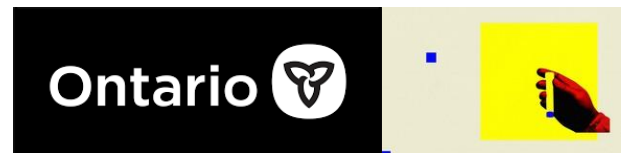
Canada is still developing a program of contact tracing. We currently do not have robust testing/tracking system. Pg. 25

3. *Therapy and Vaccines (Managing better outcomes)*

Globally there are no tools for this outbreak that have proven to work beyond small studies or anecdotal evidence. There are multiple blind studies being conducted at a clinical trial stage. The earliest approved therapy is still 2-3 months away. The earliest available vaccine is still 12-18 months way. Pg. 23-24 and 28

“Social distancing and working from home will be enacted into the summer months of 2020.”

Schedule of Effort



COVID-19 Plan in Province of Ontario and Canada:

Phase 1 – January 15, 2020

Discovery - Identification of First Case in Canada

Phase 2 – March 14, 2020 – June (minimum)

Mitigation – Reduction of Infection, Behavioral Change

Prevent – Approved FDA blood plasma – transfusion for critical patients

Economic Changes: Restricted to Essential Work/Travel and Social Distancing

Phase 3 – May -July

Surveillance and Isolation – Population Contact Tracing and Covid 19 Testing

Supply Production – More Drugs, Ventilators, Masks, PPE, Tests

Economic Changes: Work from Home Policies Enacted

Construction / Industrial / Retail / Restaurant/ Building Occupancy Restrictions

Flight Restrictions And Social Distancing

Phase 4 – September-December

Prevent – Approved Therapies and Population Wide Testing

(immunity boosters, viral inhibitors, Covid 19 Testing and Antibody Testing)

Economic Impact: Restricted Gatherings and Social Distancing

Tourism Restricted and Schools Restart

Phase 5 – 12 - 24 months

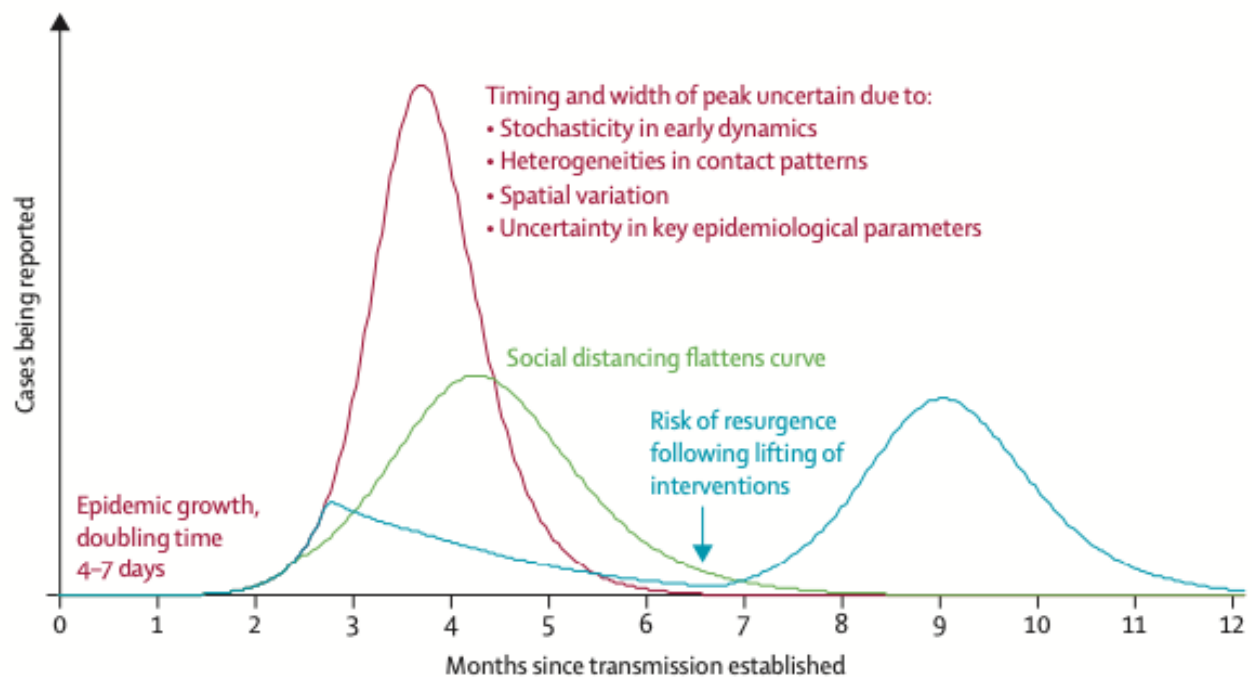
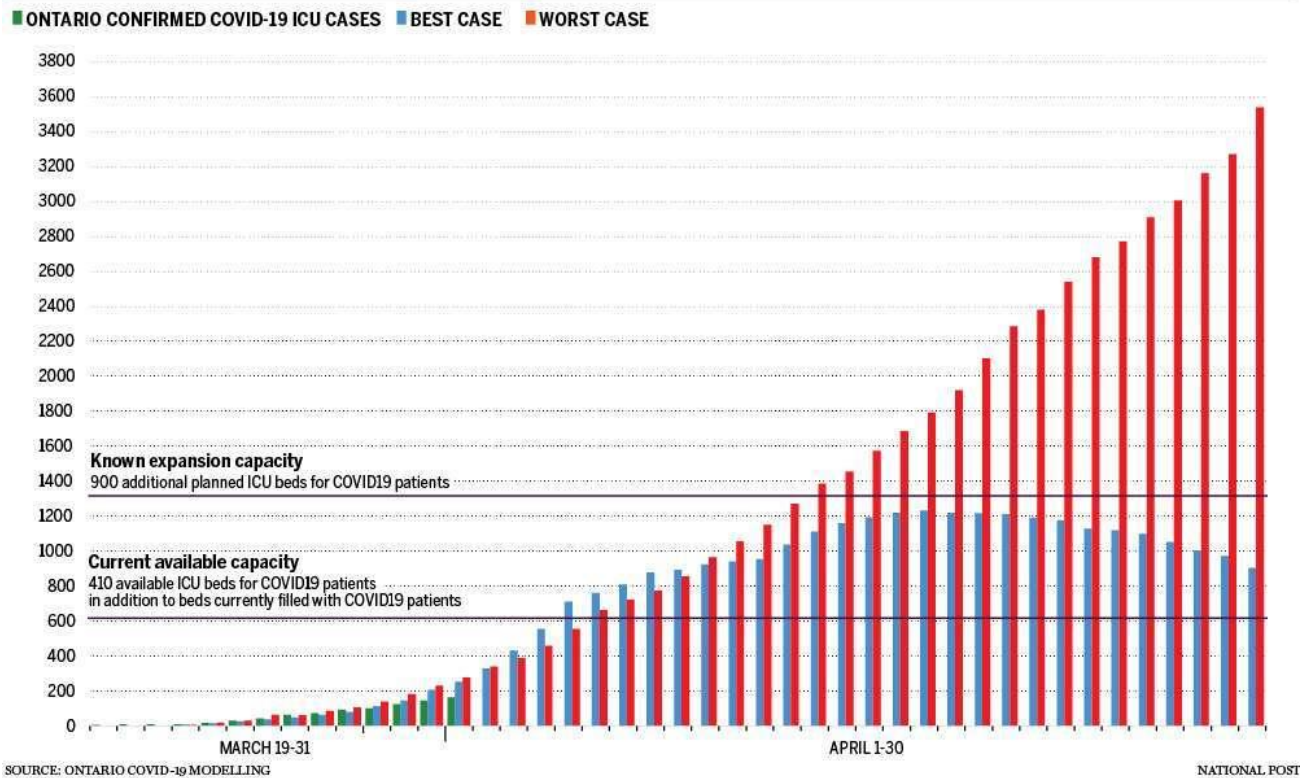
Eradication – Requires a Vaccine

