COVID-19

What can we learn about public health measures implemented in other regions?

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Background

- We presented the development and utility of the stringency index to TAC on Jan. 18 and May 31, 2021
- Evolved in the context of vaccinated population

Background - Stringency Index

Governments are using multiple interventions (i.e. public health measures and vaccination) and having to make decisions in real time as they open up

How do we look at the combined effect? Stringency Index & Vaccination

What is Stringency Index?: number which includes 9 government responses

What does the number mean?:

- Scale of 0-100; higher number generally implies more "strict"
- When mapped with disease, a stringency index >70 likely to be successful in bringing down or controlling disease
  - Why do we think this? Based on repeated observations of experience in > 180 countries over time and supported by observations using Rt with provincial data
  - Noting that all regions will have slightly different contexts and compliance

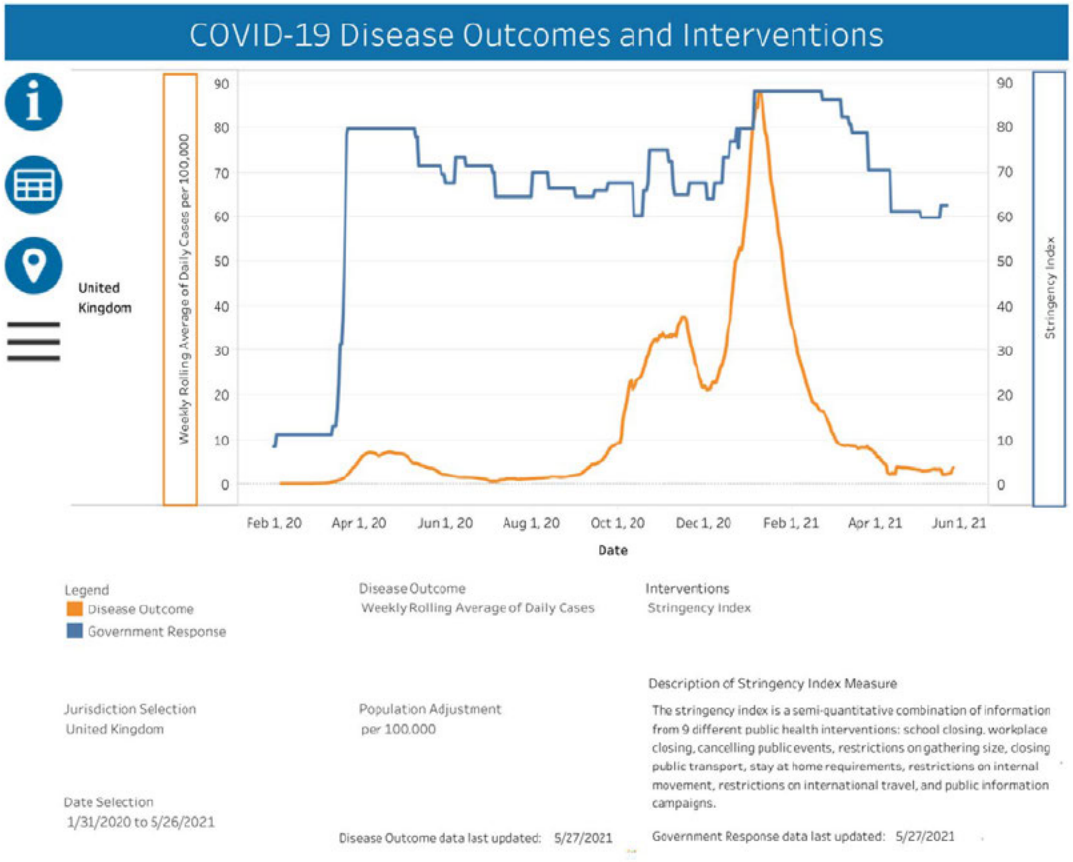
Timing, duration and magnitude of government response determine the outcome

Based on methodology from the University of Oxford

Description of Stringency Index Measure

The stringency index is a semi-quantitative combination of information from 9 different public health interventions: school closing, workplace closing, cancelling public events, restrictions on gathering size, closing public transport, stay at home requirements, restrictions on internal movement, restrictions on international travel, and public information campaigns.

The UK: Continues to be a model of success – maintenance of strong public health measures during vaccine roll-out



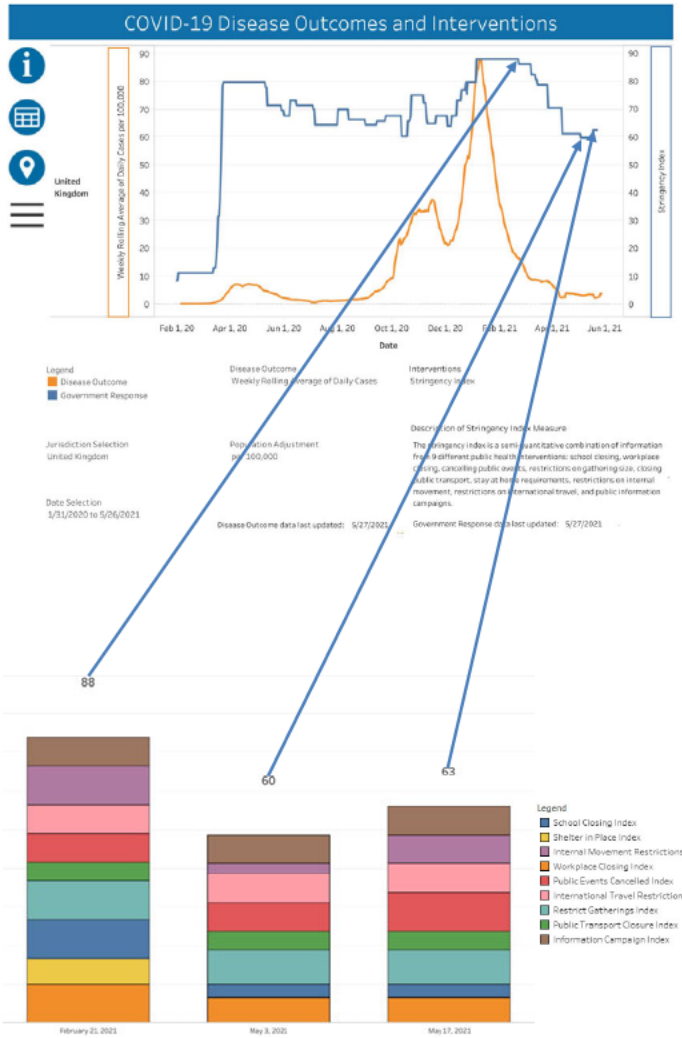
Highlights:

- Weekly rolling average of daily cases = 4/100,000 (May 26, 2021)
  - Approaching the <1 case/100,000 experienced in the summer of 2020
- Weekly rolling average of daily deaths = 0.01/100,000
  - Similar to the <0.02 deaths/100,000 experienced in the summer of 2020
- Stringency Index = 62.5

  (May 21, 2021)
  - Approaching most "open" since pandemic began in earnest in the UK
  - Recent increase related to VOC (B.1.617): Resurgence is possible in pockets where sub-optimal immunity
- % of population with at least one dose of vaccine = 58% (May 29, 2021)
- % of population fully vaccinated = 37% (May 29, 2021)

The UK: 2021 Decline of Disease

Figure 1: Weekly rolling average of daily cases of COVID-



Summary

During the 3rd wave: 1) swift in reimplementation of public health measures for the 3rd wave of cases, 2) implemented strict measures (high stringency index), and 3) implemented measures for a long period of time.

Just prior to cases peaking in early January 2021, the UK in a step-wise manner raised their stringency index to 88; this level was maintained for almost 7 weeks (until late February 2021).

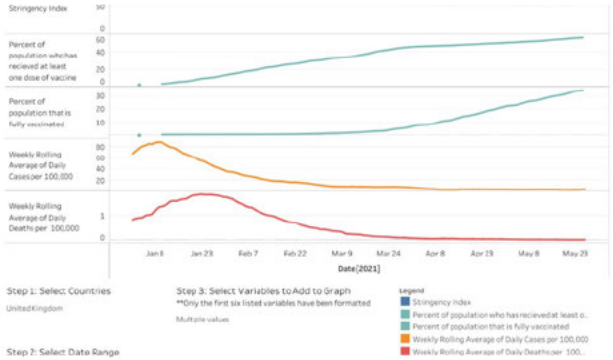
Cases dramatically dropped after the UK implemented the stringency index of 88 and rolled out vaccines.

The UK incrementally decreased their stringency index to 60, which involved relaxation of some workplace closures, shelter in place orders, school closures, and internal movement restrictions. They maintained restrictions on gatherings, their level of public health event cancellations, their public transportation closures, and international travel restrictions.

The UK only dropped their stringency index to below 70 (on April 12, 2021) when their weekly rolling average of daily cases was at 2.5 cases/100,000, and when 48% of their population had one dose of vaccine and 12% of the population were fully vaccinated.

The UK has recently increased their stringency index on May 17, 2021 (increased their internal movement restrictions) in response to circulation of B.1.617.

Figure 2: Case and Stringency data, in addition to vaccination coverage (at least 1 dose, full regimen) and weekly rolling average of daily deaths



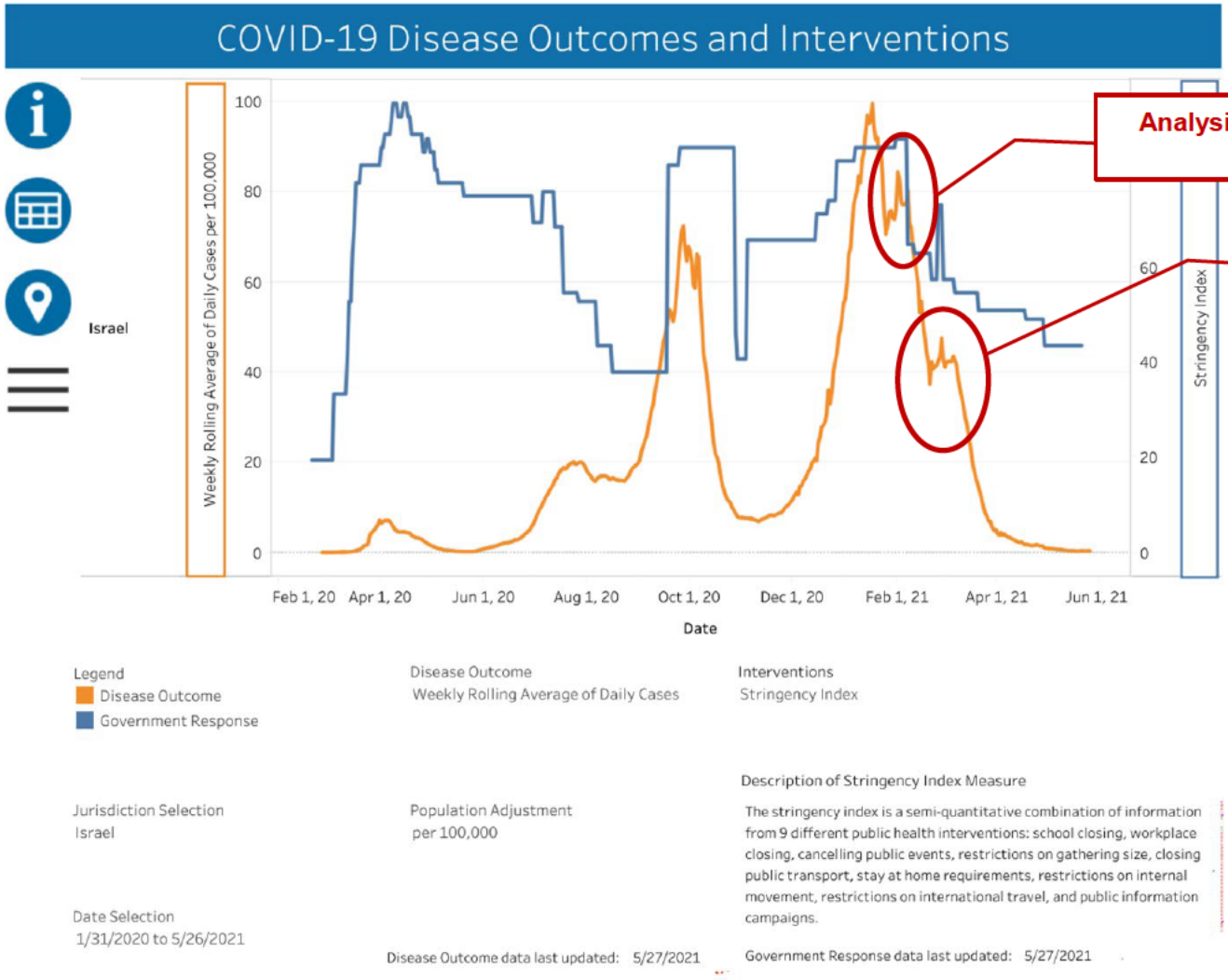
The UK met their target of offering a vaccine to everyone in their top priority groups before April 15 (all those over 50 and in high-risk categories). There has been a shift in focus from first dose to second dose. The UK has approved the Pfizer, AstraZeneca and Moderna vaccines. (https://www.bbc.com/news/health-55274833).

Given the success in the UK and a similar approach in Canada for prioritizing first doses of vaccine, the UK may serve as useful comparative model for re-opening and both easing of, and tightening of public health measures as necessary.

Why Israel?

Successfully have brought cases to <1 case/100,000.
Massive vaccination campaign.
However, there were a few bumps along the way.

ISRAEL: there have been two disease "upticks" in decline phase of the 3rd wave in 2021

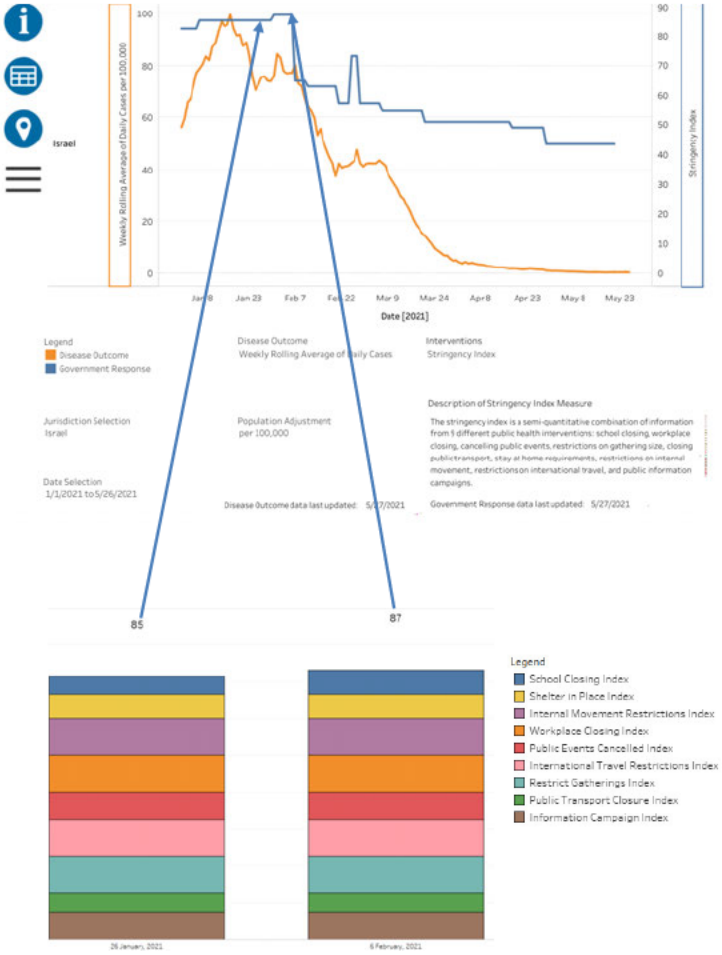


Analysis period 1: Jan. 26 – Feb. 7/21

Analysis period 2: Feb. 21 – Mar. 6/21

ISRAEL: "First Uptick" (Jan. 26 – Feb. 7, 2021)

Figure 1: Weekly rolling average of daily Cases of COVID-19/100,000 and Stringency Index



Summary

As cases decreased from peak levels during Israel's 3rd wave, there was a short period (Jan. 26 – Feb. 7/21) where cases slightly increased.