Herd Immunity (requires minimum 70-85% population infection)

Economic Impact: Social Distancing, No Large Gathering without Containment

Ontario Capacity and Curve

ONTARIO ICU CAPACITY FOR COVID-19



Portfolio Risk Management

1. More Communication
2. Being proactive
3. Learning to be patient

No quick decisions are made in real estate. The result of any actions are measured in weeks and months. We are still gathering information, so we can be proactive. **Learning what information to monitor in this evolving situation is critical.**

We will make decisions based on tenant and financial institution communications; government intervention and/or programs as they are introduced and implemented. We are currently looking at creating several options and applying solution(s) based each individual asset and tenant profile need(s). The goal is protecting tenants, employees, reducing financial risk and capital preservation.

Asset Protection - Action

Review of systems

Currently we have suspended all operations other than emergency construction and repairs. All work is being completed in single staff isolation. All protective gear and equipment usage are being enforced.

With all site work suspended we will be dedicating time and resources to evaluate current operational procedure and standards. In addition to this operation pivot, we will be researching and monitoring options, programs, policies as they present themselves in this new economic environment for the next 48 months or longer.

Review of revenue streams

Current Fixed Stream:

Rental Income(s)	<i>Monitored</i>
Insurance	<i>Monitored</i>
Property Tax	
Utilities	<i>Monitored</i>

Variable Stream:

Tenant Service(s)	<i>Increased</i>
Employee(s)	<i>Reduced</i>
Capital Investment(s)	<i>Suspended</i>
Lines of Credit(s)	<i>Increased</i>

Mortgage and Financial Commitments

Financial Institutions / Mortgage Brokers / Government of Canada

The option of deferred mortgage payments, in which the payment vacation will be applied to the end of the term or the amortization period, is preferred over using lines of credit or reserve capital. We have consulted with our financial institutions (RBC, Scotiabank, TD), other landlords (CLVG, Minto) and mortgage brokers (Debbie Belair, Mortgage Brokers Ottawa, 360 Mortgages). We have made the decision for the mortgage deferral across our portfolio. At this point in time, we have 80% of the portfolio deferred in advance of any tenant default. This will build the reserve funding for dealing with tenant defaults beyond the 6-month period this crisis is now projected to persist.

“We are looking a repaying all deferred interest payments at the end of this deferred period.”

Tenants

We have contacted all tenants. The current default rate in rent is 7.2%. We have adjusted our projection to: 35% exposure to rental default at the apex of this shutdown. The national average of rental default for the month of April was 15%. We project a 5-12% vacancy loss rate, however this will be covered by the tight vacancy rate of 1.5% in Ottawa. These numbers many rise further due to employment changes. We are encouraging tenants to apply for federal, provincial and municipal assistance that have been created for them to help pay the rent/utilities/groceries temporarily.

We maintain two programs to help them out.

1. Full Rental Deferral (2 months deferral and 12 month payback)
2. Lowered Rent Payments with Partial Deferred Rental Payment Program (6 months deferral + 8 months payback).

Federal – Government – Economic Risk Reduction

Government introduces Canada Emergency Response Benefit to help workers and businesses

The CERB would cover Canadians who have lost their job, are sick, quarantined, or taking care of someone who is sick with COVID-19, as well as working parents who must stay home without pay to care for children who are sick or at home because of school and daycare closures. The CERB would apply to wage earners, as well as contract workers and self-employed individuals who would not otherwise be eligible for Employment Insurance (EI).

Additionally, workers who are still employed, but are not receiving income because of disruptions to their work situation due to COVID-19, would also qualify for the CERB. This would help businesses keep their employees as they navigate these difficult times, while ensuring they preserve the ability to quickly resume operations as soon as it becomes possible.

Canadians who are already receiving EI regular and sickness benefits as of today would continue to receive their benefits and should not apply to the CERB. **If their EI benefits end before October 3, 2020, they could apply for the CERB once their EI benefits cease**, if they are unable to return to work due to COVID-19. Canadians who have already applied for EI and whose application has not yet been processed would not need to reapply. Canadians who are eligible for EI regular and sickness benefits would still be able to access their normal EI benefits, **if still unemployed, after the 16-week period covered by the CERB.**

Provincial – Government

3-1-1 or (613) 580-2400

Ontario Works financial assistance may be available for **basic living expenses** and health expenses.

All Ontario Works and ODSP cheques are being issued as usual at the **end of the month**. Ontario Works clients may call or email their caseworkers, as needed.

Municipal – City of Ottawa

Employment and Social Services

Residents / Tenants in need of **emergency financial assistance** (i.e. medical needs, trouble paying utility bills, **housing arrears**, etc.) can call 3-1-1 and press 4 for social services.

All Rent Geared to Income and **Rent Supplement** programs are suspending all documentation requirements and annual updates. These financial supports will continue as usual.

Review of Housing Market March 2020

Ottawa Housing Market

March's average sale price for a condominium-class property was \$369,311, an increase of 27.3% from this time last year while the average sale price of a residential-class property was \$559,739, an increase of 16.5% from a year ago.

"The Ottawa real estate market seems to have withstood the pressure of a worldwide economic event in March, however in context with our market's performance up to this point, we can see the underlying effect. **Before the pandemic, monthly unit sales were increasing between 10-16% from 2019, while March's sales were just on par with a year ago. This is an indicator that there has been a slowdown in the real estate market** due to Covid-19." reports Deborah Burgoyne, Ottawa Real Estate Board President.

Downward Housing Pressures

- In conjunction with prolonged labour stoppages and the stock market wiping out +30% of value; a proportion of house purchasers will not be able to make a house purchase in the next 18 months.
- Mentally harder to make a housing purchase during a recession.
- Banks will be conservative with lending practices until they know which way this market is going to land.
- Less of Jobs / No Summer Jobs (Contraction in Job Market)
- Loss of Personal Savings / Capital (Job Loss / Market Losses)
- Companies will Re-organize / Preserve Capital

An adjustment in economic activities permissible starting in May 2020 will not give us enough data on job/risk recovery. We will not know the complete impact on the housing market until a full restart.

We believe now the outcome of housing markets will take 24-48 months to recover from this recession and the GDP drop of 10% moving forward. Recovery may take the form of aggressive government employment programs; **quantitative easing would expose global currencies to fluctuation of 10% and affect countries' overall CPI.** We project this recovery and adjustment period to be introduced in September-October as economic restrictions are fully lifted and the fallout fully accessed. Financial markets (TSE/DOW/NASDAQ) should recover faster between 8-36 months. **Economic losses should not be proportional to Market losses.**

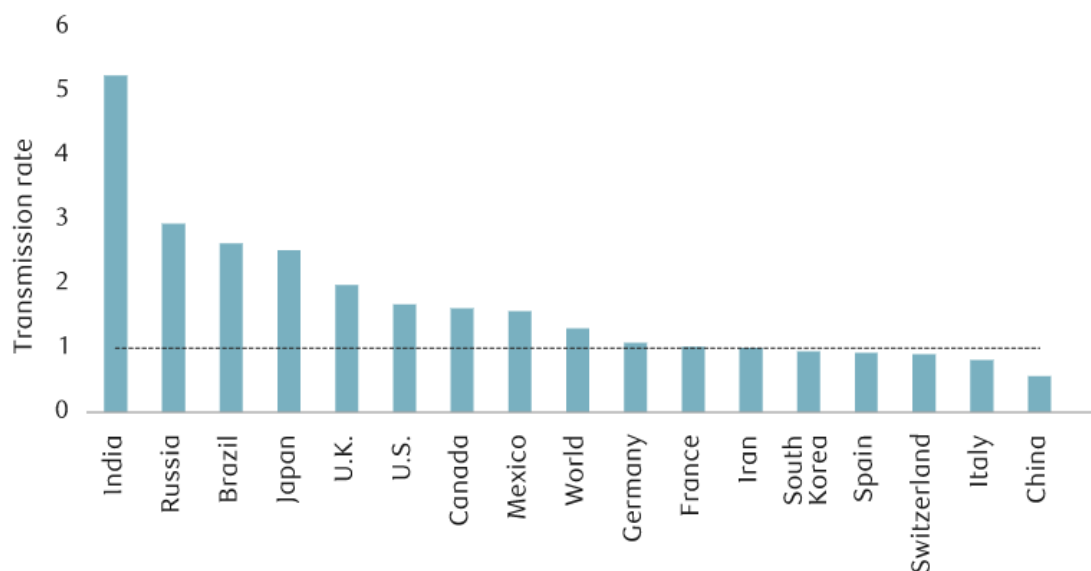
COVID-19 hit to housing market is just the beginning of a tough period

Canada's housing market passed a major inflection point mid-March. Early results from local real estate boards show a sharp drop-off in home resales in the second half of the month after what was a strong first half. We expect activity to slow to a crawl in most markets across the country in April and for as long as social distancing and lockdown measures are in place. **Home prices held up well overall in March**—strengthening further in both Toronto and Vancouver—**though it's unclear how long this can continue. We expect property values to come under increasing downward pressure the longer restrictions persist and the deeper the recession gets.** Super thin activity also makes the market prone to erratic price moves.

Timing – Normalization - When do the market re-open?

It is important to look at indicators like size of government programs and their duration to understand the scope of restrictions and recovery. With the multitude of data and charts currently produced daily it can be hard to navigate. There is one main indicator is Transmission Rate, graph 1-1. This will drive the economic considerations of reopening and/or restricting activities. **Canada needs to get below 1 in transmission rate before it should consider resuming normalized economic activities.**

Transmission rate above one suggests continued growth (based on new cases)



Source: ECDC, Macrobond, RBC GAM

Graph 1-1

Micro Economics

Ottawa GDP by sector

Industry sector	% of total GDP
High tech	18.90%
Federal government	18.20%
Tourism	2.10%
Health and education	7.50%
Finance, insurance, real estate	10.40%
Trade	9.40%
Construction	4.00%
Primary (mainly rural output)	0.90%
Others	28.60%
Total	100.00%
Risk Total	45.1

Source: City of Ottawa

- a. **The sectors at immediate risk: restaurants, retail and hospitality. The sectors which will also experience a minor contraction: banking and construction. The City of Ottawa total exposure to these risks are 35.3%. The total exposure in our portfolio is 21.4%**
- b. **Canadian purchasing power will significantly decline in the near future as nearly one-third (32%) of small business owners admitted that they are not sure they will reopen after the COVID-19 crisis, according to a new study.**

The recent survey by the Canadian Federation of Independent Business (CFIB) also found that on average, small businesses lost around \$160,000 due to the fiscal and economic ravages of the pandemic.

- c. We expect the **capital markets to continue into its decline into 40% loss territory while real estate values drop by 10%.** In periods of transition and change, more investors will change mindsets and economic views. The result of this action will have some investors

converting asset classes. Based on this volatility there will be financial opportunities for investors enter/exit those different asset classes.

1. *Residential values are going to depress. Depending on the severity of the economic downturn we are expecting a 5-8% equity loss for the next 18 months. The recovery is expected to take 48 months. (March 25, 2020) **This outlook is unchanged.***
2. Commercial real estate is the most exposed asset class. In this economic downturn businesses will look to contract or need to close locations. Commercial properties will lose equity value in the near and mid term.

Macro Economics

RBC Capital Markets APRIL 10, 2020

- Real-time economic indicators suggest the economic damage may be even greater than initially assumed given **massive jobless claims, a sharp decline in credit card usage** and data from a host of other technology-enabled indicators.
- Prominent epidemiologists continue to predict 100,000-plus deaths in the U.S. and argue that **many months of quarantine will prove necessary.**
- The exit strategy remains unclear. Yes, it would appear that the world can control COVID-19 via quarantining. ***But can everyone really then return to work while rogue cases invariably lurk? Several additional difficult steps may prove necessary.***
- **Real economic damage is occurring and recall that the business cycle was already looking stretched when this cataclysm arrived**
- More fiscal stimulus has been announced in the first month since COVID-19 became a global problem than in the first several years of the global financial crisis. **Multiple countries are approaching a fiscal push worth 10% of GDP, and more are likely.**
- Monetary stimulus is now pedal-to-metal from a policy rate perspective and U.S. quantitative easing (QE) is now running 11 times faster than was averaged across 2009, all within a month of the shock. In comparison, global financial crisis QE arrived between three months and 16 months after the onset of the crisis (the start date is debatable).
- **The Eurozone is now negotiating what could be further fiscal stimulus worth up to 4.5% of continent-wide GDP.**

“Central Banks are look at a loss of 35% GDP this quarter alone. We are looking at a projected annual GDP loss of 18% for North America.”

Interest Rates

1. The interest rate will remain low for next five years (3%) and the next five years following (below 5%).
2. **There will be a rise in mortgage rates in the near term. “The banks are having to set aside funds to cover rising loan loss reserves, which exacerbates their earnings decline,” Sherly Cooper, Dominion Lending Chief Economist explained. “An unusually large component of Canadian bank loan losses is coming from the oil sector. Still, default risk is rising sharply for almost every business, small and large—think airlines, shipping companies, manufacturers, auto dealers, department stores, etc.”**

The government has reduced interest rate(s) and will (re)introduce quantitative easing measures to stimulate the economy once the pandemic restrictions are lifted. Canada has announced a 1.9 billion stimulus budget package to date. 854 million portion of this budget is based on economic business 48 month loans.