Before the uptick in cases, the stringency index was high at 85 (in place since early Jan./21).

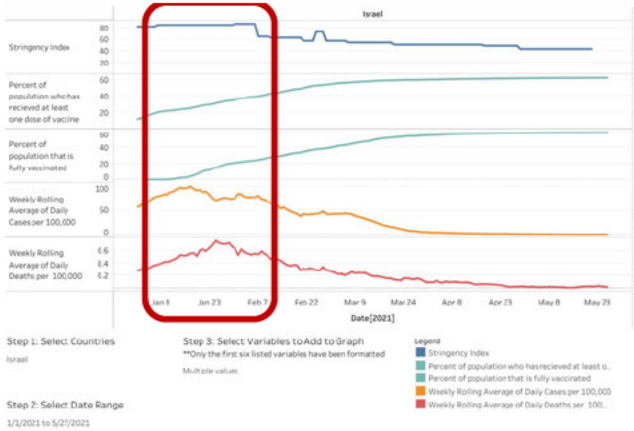
During this uptick, the stringency index was raised to 87 on Jan. 31/21 as a result of escalation of school closures (from closure of schools in certain areas only to country-wide school closures).

The stringency index was maintained at 87 until Feb. 6/21 before dropping to 65 on Feb. 7/21.

Although the stringency index was very high (85-87), lack of compliance to measures during this time is likely to have contributed to the increase in cases. For example, mass gatherings, some in excess of 20,000 people, occurred on Jan. 31/21: https://www.ctvnews.ca/world/thousands-join-in-jerusalem-funeral-flout-pandemic-rules-1.5289659

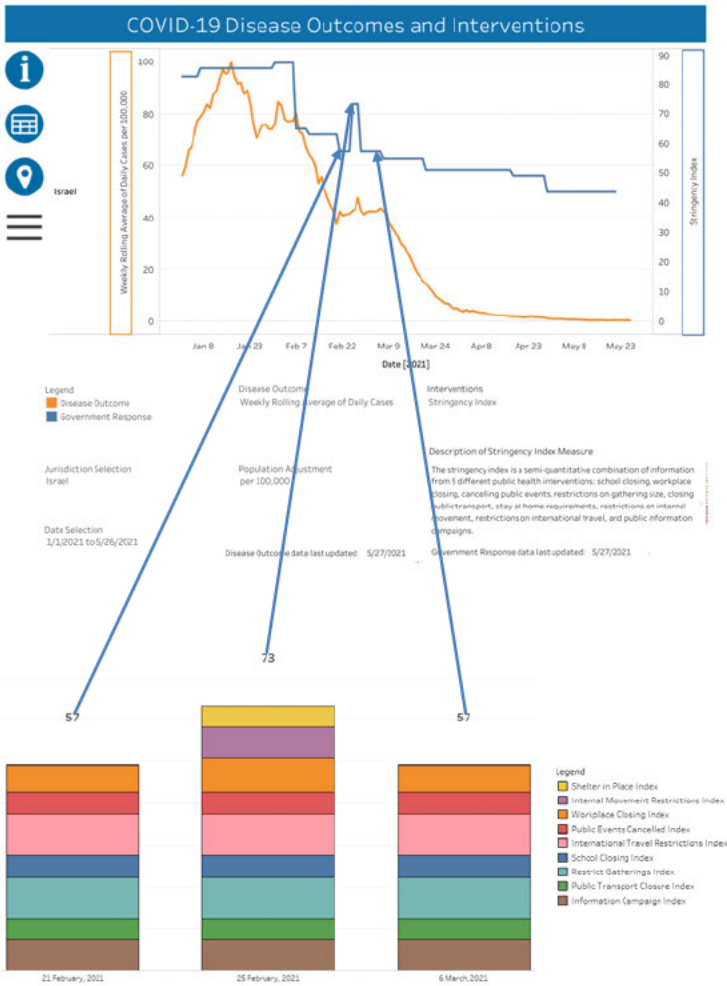
Vaccination coverage: On Jan. 26/21 as cases began to increase, 32% of Israel's population had received at least one dose of vaccine and 16% of the population were fully vaccinated. On Feb. 7/21, 40% of Israel's population had received at least one dose of vaccine and 25% were fully vaccinated.

Figure 2: Case and Stringency data, in addition to vaccination coverage (at least 1 dose, full regimen) and weekly rolling average of daily deaths



ISRAEL: "Second Uptick" (Feb. 21 – March 6, 2021)

Figure 1: Weekly rolling average of daily Cases of COVID-



Summary

When the 2nd uptick in cases began on Feb. 21/21, the stringency index was 57 (considerably lower than 85-87 observed in first uptick).

As cases continued to increase (note the "mini-spike" on Feb. 27/21), the stringency index was briefly increased to 73 for 3 days (Feb. 25-27/21).

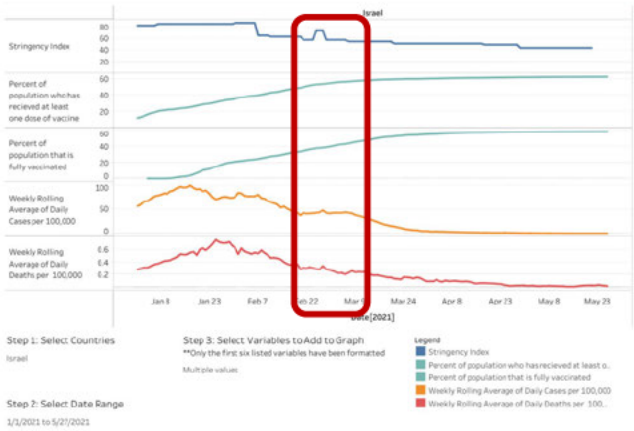
> This increase in stringency was a result of escalation of workplace closures (all but essential businesses), and implementation of internal movement restrictions and shelter-in-place requirements.

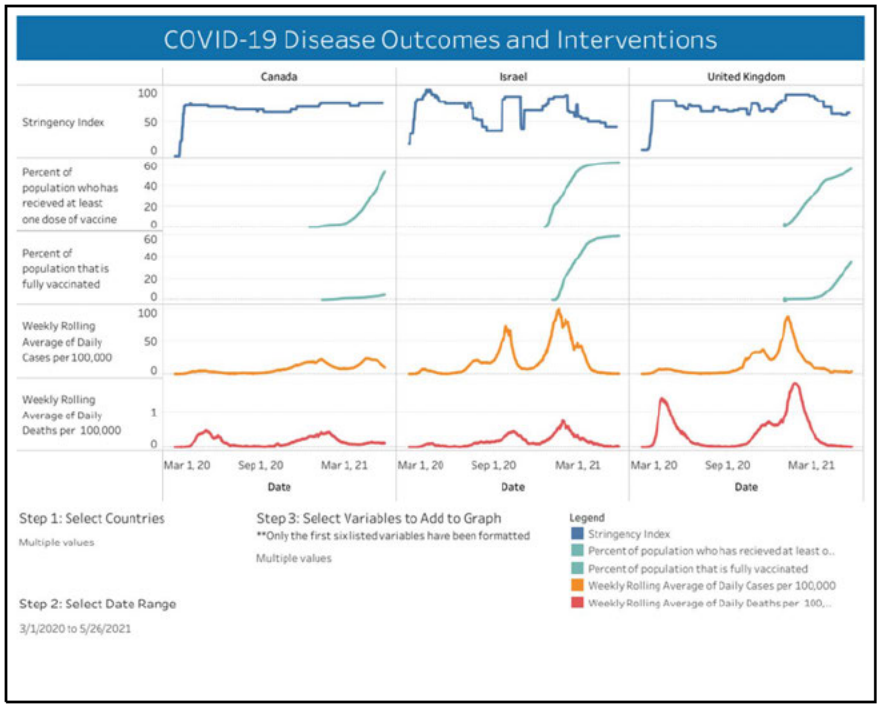
The stringency index decreased on Feb. 28/21 to 57 (same stringency index value with exact same measures in place previous to the 3-day increase in stringency mentioned above). This level of stringency was maintained until Mar. 6/21, coinciding first with a plateau in cases, then a gradual decrease that has been sustained to-date.

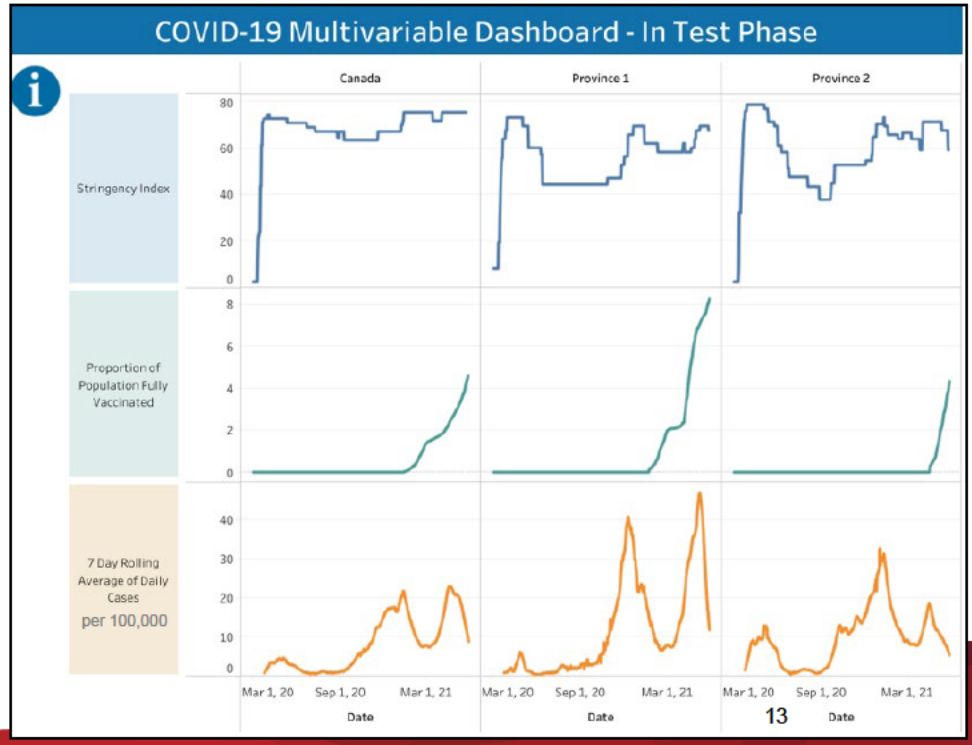
Vaccination coverage: On Feb. 21/21 as cases began to increase again, 50% of Israel's population had received at least one dose of vaccine and 35% of the population were fully vaccinated.

On Mar. 7/21 as cases started to decrease again, 57% of Israel's population had received at least one dose of vaccine and 44% were fully vaccinated.

Figure 2: Case and Stringency data, in addition to vaccination coverage (at least 1 dose, full regimen) and weekly rolling average of daily deaths




COVID-19 Disease Outcomes and Interventions
Canada
Israel
United Kingdom
Stringency Index
Percent of population who has recieved at least one dose of vaccine
Percent of population that is fully vaccinated
Weekly Rolling Average of Daily Cases per 100,000
Weekly Rolling Average of Daily Deaths per 100,000
Mar 1, 20
Sep 1, 20
Mar 1, 21
Date
Step 1: Select Countries
Multiple values
Step 2: Select Date Range
3/1/2020 to 5/26/2021
Step 3: Select Variables to Add to Graph
**Only the first six listed variables have been formatted
Multiple values
Legend
Stringency Index
Percent of population who has recieved at least o..
Percent of population that is fully vaccinated
Weekly Rolling Average of Daily Cases per 100,000
Weekly Rolling Average of Daily Deaths per 100,...


COVID-19 Multivariable Dashboard - In Test Phase
Canada
Province 1
Province 2
Stringency Index
Proportion of Population Fully Vaccinated
7 Day Rolling Average of Daily Cases per 100,000
Mar 1, 20
Sep 1, 20
Mar 1, 21
Date

Lessons can be learned in terms of indicators for implementing and lifting public health measures

At start of 3rd wave

Province 1:

- Start of 3rd wave began around March 13, 2021
- 8.1 cases (7d rolling avg. daily cases)/100,000 on March 13, 2021
- SI was **58**

Province 2:

- Start of 3rd wave began around March 22, 2021; (+9 days after Prov. 1 began to increase)
- 8.1 cases (7d rolling avg. daily cases)/100,000 on March 22, 2021
- SI was **64** (March 22, 2021) but then decreased to **59** on March 26, 2021

Therefore, comparable situations (stringency and case numbers) if slight adjustment for time

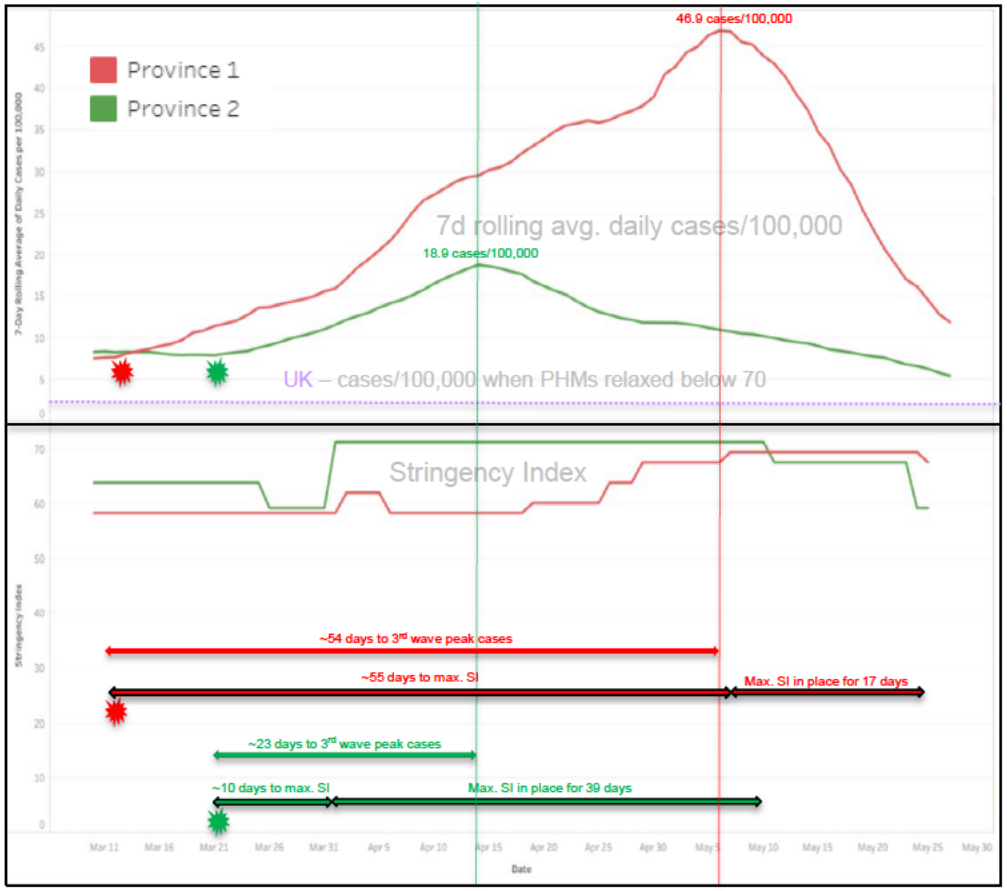
But as cases climbed:

Province 2:

- Increase in stringency index (SI) to **71** on April 1/21 (~**10 days after** start of 3rd wave); cases were at 11.6/100K on this date
- Cases peak on April 14/21 at **18.9** cases/100K (**~23 days after** start of 3rd wave)
- SI of 71 in place **14 days before** peak and **maintained for 39** days overall including well after cases declined
- SI finally relaxed to **68** on May 11, 2021 when cases were at 10 cases/100,000

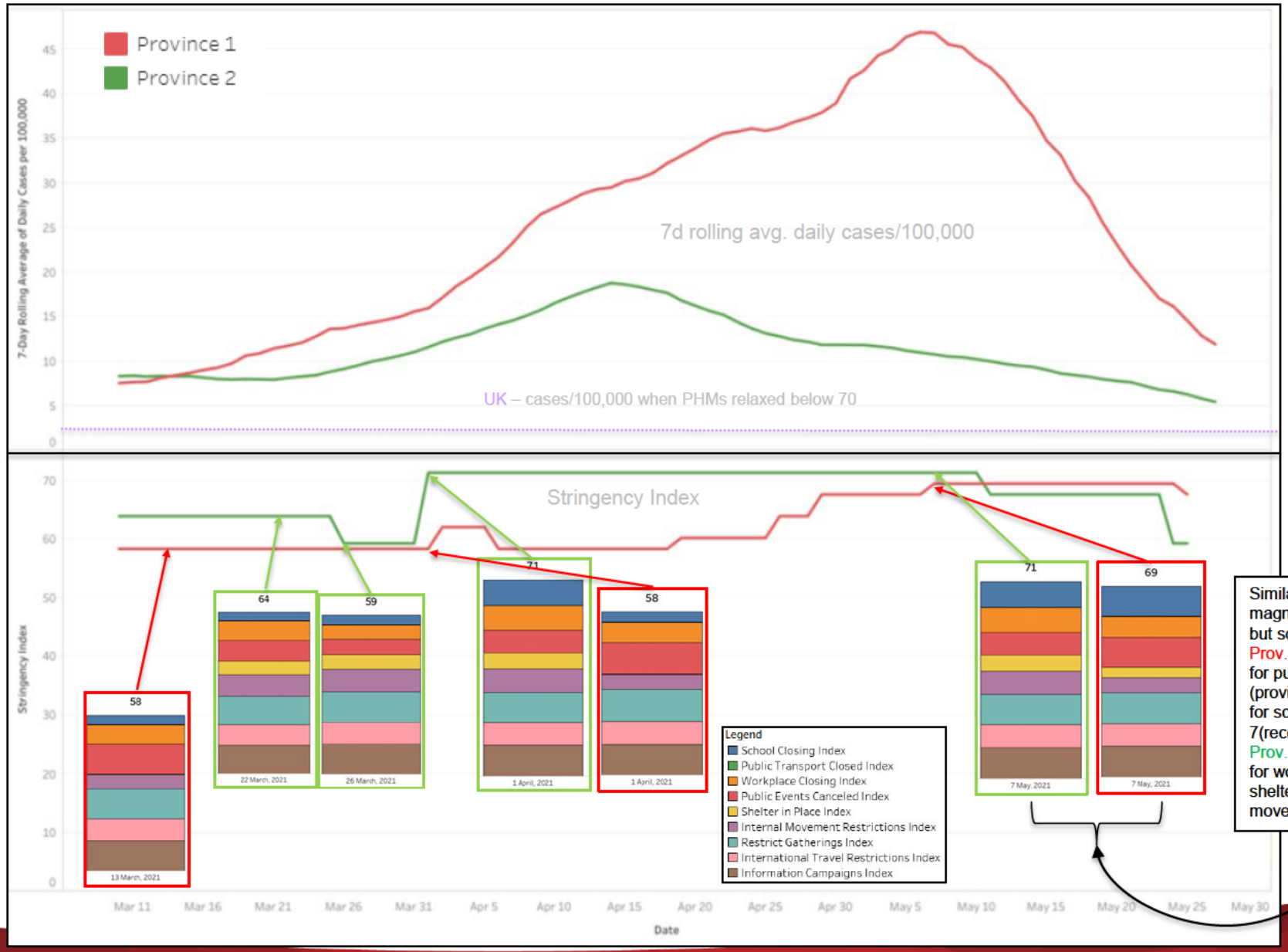
Province 1:

- **4** increments of increase in stringency index throughout wave:
  - April 19, 2021 to 60 (~39 days after start of 3rd wave); cases were at 33.1/100K on this date;
  - April 26/21 to 64;
  - April 29/21 to 68;
  - Finally on May 7 to **69** (**~55 days** after start of 3rd wave; **1 day after** cases peaked);
- Cases peak on May 6, 2021 at **46.9** cases/100K (**~54 days after** start of 3rd wave)
- Maximum SI of **69** in place on May 7, 2021 **maintained for 17** days overall
- SI finally relaxed to **68** on May 25 when cases at 14.6 cases/100K



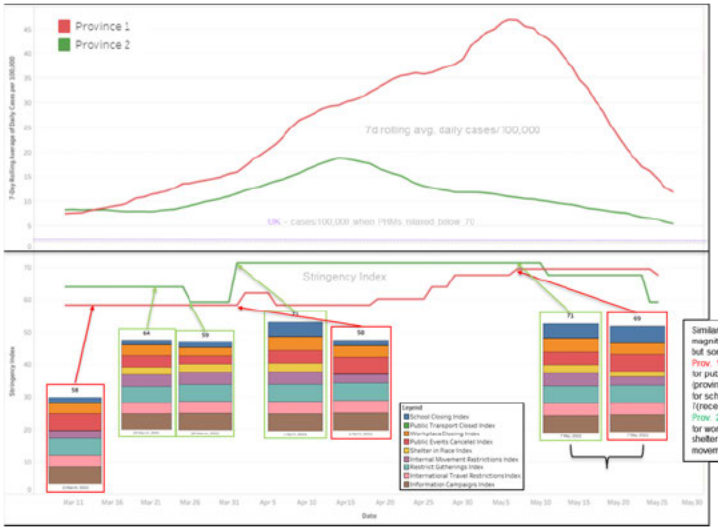
Highlights need for rapid implementation of measures of sufficient strength and duration

Composition of stringency should align to local epidemiology



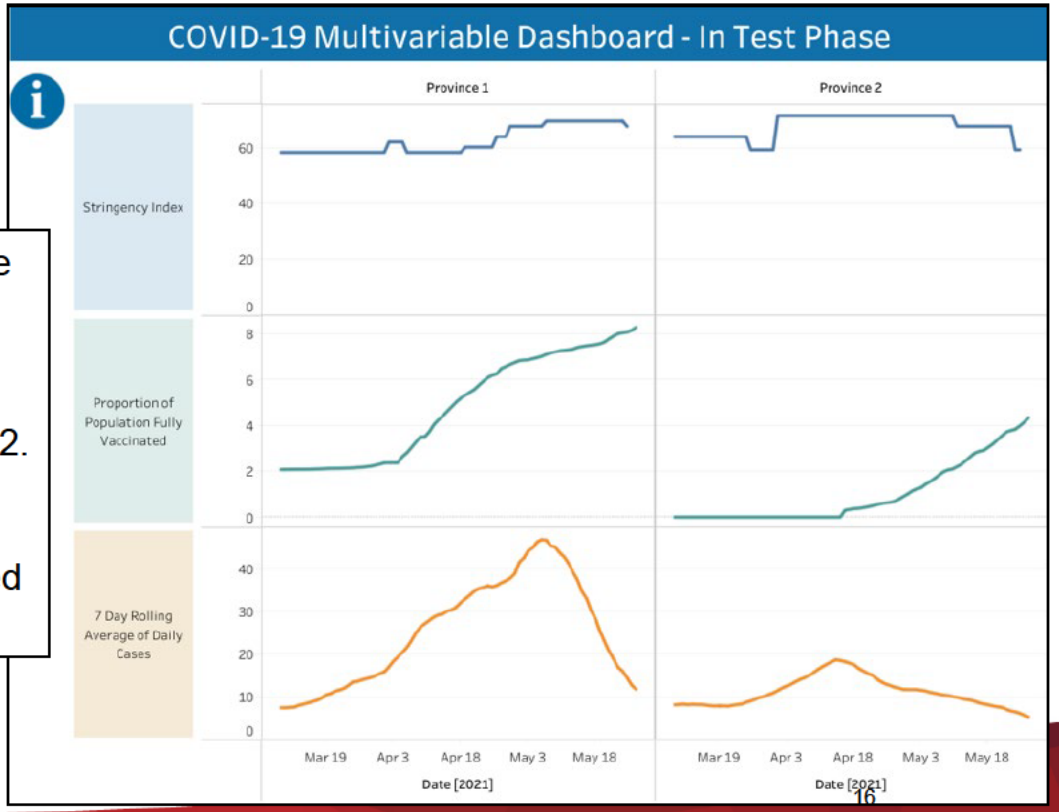
Similar stringency in terms of magnitude and components but some differences:
Prov. 1 (69) more stringent for public events throughout (provincial Vs regional) and for school closures as of May 7(recently);
Prov. 2 (71) more stringent for workplace closures, shelter-in-place and internal movement restrictions

Experiences in these two provinces emphasize need for public health measures to be in place as vaccines roll out



During the third wave, vaccination coverage (% population fully vaccinated) is higher in Province 1; however the stringency index has been lower and case numbers have been higher relative compared to Province 2.

Highlights the need to monitor for resurgence during re-opening and continued vaccination and act swiftly.



Take home messages

- Experiences of other countries have shown that maintaining public health measures as vaccines roll out is critical
- A cautious and phased approach to re-opening is needed
- Several countries experiencing VOCs have controlled disease
  - Contributors to success include rapidity of response, how "strict" the public health measures are, and how long they are in place given the local circumstances
- Resurgence can occur in pockets and require quick response as we re-open
- Having an "at a glance" tool to help make decisions in light of international experiences is useful
  - Can help identify the need to react and how
- There may be bumps along the way – need to maintain a nimble approach as we re-open and continue vaccination

Mass SARS-CoV-2 Screening with Rapid Diagnostic Tests

Objective

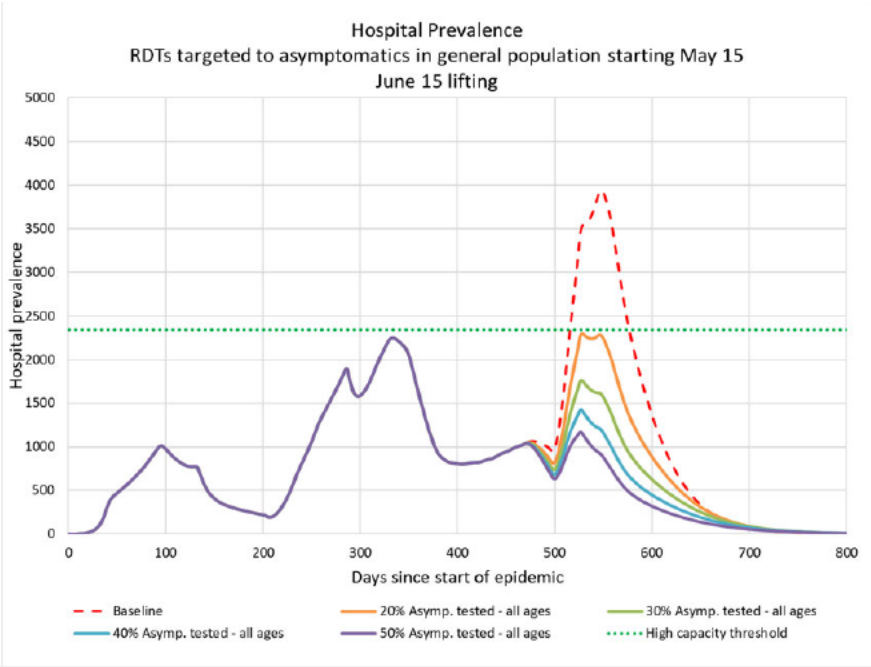
- Update information on rapid diagnostic test performance, modelling and usage
- Comments/points from TAC members
- Guidance on use to enable wider implementation of rapid diagnostic testing – for discussion and comments

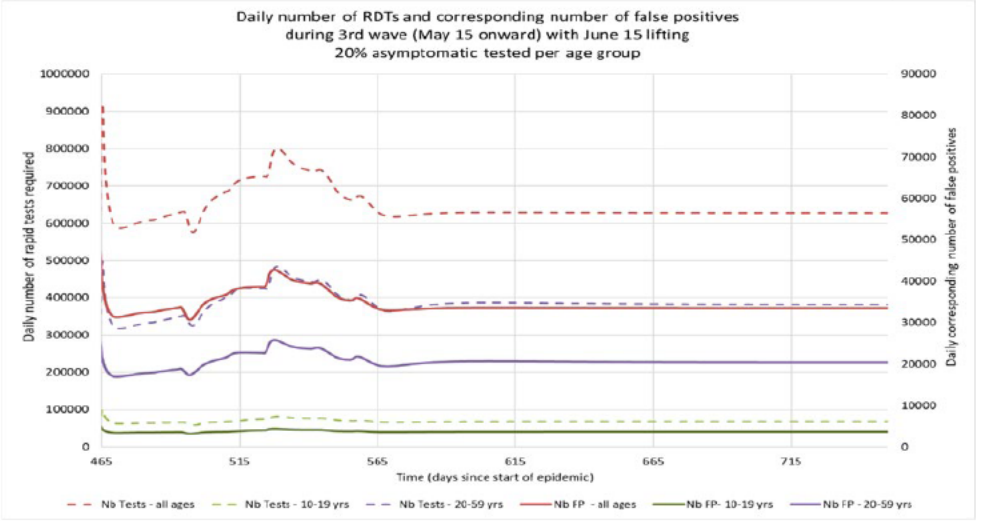
Background

- Multiple modelling studies identify that control of COVID-19 epidemic is assisted by detection of a high % of cases, including asymptomatic cases, and by early detection of cases
- Higher % of cases detected may allow earlier/safer easing of restrictions with vaccine roll-out
- Once a high % of Canadians are vaccinated, most cases due to immune escape VOC will be asymptomatic or mild – asymptomatic testing will likely be needed to detect them early
- Lab-based PCR tests have capacity limits – and need healthcare staff to take NP samples
- Rapid PCR tests (e.g. Abbott ID Now) highly sensitive, but difficult to scale up
- Antigen-based rapid diagnostic tests (Ag-RDT) can scale up testing volumes significantly
- But Ag-RDT considered as having lower sensitivity than PCR
- **Can we use Ag-RDTs at large scales to help control the epidemic and detect immune escape VOC?**