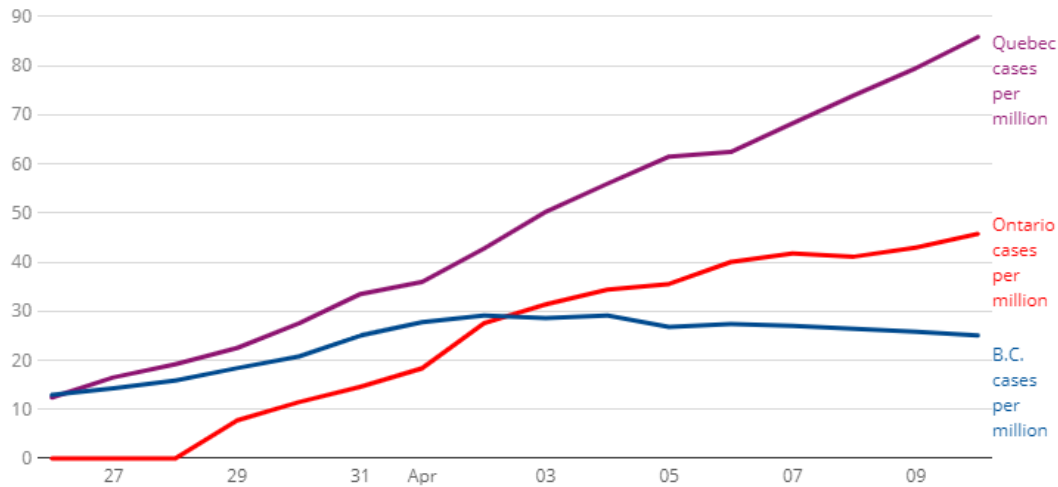
“We are now using economic models from the Great Depression (1923-1935) as way forward and recovery. “



Months of Continued Uncertainty Ahead

While observing other countries and using mitigating strategies, Ontario is still adjusting our provincial and city quarantine guidelines. As evidenced by the Graphs 2-1, Canada still has a large infection case load to work through. In addition to moving off the peak, the federal and provincial governments are still in the process of approving testing programs (ex. Spartan Bioscience DNA assay). Without any exit strategy to the quarantine due to a lack of data, economic and social restrictions will remain until June 2020. We forecast changes going into September 2020 and beyond.

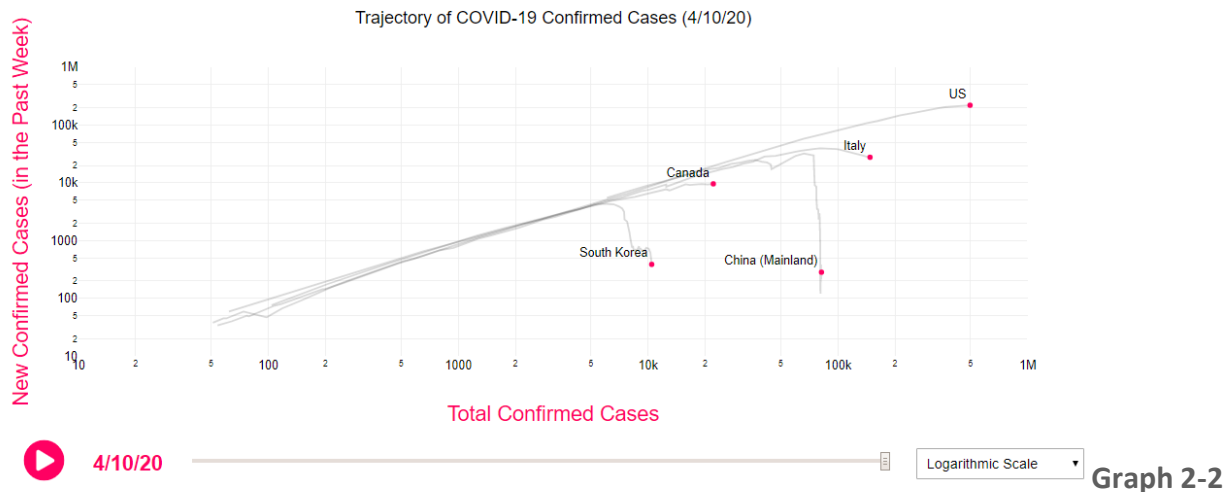
Per capita COVID-19 hospitalizations in Ontario, Quebec & B.C.



Graph 2-1

"The problem is this virus is spreading so fast, which means there are too many people who get sick at the same time and you collapse the hospitals, so it just doesn't go together. **While children appear to be less affected by the COVID-19 virus than adults, they act as carriers. They can still be a driver of the whole infection in society.** They are an engine, basically." Dr. Söderberg-Nauclér.

"1918 Spanish Flu went on for three flu cycles thru to 1920"



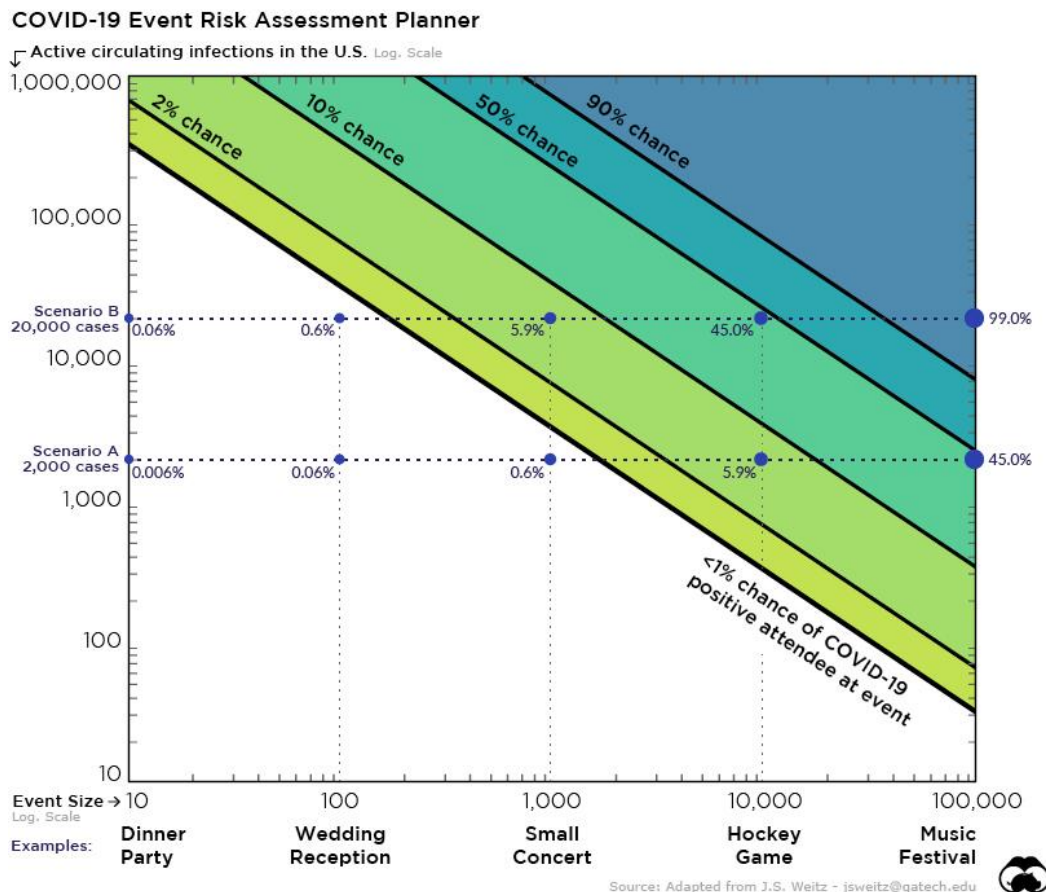
Graph 2-2

Darpa/Gates Foundation Funded Study – Abstract

“The novel coronavirus (2019-nCoV) is a recently emerged human pathogen that has spread widely since January 2020. Initially, the basic reproductive number, R_0 , was estimated to be 2.2 to 2.7. Here we provide a new estimate of this quantity. We collected extensive individual case reports and estimated key epidemiology parameters, including the incubation period. Integrating these estimates and high-resolution real-time human travel and infection data with mathematical models, we estimated that the number of infected individuals during early epidemic double every 2.4 days, and the *R_0 value is likely to be between 4.7 and 6.6. We further show that quarantine and contact tracing of symptomatic individuals alone may not be effective and early, strong control measures are needed to stop transmission of the virus.*”

Los Alamos Study – Abstract

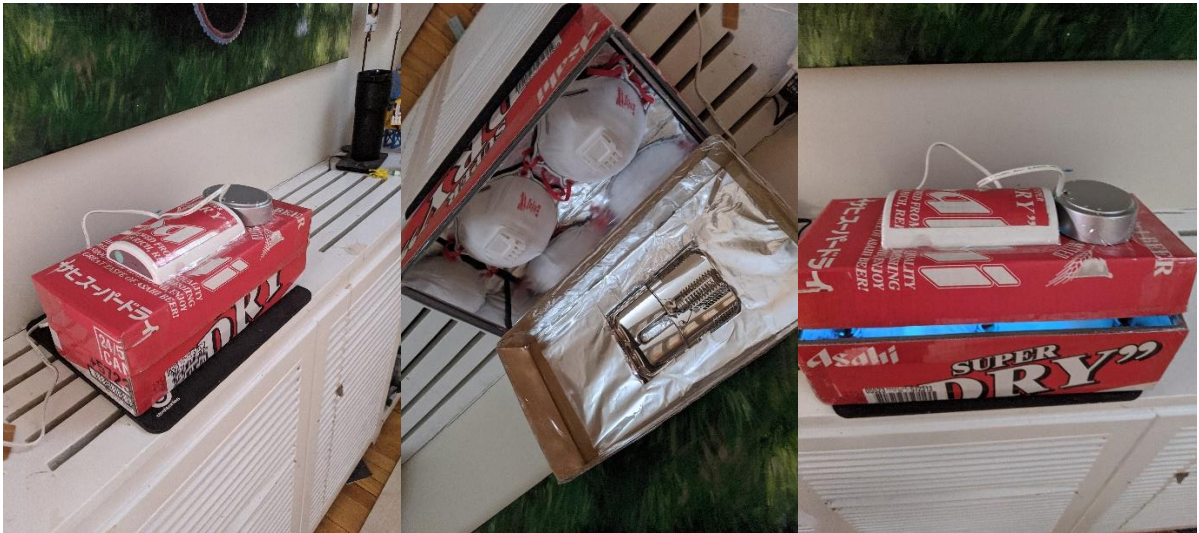
“At the rate of spread calculated in this study, some 82% of the population would need to be immune, either via a vaccine or because they’d already had the disease, in order to stop the virus from spreading, the Los Alamos team said. Without such protection, high levels of social distancing will be needed if more than one out of five infectious people is undiagnosed, the authors said.”



Community - Action

AMGhome +service

1. We prototyped our first UV-C portable sanitizing unit for PPE N95 Masks. We are currently in testing phase and look at procuring more supplies to create these to use as an intermediate measure until the supply chains are ramped up and restored.



Guidelines for UV-C decontamination:

UVGI:

A UV-C lamp (80W, 254 nm) is used to expose the contaminated FFRs to UV radiation ($\geq 1 \text{ J/cm}^2$ total dosage) for 15 minutes on each side of the mask (outer and inner). Use of this method resulted in an average log reduction of 4.81 of viable virus. Both dosage and wavelength of UV light are critical for inactivation, and when designing a procedure, user must bear in mind that UV light is based on line-of-sight, and any part of the mask in shadow will not be disinfected. Further, it is vital to ensure that UV-C dosage is measured at the mask as dosage can be significantly reduced with increased distance from the source(s). One potential problem with implementing UVGI disinfection is penetration to the inner layers of some mask designs, which may not be exposed to the same dosage. Certain strap designs prone to twisting may also inhibit UVGI disinfection and a secondary disinfection step only applied to the straps of the mask may be necessary to counteract this.

While testing has shown that exposure to UVGI does not reduce the aerosol penetration to above 5%, statistically significant increases in penetration do occur meaning that repeated use of this method of disinfection will degrade masks over time. However, anecdotal evidence from facilities like the University of Nebraska where mask reuse has been fully implemented using UVGI light disinfection protocols suggests that the repeated usage of the mask leads to degradation far faster than the disinfection protocol does. At that facility the average number of times masks have been able to be reused is 3 times before fit testing failures are observed, whereas masks were run through the ***UVGI disinfection protocol 50 times before significant degradation*** of seal integrity was observed.

2. We are mobilizing with Homedepot MRO, PUPS storage, Goodfellow Flooring and Lithuania lighting to develop and create mobile clinics which can be shipped and built in 72 hours to any commercial retail/office building site with hydro power.



3. We have dedicated eight beds in three separate units to help our existing tenant(s) **isolate** from their current roommates or family should they develop symptoms and test positive for COVID-19. These units will be maintained and held vacant until this pandemic is over. Our are completing another unit this coming week.