Modelling studies

- Modelling studies suggest that routine and non-targeted testing with rapid antigen tests can have a significant impact on the epidemic by a combination of:
  - Detecting some pre-symptomatic infections
  - Detecting asymptomatic infections
  - Reduced delay from testing to case isolation and contact tracing
- But to be effective you need a lot of tests
- Which will yield a significant number of false positive test results
- B.1.617.2 (delta) threatens all opening up plans
- Enhanced case detection and isolation will help safe opening with increasing delta transmission





Overview of Antigen-Based RDT

Pros

- Relatively cheap ($5-25 vs. $75 lab PCR),
- Short turnaround time (< 1 hour vs. 1-3 days for lab PCR)
- Scalable to very large populations (especially if self-administered)
- Access populations that may never be tested with traditional surveillance (e.g., asymptomatic)
- Nasal swabs, gargle and spit testing possible

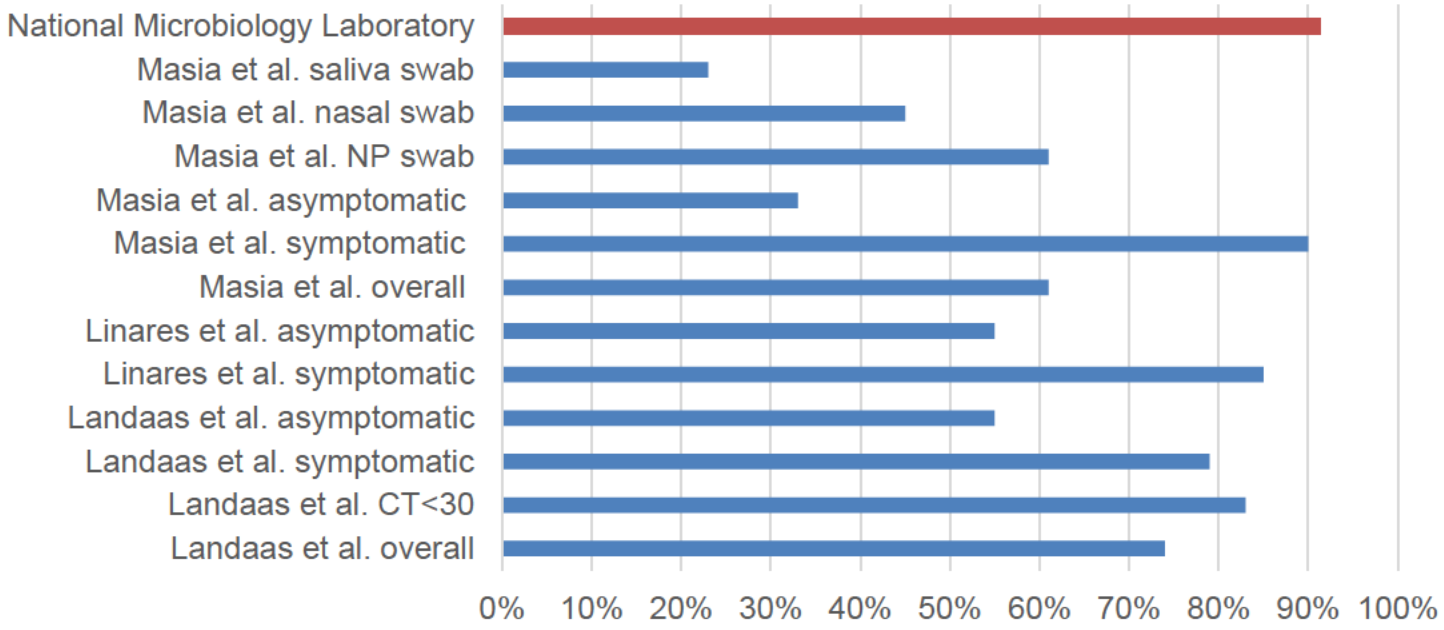
Cons

- Ag considered as having low sensitivity compared to PCR
- Test performance varies significantly amongst manufacturers

Approved Point-of-Care Diagnostic Tests in Canada

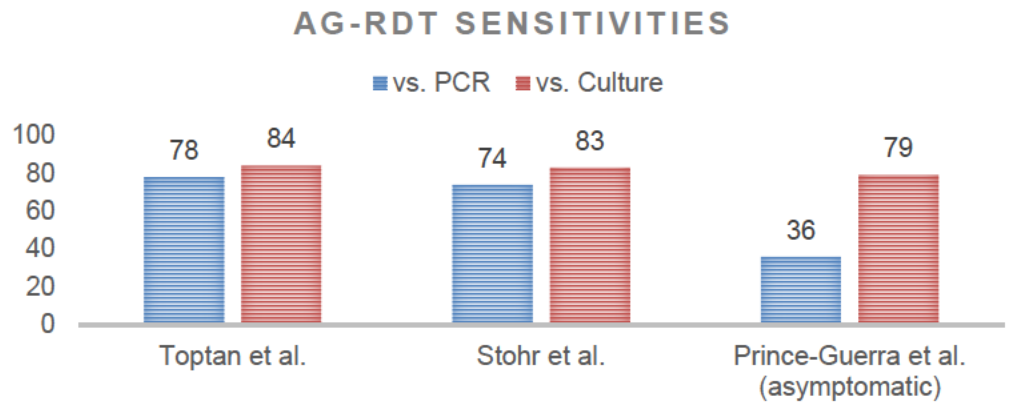
Sensitivities and specificities estimated by the National Microbiology Laboratory

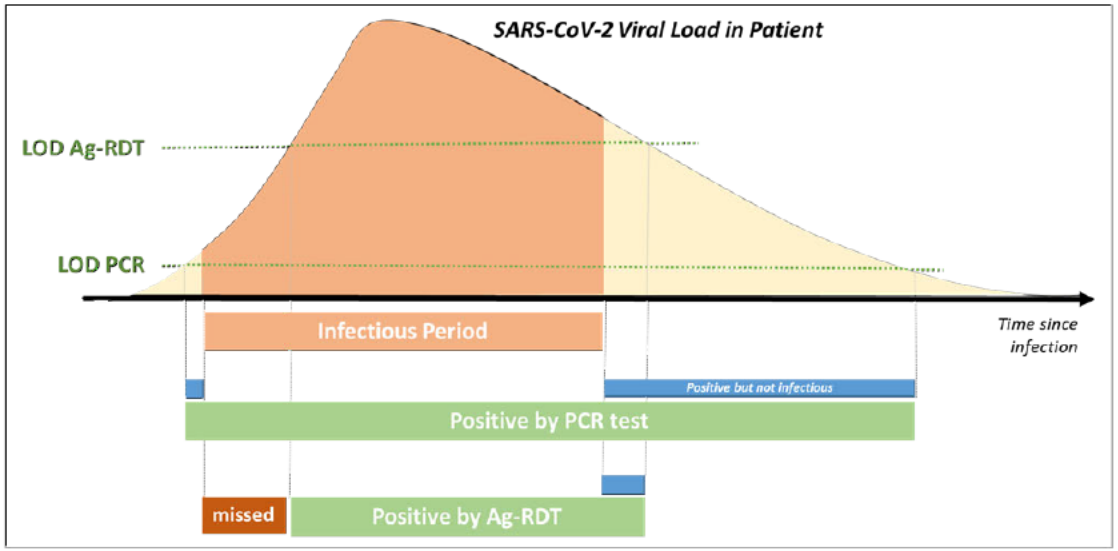
	Point-of-care PCR			Rapid antigen test			
	Gene Xpert	Abbott ID NOW	Spartan Cube	Abbott PanBio (NP)	Abbott PanBio (Nasal)	BD Veritor	Quidel Sofia
Sensitivity	99%	92.90%	83.90%	91.40%	91.10%	83.9-93.5%	96.70%
Specificity	97-100%	98.20%	97.40%	99.80%	99.80%	99.8-100%	100.00%



Sensitivity to Infectiousness, not Infection

- PCR-based tests are extremely sensitive and can detect fragments of viral RNA even when live viruses aren't produced anymore (i.e. not infectious)
- Comparing Ag-RDT to PCR sensitivity may not make sense when the focus is infectiousness, not infection
- A better comparison would be using positivity agreement with viral culture

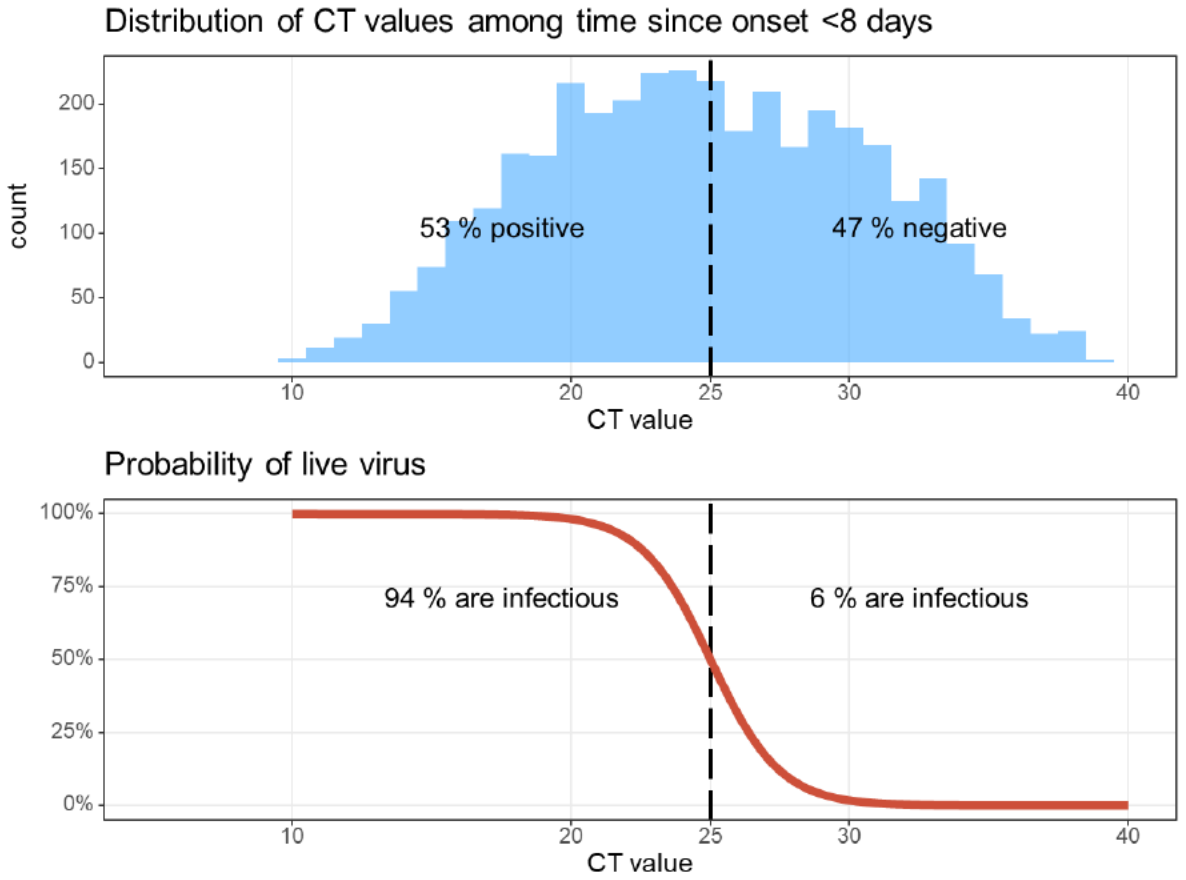




LOD = Limit of detection

Canadian Data

- 4,808 CT values from PCR tests in Canada
- Restricting dataset to time since symptom onset < 8 days may identify infectious patients (Bullard et al.)
- Limit of detection for Ag-RDTs usually around CT ~ mid/high 20s (Jaafar et al., Bullard et al.)
- If Ag-RDTs LOD is 25CT, would still identify ~94% of *infectious* cases, despite identifying only 53% of PCR-positive
- Hence, Ag-RDTs have potential to identify a majority of *infectious* patients
- No studies for *asymptomatic* cases, so fraction of infectious identification may be lower than 90s%



Impact of Operator and Swab Type on Sensitivity & Specificity

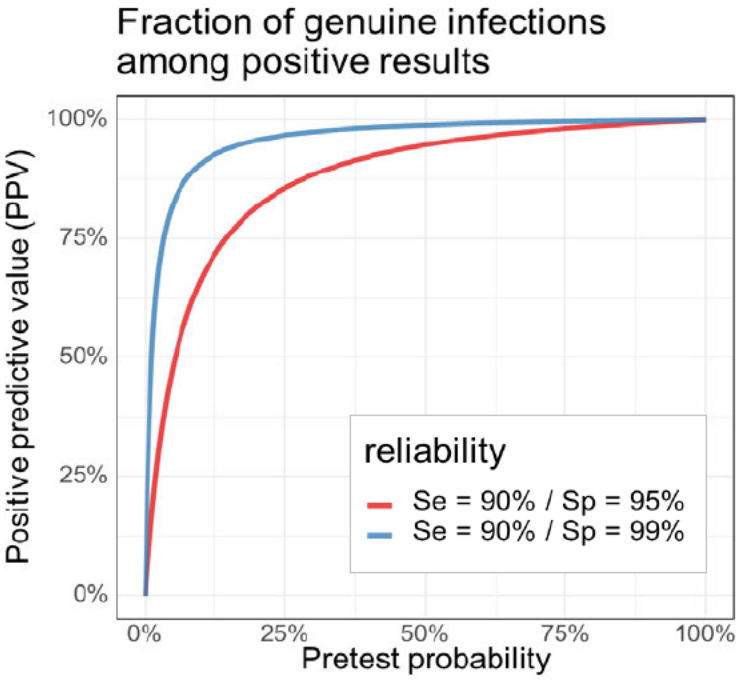
- Mass testing requires testing by staff who are not healthcare workers, or by the public themselves
- Systematic reviews (Bastos et al., Butler-Laporte et al.) found no difference in sensitivity between saliva and NP swabs for *PCR* tests (no systematic review for Ag-RDTs)
- Impact of swab type on Ag-RDT not clear: one study (Lindner et al.) suggests sensitivity of Ag-RDTs may not be significantly affected either, but another (Masia et al.) found drop in sensitivity for nasal and saliva swabs
- In one pilot study, Public Health England found that Ag-RDTs (Innova) sensitivity was operator-dependent:
  - Se ~ 79% when performed by *lab professionals*
  - Se ~ 57% when performed by *self-trained public*

Past & Current Use of Ag-RDTs in Asymptomatic Populations

- In general, difficult to assess efficacy in reducing transmission due to lack of observational studies aimed at controlling transmission - most 'evidence' is model-based (d'Angelo et al)
- Public Health England pilots (Liverpool, UK)
  - https://www.medrxiv.org/content/10.1101/2021.03.31.21254687v1
- Slovakia
  - Nationwide mass test
  - Claim prevalence reduced by >50% in 1 week, but cannot disentangle effects from other PH interventions
- Canada
  - ON: airport staff tested multiple times a week for several weeks
  - ON: EllisDon construction worksites staff (was voluntary, now mandatory); 40k tests/week
  - NB: mass testing for asymptomatic people in Zone 4.
  - SK: 100k rapid tests have been provided to K-12 schools
  - AB: ~2M free rapid testing kits will be available to public, private and not-for-profit employers and service providers
- Participation: mandatory vs. voluntary
  - ~85% in Slovakia (semi-mandatory, many employers asked for negative certificate to go back to work)
  - ~30% in schools in Hildburghausen Germany (voluntary)
  - ~30% in Liverpool, UK (voluntary ; door-to-door in areas of low uptake)
  - ~100% in China & Singapore
- Logistics: very large population scale supported by military (for studies in the UK and Germany)
- Positive results from Ag-RDT often required to: self-isolate and confirm with PCR

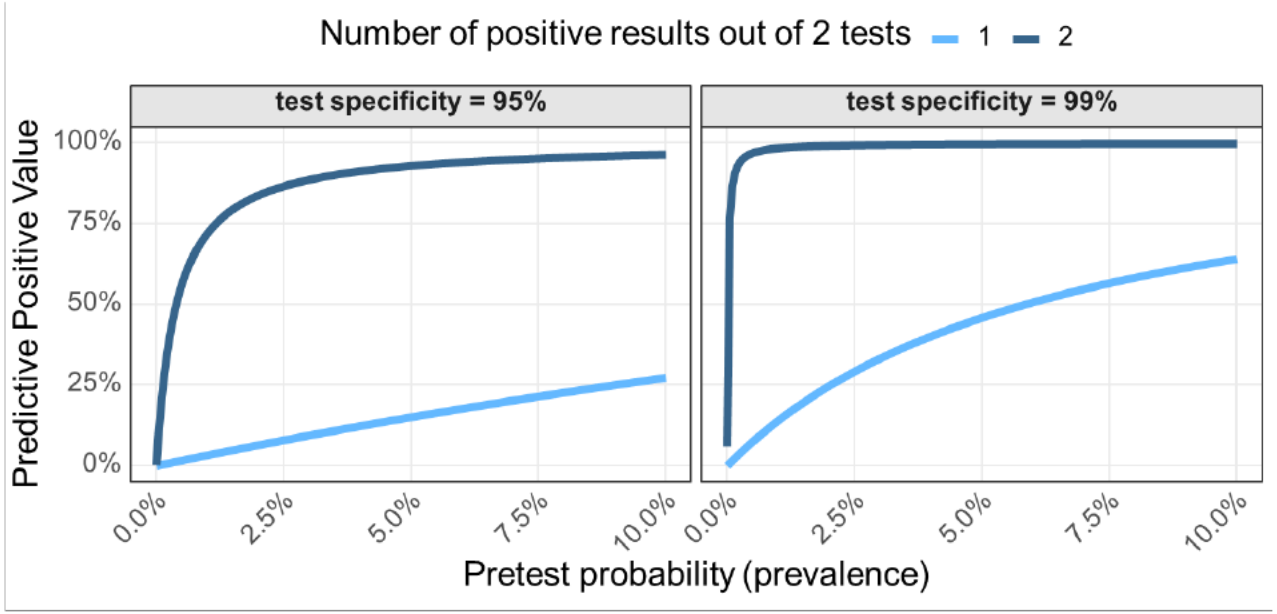
Predictive Value of Positive Results

- Ag-RDTs specificity is often estimated as very high (≥ 99%)
- *Positive predictive value* (PPV): probability to be infected given a positive result
- In low prevalence settings, Ag-RDTs may have a low PPV: in one study in NS few tests were positive but 50% were thought to be false positive
- The PPV is automatically reduced when broadening testing to asymptomatic populations (lower pretest probability)
- Example: 2M students in primary/sec schools in ON. Testing all of them every 4 days means 500k tests everyday.
  Assume prevalence = 1% , sensitivity = 80%,
  specificity = 99% → ~3,000 false positive everyday
- Public health guidance often requires confirmation with PCR test
  ➔ additional burden for labs and contact-tracing?



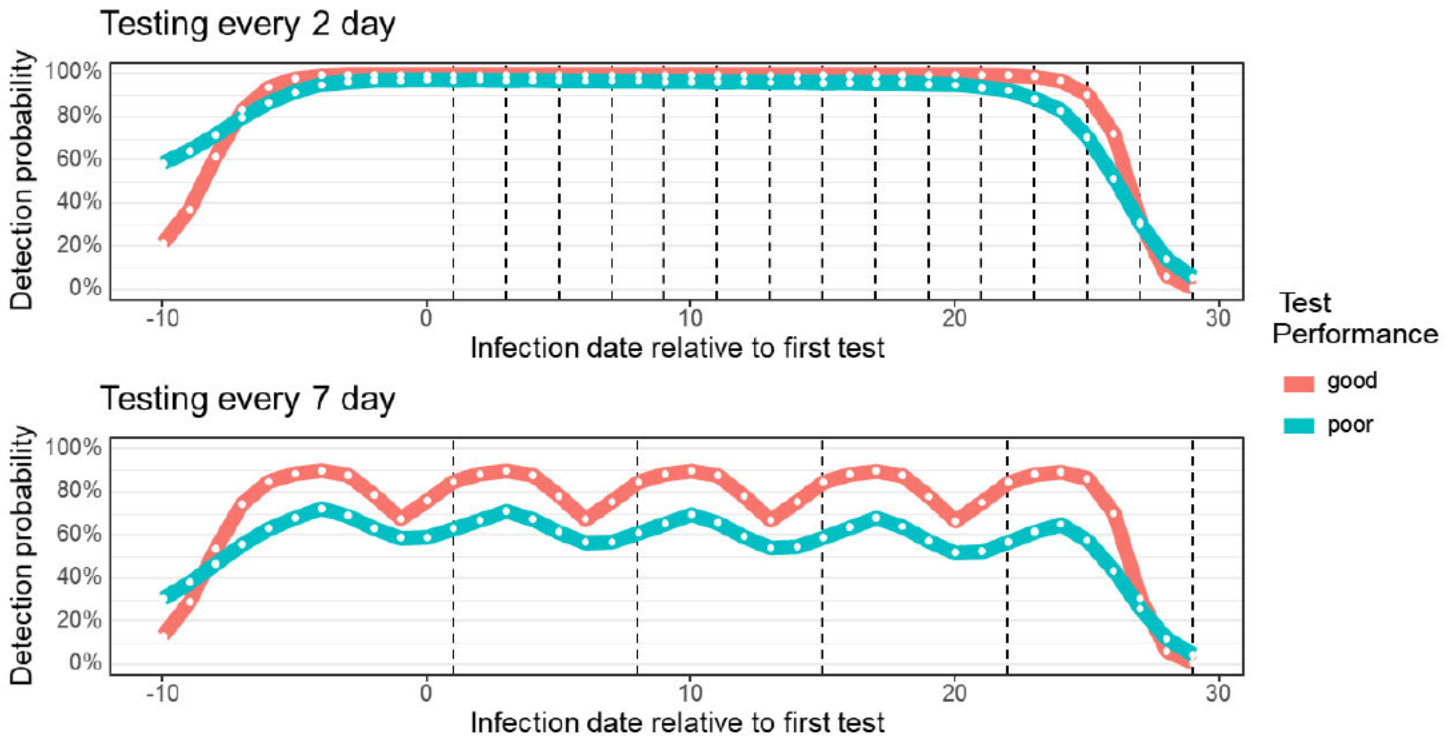
Confirming a First Positive Result with Ag-RDT

- Confirming a positive results from an Ag-RDT with a PCR test adds burden to labs
- Confirming a first Ag-RDT positive result with an immediate second test avoids additional burden to labs
- The PPV of a 2nd positive result is satisfactory for tests with excellent specificity (≥ 99%) in communities with sufficient prevalence (>1%)
- However, if Ag-RDTs specificity is not excellent and community prevalence is very low, the predictive positive value of a 2nd Ag-RDT positive result will likely be low
- Furthermore, how should users/operators interpret a mixed result (positive then negative)?



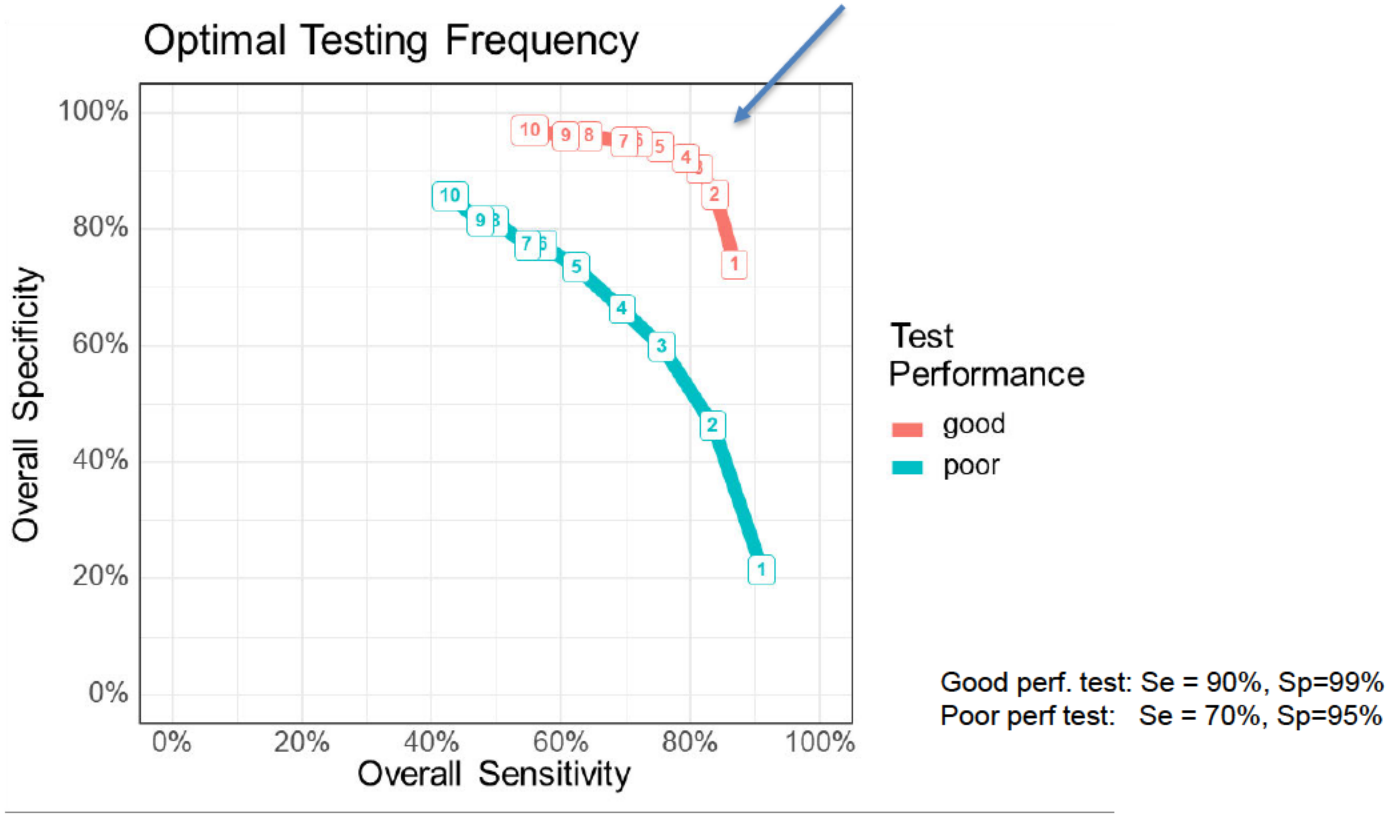
Multiple Testing (1)

- Testing the same individuals multiple times with Ag-RDTs increases the probability of detecting infections compared to a one-time test
- Sensitivity is less critical as testing frequency increases



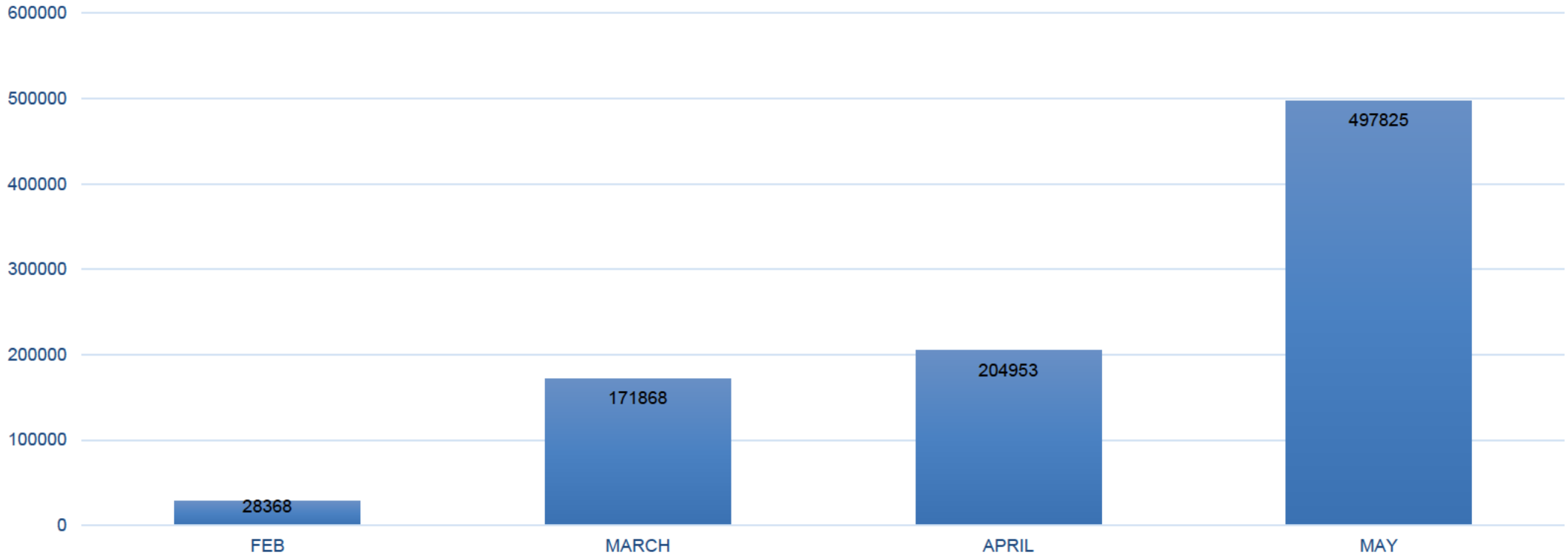
Multiple Testing (2)

- Trade-off between testing frequency and overall sensitivity & specificity
- High frequency testing increases sensitivity, but decreases specificity
- "Optimal" frequency may be every 3-5 days