References

Dr. Fauci, NAID, USA - March 05 2020 – April 10 2020

Dr. Kim Woo-joo Guro Hospital, South Korea – March 27 – April 10 2020

PM Justin Trudeau / Canadian Government Daily Update – March 15 -April 10 2020

Govenor Andrew Cuomo – March 15 -April 10 2020

John Hopkins University

Darpa / Gates Foundation

RBC Economics / Global Markets

National Post / Canadian Press

CDC.gov

https://wwwnc.cdc.gov/eid/article/26/7/20-0282_article

medrxiv.org

<https://www.medrxiv.org/content/10.1101/2020.02.07.20021154v1.article-metrics>

theAtlantic

<https://www.theatlantic.com/category/what-you-need-know-coronavirus/>

Data Dashboards

Provincial Infection Timeline Graph

<https://scivero.com/en/visualizations/coronavirus>

Global Country Dashboards

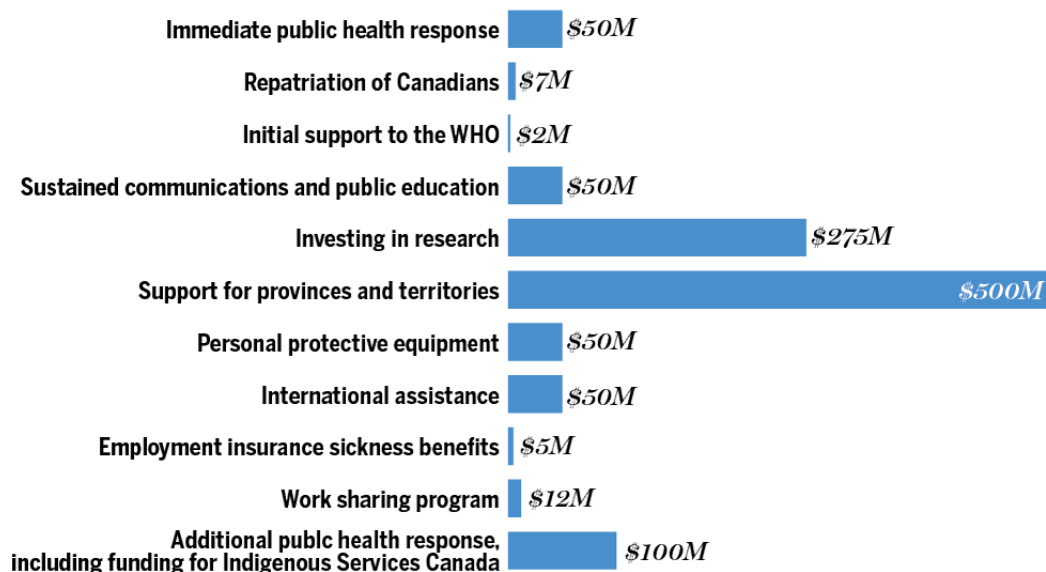
<https://dash-coronavirus-2020.herokuapp.com/>

<https://aatishb.com/covidtrends/>

Infomatics and Research – Appendix

1st Billion Announcement Federal Government of Canada

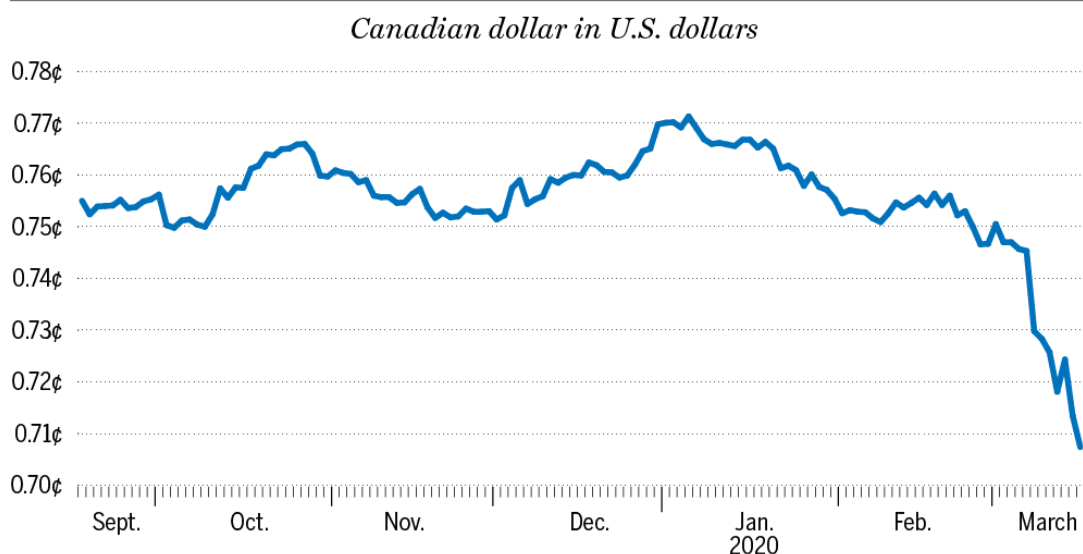
HERE'S WHAT OTTAWA'S \$1.1B COVID-19 FUND IS BEING SPENT ON



SOURCE: GOVERNMENT OF CANADA

NATIONAL POST

LOONIE IN TAILSPIN

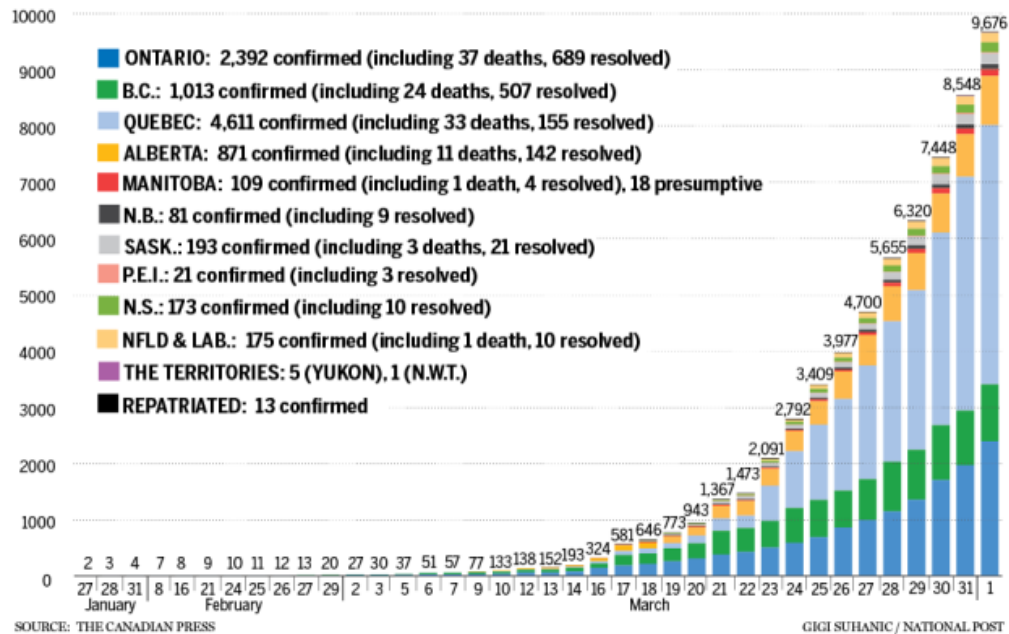


SOURCE: BLOOMBERG NEWS

GIGI SUHANIC / NATIONAL POST

THE RISE OF COVID-19 IN CANADA

Cumulative confirmed and probable cases by date of reporting, April 1 as of 5:05 p.m. EDT



FIGHTING THE PANDEMIC

Vasudev Bailey, PhD @vasudevbailey
Zoe Guttendorf @zoeguttendorf

Healthcare innovations to combat Covid-19

Technological and scientific innovations in **diagnostics** to help identify positive cases, **treatments** to alleviate or cure, and **vaccines** to prevent potential future infections.