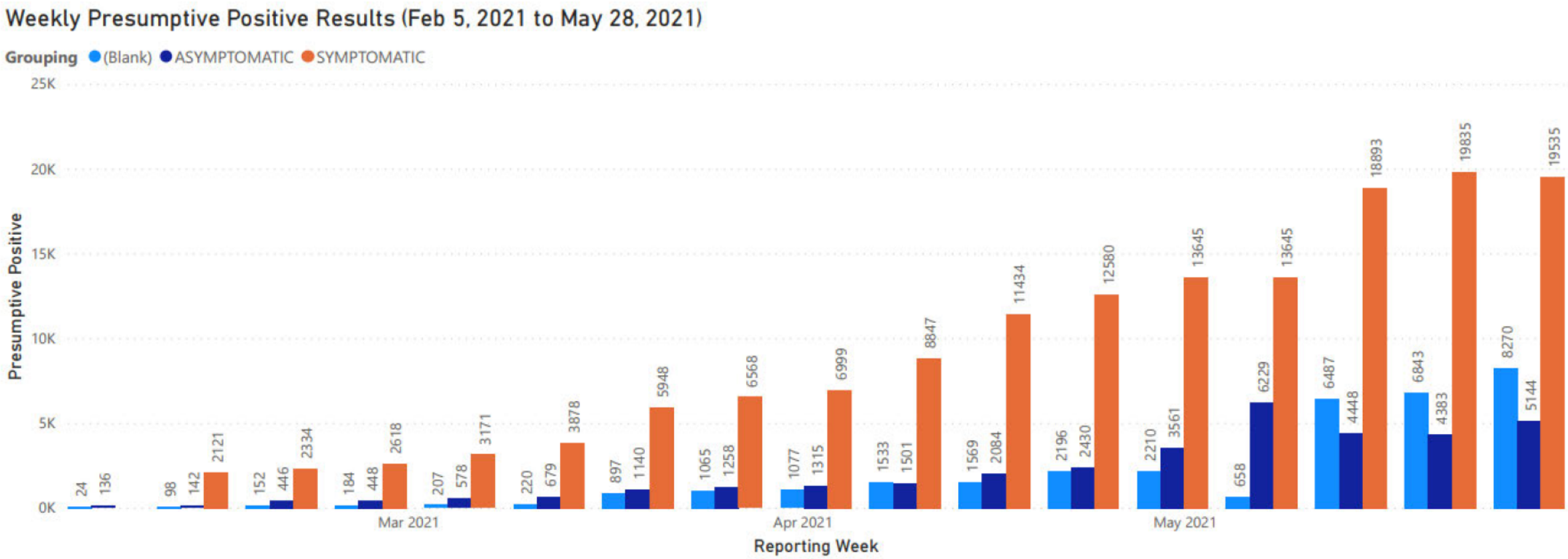
Good perf. test: Se = 90%, Sp=99%
Poor perf test: Se = 70%, Sp=95%

Average Weekly Rapid Test Usage by PTs

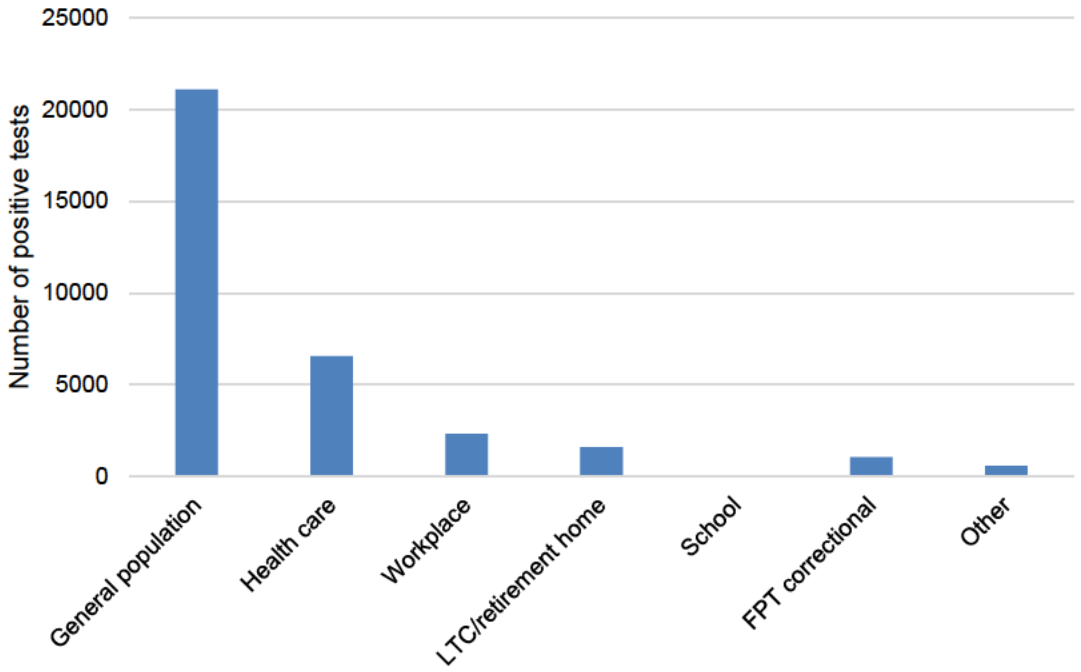


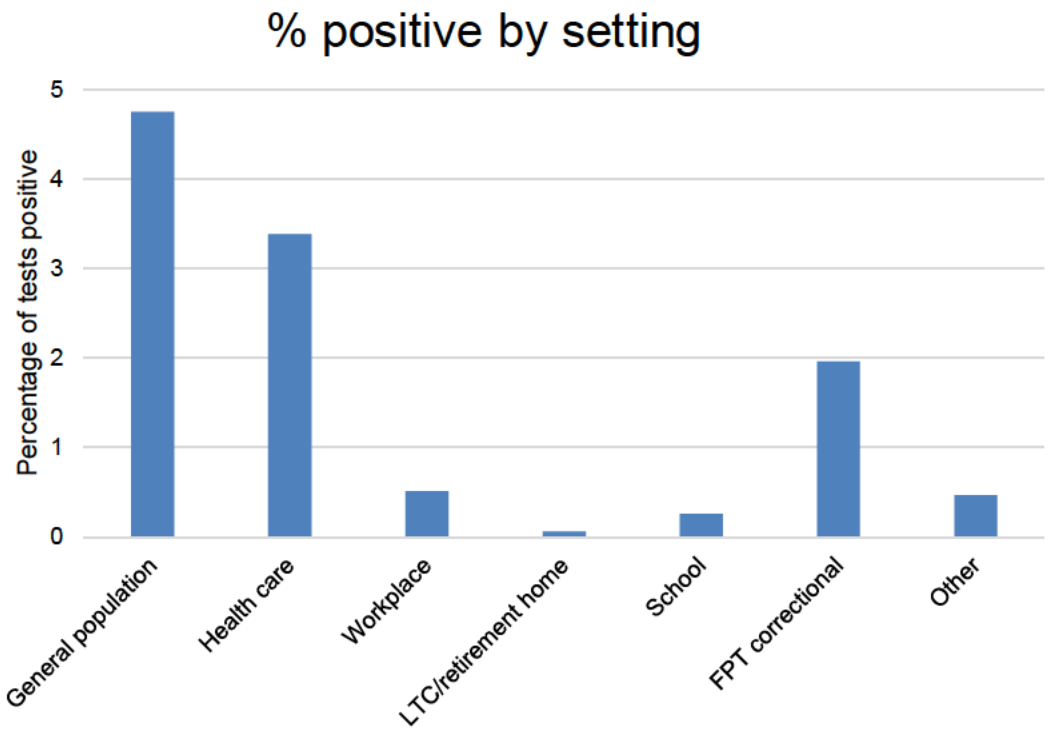
- Federal programs - workplaces, crown corporations etc.
- PT programs

Changes in PT-Reported Presumptive Positives Over Time



PT-Reported Presumptive Positives By Setting





UK's "NHS Test & Trace" Approach to Some of the Issues Raised Here

Identified Issues from Modelling	UK "NHS Test & Trace" Approach
Repeat rapid testing better than one-off	Encourage twice-weekly testing and make sure those test are easily available (and free)
Optimal testing frequency every 3-5 days	Encourage twice-weekly testing
Operator risk	Pivot to home testing after testing has been performed with trained staff
Sub-optimal positive predictive value of rapid tests	Does not question positive result when performed in a community where prevalence >1%
At large scales, false-positive may swamp labs because of confirmatory PCR	Suspend confirmatory PCR test when high prevalence setting
At large scales, false-positive may swamp contact-tracing	*For home testing:* No contact tracing because no safeguard that people lie about having a positive result (e.g., to avoid work), and then would have to ask all contacts to (unnecessarily) isolate *In controlled settings:* trace immediately, don't wait for PCR
Enhanced case detection needed for B.1.617.2	Part of 'VIP' protocol of test, trace, isolate and vaccinate for B.1.617.2 outbreak zones

TAC and CPHLN main points

- Benefits and harms need balancing – but what are the harms?
- Targeting to high prevalence groups/locations versus general population – positive predictive value issue
- Equity
- Is it a tool for outbreaks or general use?
- Unnecessary when high levels of public health measures (lockdowns) in place
- Lack of resources to set up these schemes within public health
- False negatives may lead to adverse behaviour change – but may not
- Are there situations where a rapid test result is considered as positive without confirmation?
- Distinction between ‘screening’ for public health, and ‘clinical diagnosis’ is indistinct for some
- Comparison of rapid tests against culture may overestimate sensitivity to detect infectious people
- Rapid antigen tests deployed in some jurisdictions either widely or in pilot schemes

Conclusions

- Lack of well-controlled real-life studies to assess Ag-RDTs
- Ag-RDT approved in Canada will likely identify the majority of *infectious* cases in populations not targeted by traditional surveillance
- Ag-RDT most useful when multiple serial testing (every 3-5 days) in same population
- Ag-RDT will generate false positive results. At very large scale this may swamp:
  - Contact-tracing capacity
  - Labs undertaking confirmatory PCR tests
- Confirmation with a second Ag-RDT has weak predictive value in communities with very low prevalence
- Wide scale testing using Ag-RDT would likely support control of the COVID-19 epidemic and safe lifting of restrictions as vaccines roll out
- However this may only be practicable with changes in current policy, and clear decisions on what to do with a positive test result (isolation of the case, tracing of contacts, retesting) to mitigate possible negative effects on public health and laboratory capacity
- Clarity is needed on the objective, i.e. overall epidemic control and surveillance, and thus the setting
- Guidance is needed for those implementing rapid testing schemes, and on what a positive test result means for surveillance

For Discussion

- Guidance from FPT public health – what should it contain/update?
- Settings for use
- Objective of testing in each setting
- Interpretation and action for one or more positive test results
  - Recommendations to the tested person
  - Circumstances for confirmatory testing
  - Reporting in surveillance
  - Contact tracing
  - Outbreak management
- Interpretation and action for negative test results
- Acceptability and ethics
- Promotion of testing schemes

COVID-19 IMMUNITY TASK FORCE

CHARTING A COURSE BEYOND THE 3RD WAVE

Timothy Evans, Executive Director

Presentation to CMOHs, July 8th, 2021

COVID-19 IMMUNITY TASK FORCE MANDATE

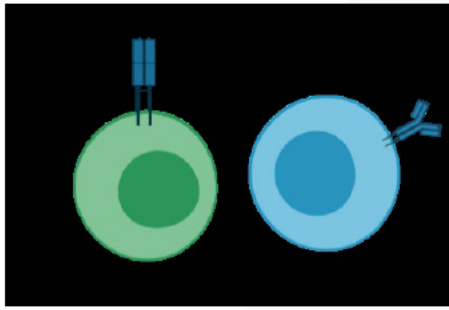
- Established by the Government of Canada in April 2020
- Addresses the need to understand:
  - The extent of SARS-CoV-2 infection across Canada
  - The nature of immunity arising from infection and vaccination
- Aims to catalyse, support, and harmonize the design and rapid implementation of studies that generate reliable estimates of SARS-CoV-2 immunity, overall and in priority populations AND that accelerate understanding of SARS-CoV-2 immunity.

OUTLINE

- CITF Mandate
- Phase 1 – focus and selected findings
- Phase 2 – focus and selected findings
- Phase 3 – proposed focus…

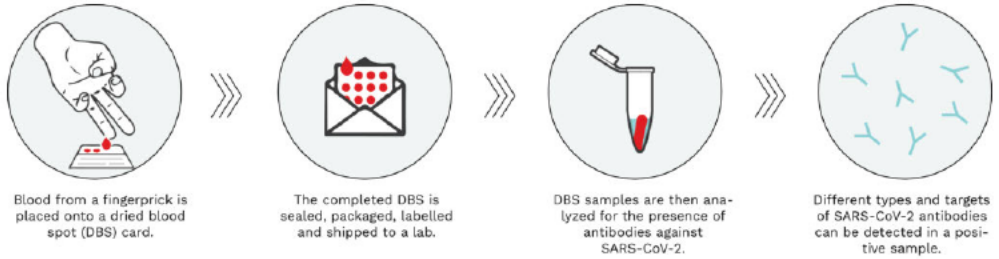
PHASE I (May – October 2020)

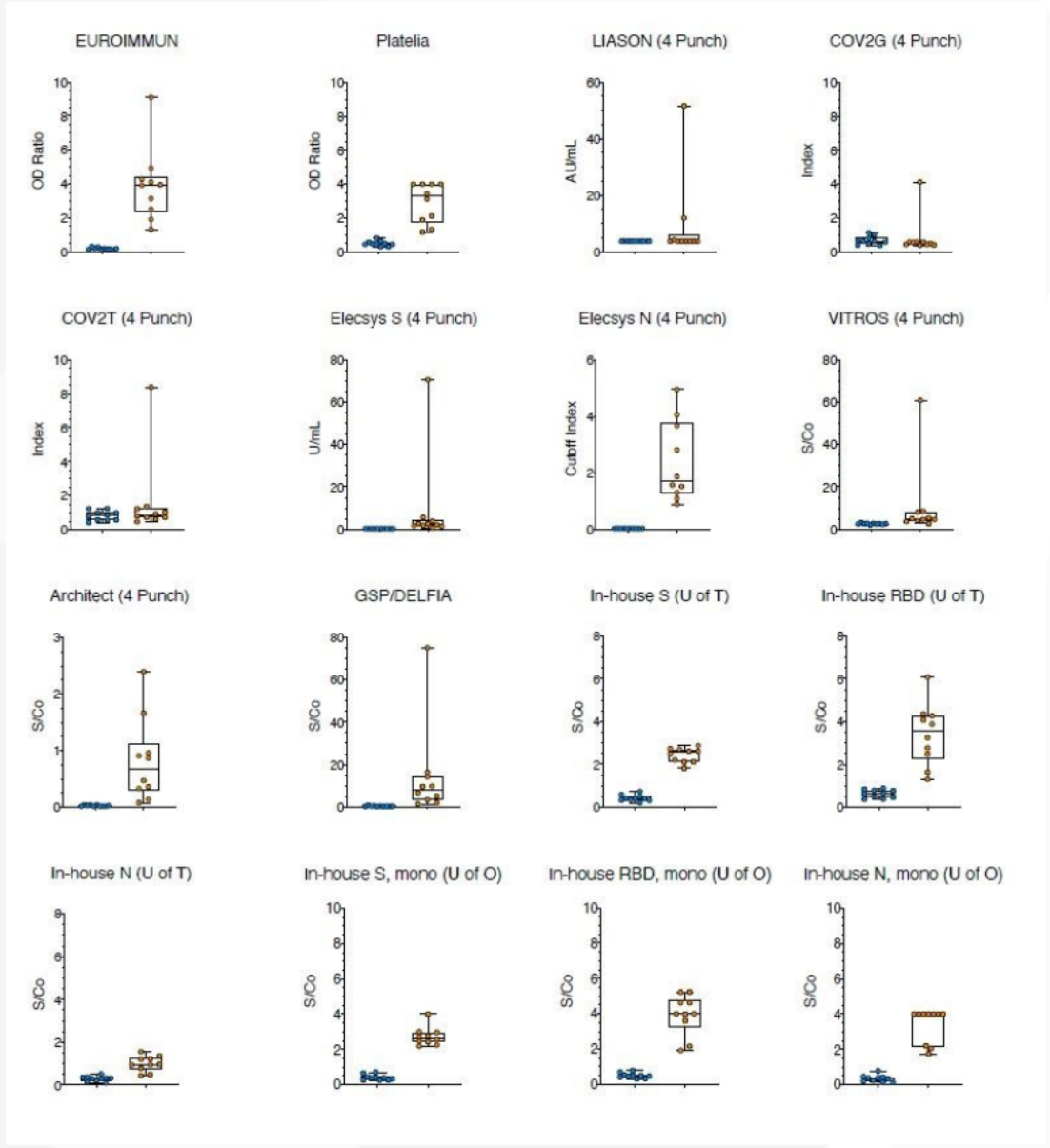
- Convenience samples/sero-surveys (blood banks, antenatal, left-over lab samples)
- Population-wide cross-sectional or cohorts (high-risk, elderly, random Canada-wide)
- Cohorts (known COVID-19, healthcare workers, children)
- Priority populations/Hot Spots (Indigenous, LTC, LGBTQ, Corrections, Homeless)
- Translational Immune Science (wide-ranging working with CIHR)
- Testing Technologies (new techniques, validation existing tests)
- Policy/Guidelines (uses of serology tests, use/misuse of immunity data)
- >50 Investments, >$80 million in commitments



PHASE 1: SELECTED FINDINGS

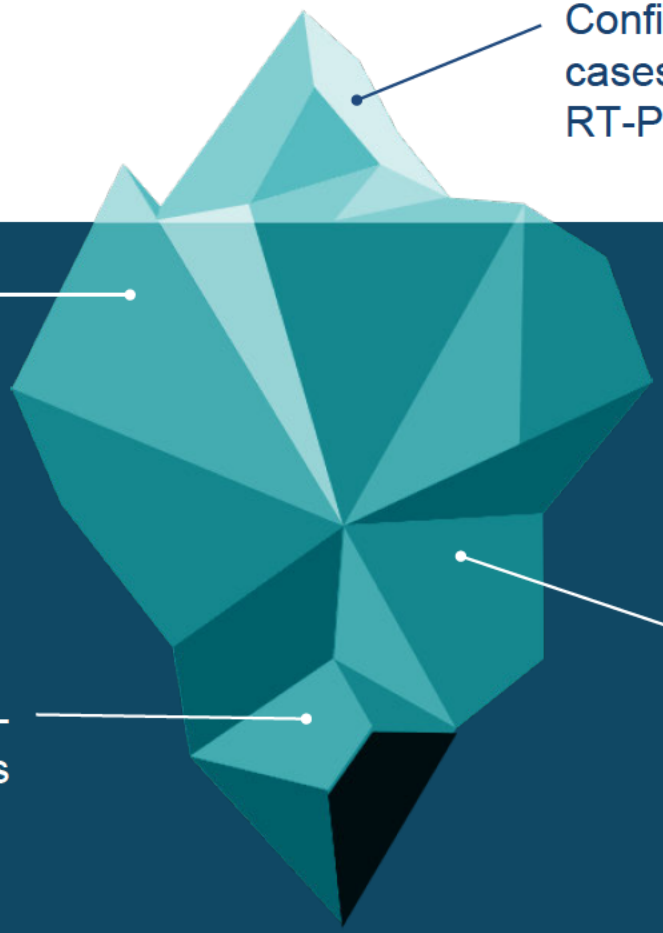
DRIED BLOOD SPOTS ARE A VALID METHOD FOR ASSESSING SARS-COV-2 SEROPREVALENCE





Courtesy of Cholette F et al, submitted

Serology data can help understand the full extent of the COVID-19 pandemic



JOHNS HOPKINS UNIVERSITY & MEDICINE | CORONAVIRUS RESOURCE CENTER

Cases found by diagnostic testing

SeroTracker

Cases that serological testing can help reveal

Low seroprevalence amongst blood donors across Canada after 1st wave

SARS-COV-2 SEROPREVALENCE BY PROVINCE (%)

British Columbia	0.50
Alberta	0.37
Saskatchewan	0.46
Manitoba	0.56
Ontario	0.96
Québec	1.06
New Brunswick	0.26
Nova Scotia	0.36
Prince Edward Island	0.00
Newfoundland and Labrador	0.29

SARS-COV-2 SEROPREVALENCE BY CITY (%)

Vancouver	0.60
Calgary	0.43
Edmonton	0.38
Ottawa	1.29
Toronto	1.07
Montréal	1.47

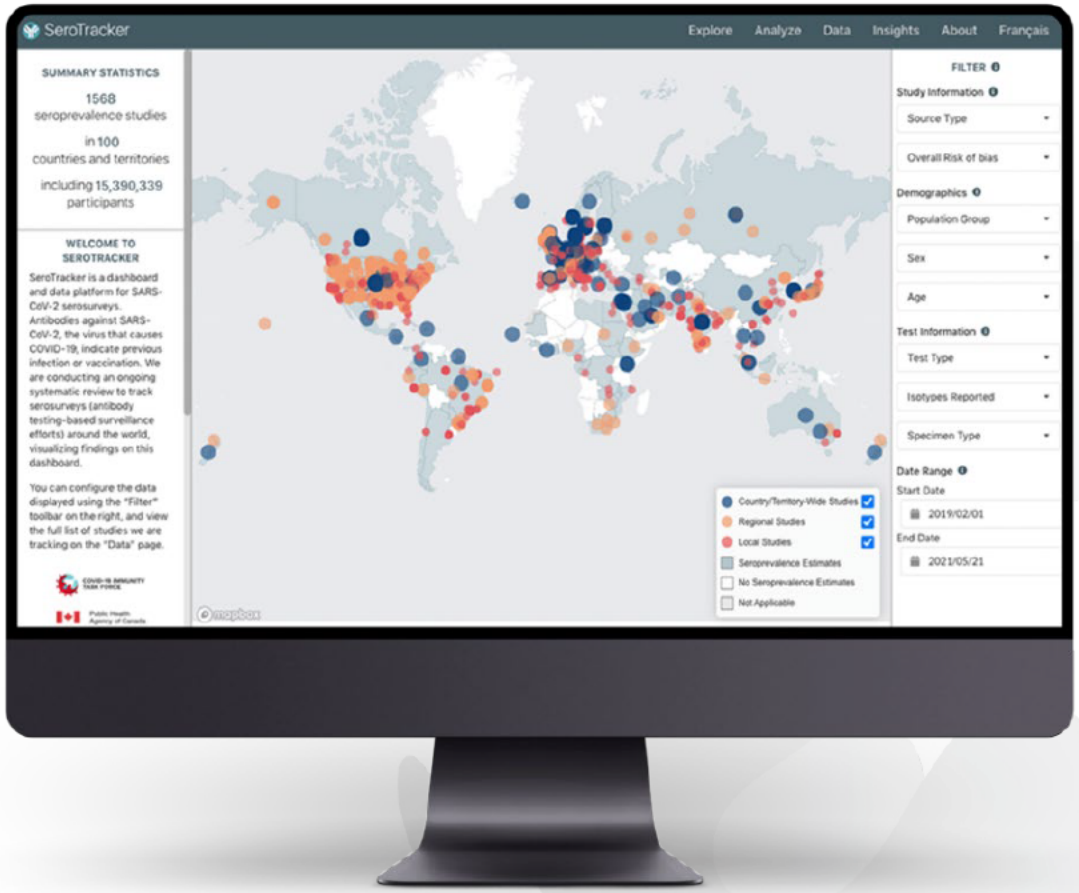
(May-June 2020, Canadian Blood Services and Héma-Quebec)

All seroprevalence figures based on Abbott anti-SARS-CoV-2 CMIA IgG Assay

SeroTracker is mapping global seroprevalence data

SeroTracker is a knowledge hub that **tracks and synthesizes** findings from SARS-CoV-2 serosurveillance efforts worldwide.

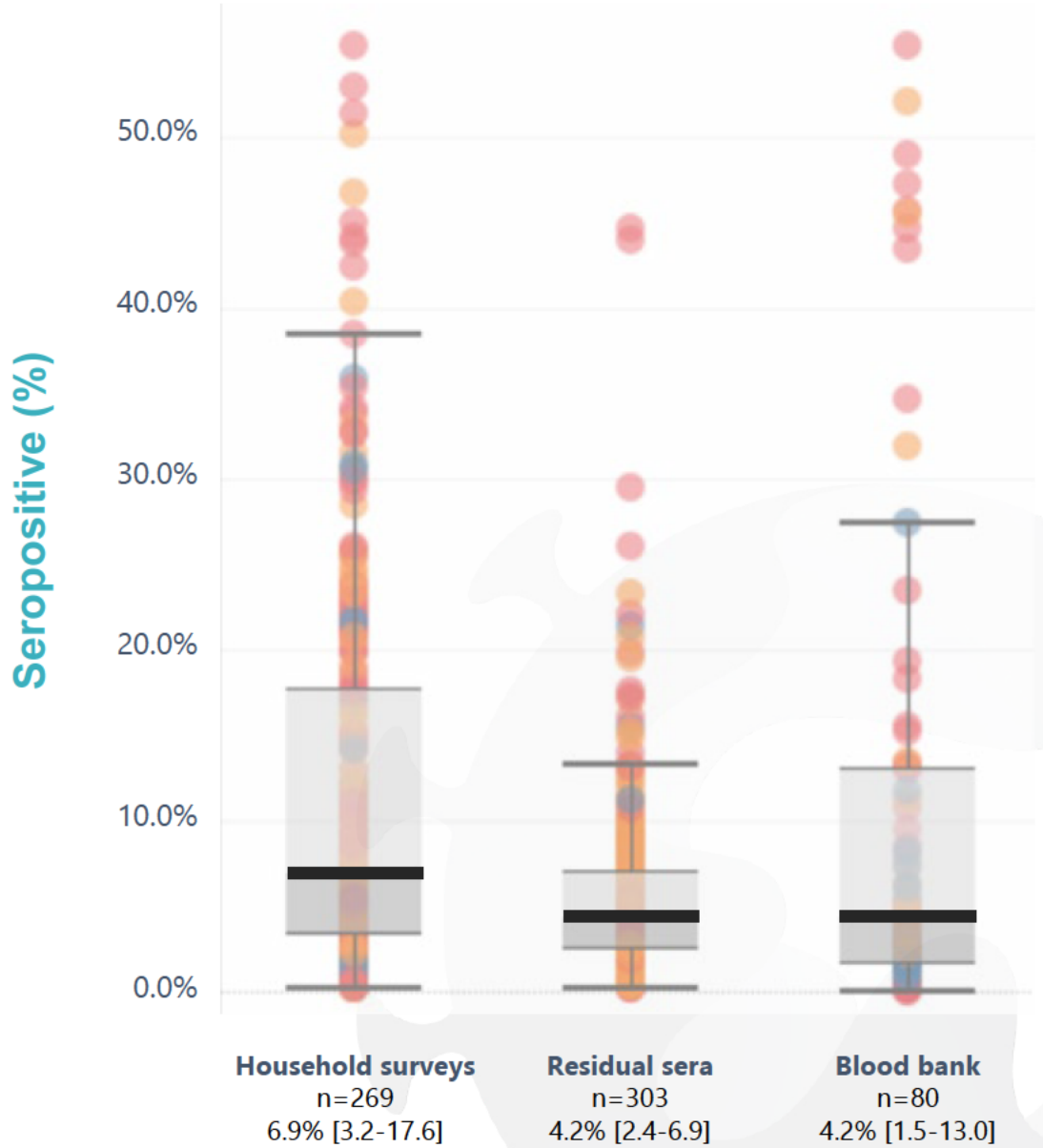
It was initiated in early April to serve the CITF's need for global serological testing data and is supported by the Task Force.



Blood donor studies are representative of the general population

Do studies of blood donors produce comparable results?

- Meta-regression: **No difference** in seroprevalence from blood banks and household surveys
- Analysis corrects for risk of bias, study region, scope of study, and reported case burden



Seroprevalence is low in the general population

What have seroprevalence studies reported?

- **Studies:** 1568, across 100 countries
- **Total sample size:** 15.4 million
- **Seroprevalence estimates from national studies are low:** median 4.6% [IQR 1.9-7.7%]

How do seroprevalence and case numbers compare?