DIAGNOSTICS

40 **41** 42

Regulatory authorized diagnostic tests



TREATMENTS

22 **23** 24

Assets in human clinical trials



VACCINES

4 **5** 6

Assets in human clinical trials

DIAGNOSTICS

Diagnostic Test Type

Scientific assay/technology used for detection

35

Polymerase chain reaction (PCR)

3

PCR - Point-of-care

2

Next-generation sequencing (NGS)

1

Isothermal amplification

Diagnostics Approval Status

FDA-Emergency Use Authorization

20

CE mark (approval to sell in Europe)

17

Lab developed test (LDT)

1

Discontinued

~~3~~

Result Time

Based on time for assay to run

< 1 hr

7

2-8 hr

23

12+ hr

11

TREATMENTS

Treatment Goal

End purpose of drug being developed



6



Treat symptoms



12



Anti-inflammation



5



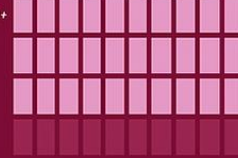
Anti-viral growth

In Development

Preclinical



30+



Phase of Development (Clinical Trials)

30+

1

2

1

6

4

5

1

1

~~2~~

Preclinical candidates

Innovations not yet in clinical trials

Observational

Ph I

Safety, side-effects/dose

Ph I/II

Effectiveness/safety

Ph II

Ph II/III

Ph III

Confirm effectiveness

Ph IV

Risk-benefit/best use

Emergency use

Failed Trial

VACCINES



Vaccine Candidates

41

Currently in early development (preclinical)

Vaccine Platform

Mechanism being used for vaccine development

3

DNA

1

Inactivated

1

Live Attenuated Virus (LAV)

5

Non-replicating viral vector

15

Protein subunit

3

Replicating viral vector

7

RNA

1

Virus-like particle (VLP)

5

Unknown

Current Clinical Treatment Research

TREATMENTS

Vasudev Bailey, PhD @vasudevbailey
Zoe Guttendorf @zoeguttendorf

Drug	Company	Target	Stage	Treatment Goal	Location
1. Kaletra (lopinavir-ritonavir)	Abbvie	HIV protease inhibitor	Failed Trial	Anti-viral growth	★
2. Arbidol	Pharmstandard	broad-spectrum antiviral	Failed Trial	Anti-viral growth	★
3. Ganovo + Ritonavir	Ascleitis	Hep C/HIV protease inhibitors	Phase IV	Treat pneumonia	★
4. Actemra	Roche	IL-6 inhibitor	Phase III	Anti-inflammatory	★
5. Lenzilumab	Humanigen	anti-GM-CSF	Phase III	Anti-inflammatory	★
6. CD24Fc	OncoImmune	IL-6 inhibitor	Phase III	Anti-inflammatory	★
7. Prezcofix	Shanghai Public Health Clinical Center*	HIV-1 protease inhibitor + CYP3A inhibitor	Phase III	Treat pneumonia	★
8. Colchicine	Montreal Heart Institute*	tubulin disruption	Phase III	Anti-inflammatory	★
9. Kevzara	Regeneron, Sanofi	IL-6 inhibitor	Phase II/III	Anti-inflammatory	★
10. Chloroquine/ Hydroxychloroquine	Univ of Minnesota*	ACE-2 inhibitor	Phase II/III	Anti-viral growth	★
11. Avigan	Fujifilm	RNA polymerase inhibitor	Phase II/III	Anti-viral growth	★
12. Avastin	Roche	VEGF inhibitor	Phase II/III	Treat pneumonia	★
13. Remdesivir	Gilead	adenosine analog	Phase II	Anti-viral growth	★
14. Ieronlimab (PRO 140)	CytoDyn	CCR5 antagonist	Phase II IND filed**	Anti-inflammatory	★
15. Aivaptadil	NeuroRx	IL-6 inhibitor	Phase II	Anti-inflammatory	★
16. SNG001	Synairgen	IFN-beta-1a	Phase II	Treat respiratory illness	★
17. Gilenya	Novartis	sphingosine 1-phosphate receptor modulator	Phase II	Anti-inflammatory	★
18. AiRuiKa	Southeast Univ, China*	PD-1 inhibitor	Phase II	Treat pneumonia/sepsis	★
19. Mesenchymal Stem Cells	VCANBIO Cell & Gene Engineering	Tissue regeneration	Phase I/II	Anti-inflammatory, Tissue regeneration	★
20. Losartan	Univ of Minnesota	AT1R inhibitor	Phase I	Reduce organ failure	★
21. Gimsilumab	Roivant	anti-GM-CSF	Phase I	Anti-inflammatory	★
22. Sylvant	EUSA Pharma	IL-6 inhibitor	Observational	Anti-inflammatory	★
23. Plasmapheresis	Mount Sinai	antibodies from recovered patients	Emergency use	Anti-viral growth, anti-inflammatory	★












ARTIS VENTURES

*Trial sponsor **Emergency Use in Patients
Source: FDA, WHO, company websites, news. Available upon request.

Current Vaccine Research

VACCINES

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Vaccine	Company	Platform	Stage	Description	Location
1. mRNA-1273	 Moderna	RNA	Phase I-First Patient Dosed	First to dose a human in the US. Vaccine consists of a synthetic strand of mRNA designed to elicit an immune response to produce antibodies against SARS-CoV-2	
2. Ad5-nCoV	 CanSino Bio	Non-Replicating Viral Vector	Phase I	Benefits from previous success in the Ebola virus (time to market ~3 years). The vaccine being developed is based on viral vectors (adenoviruses) to deliver antigens to express the SARS-CoV-2 spike protein	
3. ChAdOx1 nCoV-19	 University of Oxford	Non-Replicating Viral Vector	Phase I/II	Enrolling 500+ individuals to test its vaccine candidate, which uses a non-replicating virus to deliver RNA into cells.	
4. LV-SMENP-DC	 Shenzhen Geno-Immune Medical Institute	Lentiviral	Phase I/II	Begun early testing of its vaccine candidate. The vaccine uses a lentiviral vector to deliver Covid-19 minigenes to modify dendritic cells and activate T cells.	
5. BCG Vaccine	Research Group, Netherlands	Live Attenuated Virus (LAV)	Phase II/III	Repurposing the BCG vaccine, originally for TB, to fight SARS-CoV-2 in healthcare workers at high risk of infection. 1,000 individuals will be enrolled across 8 hospitals to receive the vaccine or placebo.	
6. BCG Vaccine	 Murdoch Children's Research Institute	Live Attenuated Virus (LAV)	Phase II/III	The BRACE trial will conduct a randomized, multi-center study of the TB vaccine in 4,000 healthcare workers across Australia.	

*Trial sponsor

Source: FDA, WHO, company websites, news. Available upon request.












































ARTIS VENTURES

Current Testing Kits

DIAGNOSTICS

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Product	Company	Test Type	Result Time (hr)	Approval Status
1. RealTime SARS-CoV-2	 Abbott	PCR	4-6	FDA - EUA
2. ID NOW COVID-19 test	 Abbott	Isothermal amp. - PoC	<1	FDA - EUA
3. AvellinoCoV2	 Avellino Labs	PCR	24-48	FDA - EUA
4. Real-Time Fluorescent RT-PCR kit	 BGI	PCR	3	FDA - EUA
5. BIOFIRE COVID-19 test	 BioMérieux - BioFire Defense	PCR	<1	FDA - EUA
6. 2019-nCoV Real-Time RT-PCR Dx Panel	 CDC	PCR	24-72	FDA - EUA
7. Xpert Xpress SARS-CoV-2 test	 Cepheid	PCR-PoC	<1	FDA - EUA
8. Simplexa COVID-19 Direct	 DiaSorin Molecular	PCR	1	FDA - EUA
9. ePlex SARS-CoV-2 Test	 GenMark Diagnostics	PCR	2	FDA - EUA
10. Panther Fusion SARS-CoV-2 Assay	 Hologic	PCR	3	FDA - EUA
11. Covid-19 RT-PCR test	 LabCorp	PCR	24	FDA - EUA
12. NxTAG CoV Extended Panel Assay	 Luminex Molecular Diagnostics	PCR	4	FDA - EUA
13. Accula SARS-CoV-2 test	 Mesa Biotech	PCR-PoC	<1	FDA - EUA
14. New Coronavirus RT-PCR Test	 PerkinElmer	PCR	4-6	FDA - EUA
15. COVID-19 genesig Real-Time PCR assay	 Primerdesign	PCR	2	FDA - EUA
16. Quest SARS-CoV-2 rRT-PCR	 Quest	PCR	96-120	FDA - EUA
17. Lyra SARS-CoV-2 Assay	 Quidel	PCR	4-6	FDA - EUA
18. cobas SARS-CoV-2 Test	 Roche	PCR	24	FDA - EUA
19. TaqPath COVID-19 Combo Kit	 Thermo Fisher	PCR	4	FDA - EUA
20. NY SARS-CoV-2 Real-time RT-PCR	 Wadsworth Center, NY State Dept of Public Health (CDC)	PCR	24-72	FDA - EUA
21. SARS-CoV-2 + Influenza A & B RT-qPCR Kit	 3D Medicines	PCR	4-6	CE Mark
22. REALQUALITY RQ-2019-nCoV	 AB ANALITICA	PCR	4-6	CE Mark
23. Bosphore 2019-nCoV Detection Kit	 Anatolia Geneworks	PCR	2	CE Mark
24. SARS-CoV-2, influenza, RSV panel	 AusDiagnostics	PCR	4-6	CE Mark
25. AccuPower COVID-19 Real-Time RT-PCR Kit	 Bioneer	PCR	8	CE Mark
26. Q-Sens 2019-nCoV Detection Kit	 CancerRop	PCR	2	CE Mark
27. VIASURE SARS-CoV-2 Real Time PCR	 CerTest Biotec, BD	PCR	3	CE Mark
28. Logix Smart Coronavirus COVID-19 Test	 Co-Diagnostics	PCR	1-2	CE Mark
29. VitaPCR SARS-CoV2 Assay	 Credo Diagnostics Biomedical	PCR-PoC	<1	CE Mark
30. qCOVID-19, CLART COVID-19	 Genomica/PharmMar Group	PCR	5	CE Mark
31. 2019 Real-time PCR Kit	 Kogene Biotech	PCR	4-6	CE Mark
32. GeneFinder COVID-19 RealAmp Kit	 OsangHealthcare	PCR	4-6	CE Mark
33. QIAstat-Dx Respiratory SARS-CoV-2 Panel	 Qiagen (acq. by Thermo Fisher)	PCR	1	CE Mark
34. Allplex 2019-nCoV Assay	 Seegene	PCR	4	CE Mark
35. DiaPlexQ 2019-nCoV Detection kit	 SolGent	PCR	2	CE Mark
36. SARS-CoV-2 Clinical Sequencing assay	 Vision Medicals	NGS	>12	CE Mark
37. Multiple Real-Time PCR Kit	 Beijing Applied Biological Technologies (XABT)	PCR	4-6	CE Mark
38. Explify Respiratory	 IDbyDNA	NGS	24-48	LDT
39. COVID-19 Home Test Kits	 Carbon Health	PCR	72-144	discontinued
40. At-home Covid-19 test	 Everlywell	PCR	48	discontinued
41. Covid-19 Home Test Kit	 Nurx, Molecular Testing Labs	PCR	48	discontinued

ARTIS VENTURES

Source: FDA, WHO, company websites, news. Available upon request.

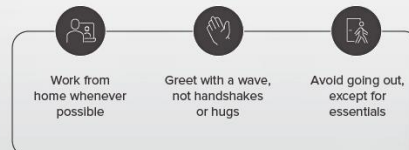
THE MATH BEHIND SOCIAL DISTANCING

Social distancing measures can play a critical role in controlling the spread of pandemics, but **only if carried out properly**.

WHAT IS IT?



WHAT CAN YOU DO?



Source: Government of Canada

Scientists measure the intensity of an infectious disease by its reproduction number (R_0).

R_0 : the average number of people a sick person will infect



For **COVID-19**, this has been estimated at **2.5**

Source: ISGlobal

To illustrate the potential of social distancing, the following assumptions are made:



There is a direct linear correlation between social exposure and R_0 .



The median incubation period of **COVID-19** is approximately five days—after this period, a person will experience symptoms and self quarantine

With these in mind, here's how distancing measures can control the spread of the disease:

REDUCING SOCIAL EXPOSURE BY 75%



REDUCING SOCIAL EXPOSURE BY 50%



NO SOCIAL DISTANCING MEASURES IN PLACE





Opinion: The Way The United States Beat Tuberculosis Could Be A Boon In Battling Coronavirus

Salmaan Keshavjee | Aaron Shakow | Tom Nichol

Current efforts to battle COVID-19 focus largely on reducing transmission by quarantine and physical distancing and by providing hospital care for the severely ill. But as scientists discovered with TB, the secret is not to put the everyday life of the community on indefinite hold, but rather to make it progressively safer. The focus of stopping transmission and delivering care should not only be on hospitals, but also in the communities where people live and work: their homes, schools and workplaces. Using this approach, wealthy countries turned the airborne scourge of TB from the leading cause of death at the end of the 19th century to a tiny fraction of all infections only 60 years later.

How did public health agencies, municipalities and private partners do it? Aided by a flurry of diagnostic and treatment innovations in the early to mid-20th century, they stopped TB using a community-based strategy called **"search, treat and prevent."**

First they searched for contacts of known patients. In communities where TB was rampant, they went house-by-house looking for people who had the disease and were transmitting it to others. "Searching" meant giving thousands of people skin tests and chest X-rays, in many cases with mobile vans.

Then they treated the sick — first with food, rest and basic nursing care, and later with medicines. This was done in combination with social and financial support for those who were ill with TB. This freed people from the need to keep working to support themselves and their families, spreading the illness in the process. Finally, starting in the early 1960s, they stopped further spread of the microbe by giving preventive therapy to exposed individuals before they became sick.

In the U.S., all this was made possible through an infusion of resources from national, state and local governments and by voluntary contributions from organizations like the National Tuberculosis Association, as well as employers and labor unions.

The results were stunning: **"Search, treat and prevent" helped the U.S. and other wealthy countries stop TB in its tracks.** A disease which had been a plague on mankind since the beginning of the modern era was brought to heel in the period from the 1950s to the 1970s — fewer than 20 years.



The lesson for coronavirus? Community-focused mobilization using the "search, treat and prevent" approach could be transformative. Although physical distancing may indeed be necessary in the short term, its economic cost is devastating, particularly for those who cannot work from home or who work in industries that depend on social interaction. The dislocation caused by quarantines — the destruction of social bonds and livelihoods — may in the end be as harmful to health and well-being as the pandemic itself. Moreover, countries relaxing quarantines have seen transmission begin anew from carriers who are not showing symptoms.

We need to lay a foundation that will ensure that when we leave our homes in weeks or months, we are better prepared and safer than when the outbreak began. The community-wide approach can ensure that we find the sick and begin the process of healing. And with the right resources, it can begin today.