Varies widely by region:

- Central Europe, Eastern Europe, Central Asia: seroprevalence is median 4x cases [IQR 3x-14x]
- High-Income: 10x [4x-19x]
- Latin America and Carribean: 13.1x [10x-48x]
- South Asia: 107x [81x-134x]
- Limited data for other regions

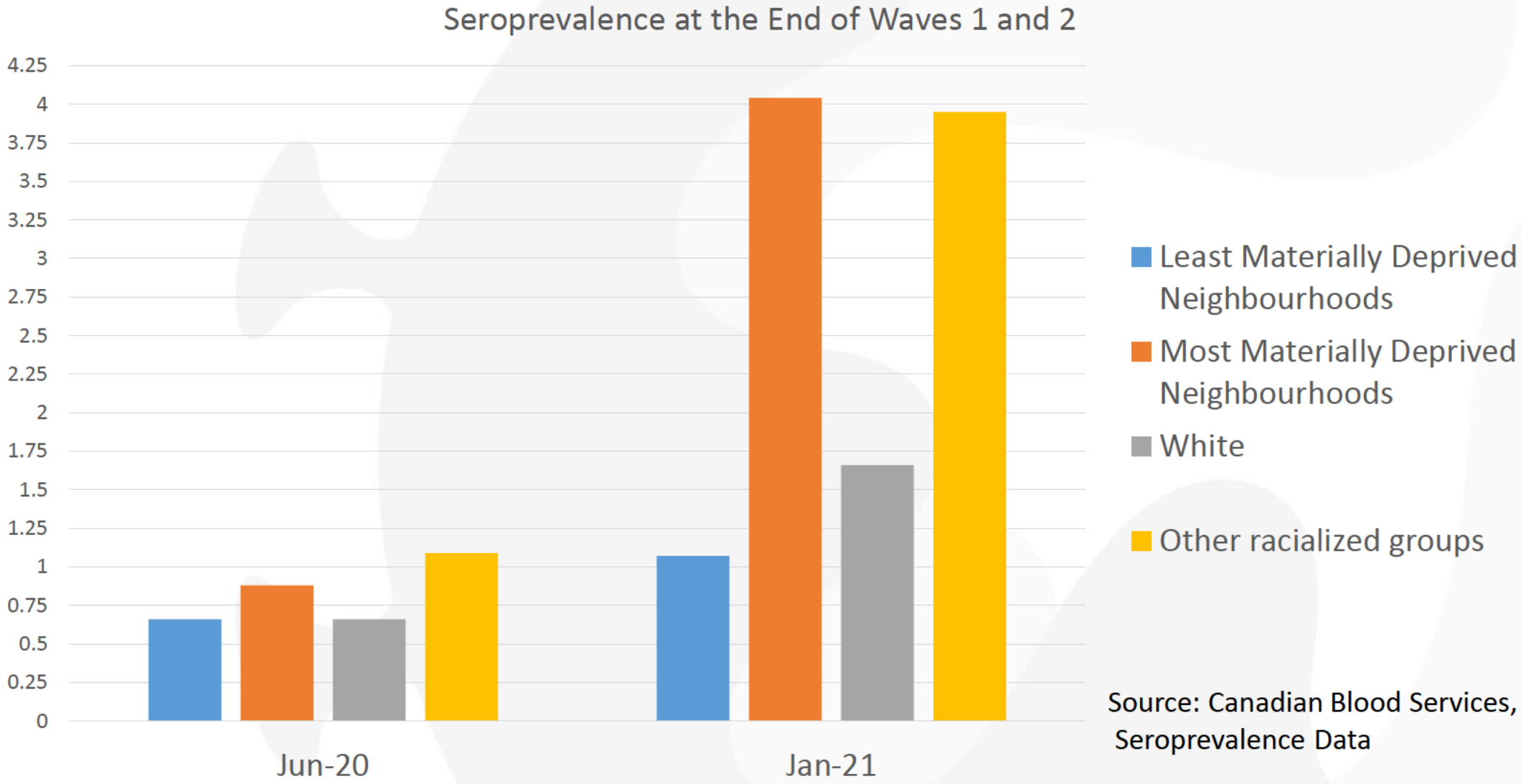
FOCUS ON "HOT SPOTS"

Hard-hit Neighbourhoods/
Racialized Communities

Long-Term Care

Occupational Settings

COVID-19 THRIVES ON SYSTEMIC INEQUALITIES!



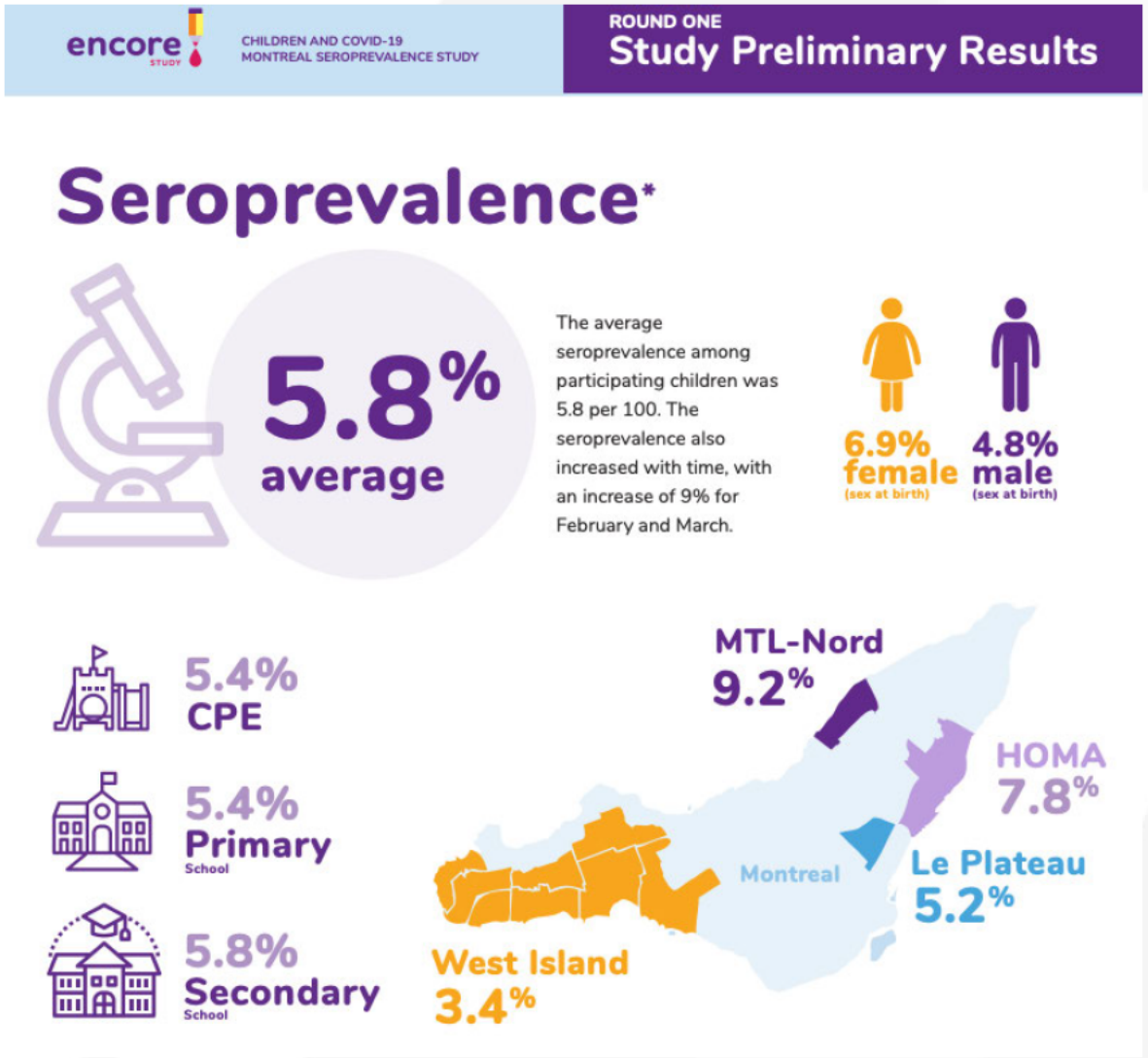
Source: Canadian Blood Services, Seroprevalence Data

COVID-19 THRIVES ON SYSTEMIC INEQUALITIES!

Visible Minority Status	**Antibody seroprevalence overall percentage**	Low 95% Confidence Interval	High 95% Confidence Interval	**Antibody seroprevalence due to infection percentage**	Low 95% Confidence Interval	High 95% Confidence Interval	**Antibody seroprevalence due to vaccination percentage**	Low 95% Confidence Interval	High 95% Confidence Interval
Visible Minority	**4.8**	3.1	6.8	**4.3**	2.6	6.3	**0.5**	0	1.2
Not a Visible Minority	**3.3**	2.3	3.9	**2.1**	1.1	2.6	**1.2**	0.2	1.5

Source: Statistics Canada's Canadian COVID-19 Antibody and Health Survey (CCAHS)

ENCORE STUDY: MONTREAL SCHOOL-AGED CHILDREN



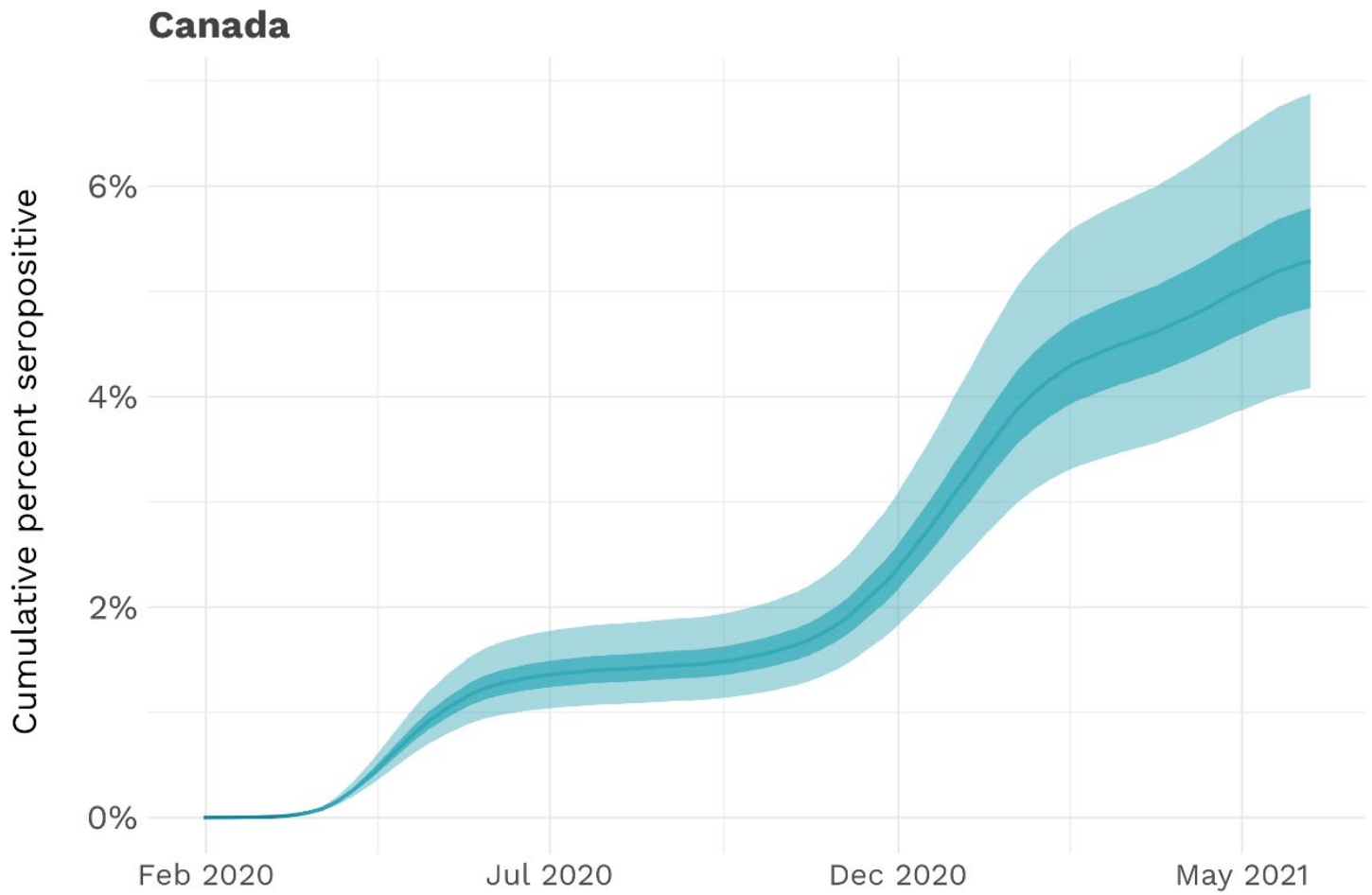
- Source: Zinser et al.
- Preliminary Results.

Immunity from natural infection is not the route to herd immunity!!

	Seroprevalence % (95% CI)	**Seroprevalence %** (95% CI)
	May-July 2020	January 2021
Canada	**0.70%** (0.63-0.77)	**1.99%** (1.31-1.71)
British Columbia	**0.56%** (0.41-0.70)	**1.48%** (1.04-1.97)
Alberta	**0.48%** (0.33-0.62)	**3.41%** (1.24-2.34)
Saskatchewan	**0.53%** (0.23-0.83)	**2.46%** (2.57-5.77)
Manitoba	**0.59%** (0.30-0.88)	**3.92%** (6.51-10.62)
Ontario	**0.88%** (0.78-0.99)	**1.82%** (0.56-0.97)
Quebec*	**1.06%** (0.82-1.30)	
New Brunswick	**0.23%** (0.00-0.49)	**0.27%** (0.00-1.20)
Nova Scotia	**0.69%** (0.33-1.05)	**0.56%** (0.00-0.65)
Prince Edward Island	**0.04%** (0.00-0.42)	**0%**
Newfoundland	**0.44%** (0.04-0.84)	**0.42%** (0.00-2.09)

(May-July 2020, and January 2021, Canadian Blood Services and Hema-Quebec)

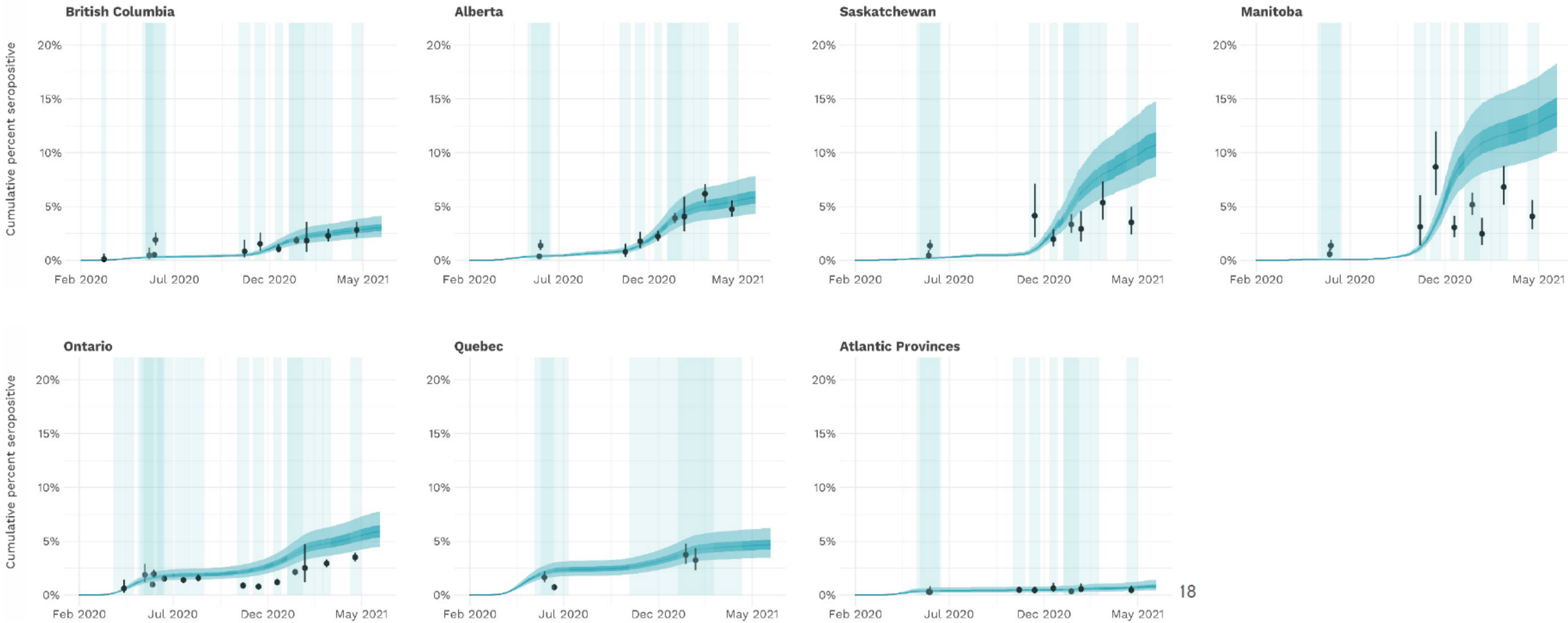
Results: Canada, natural infection only



5.4%

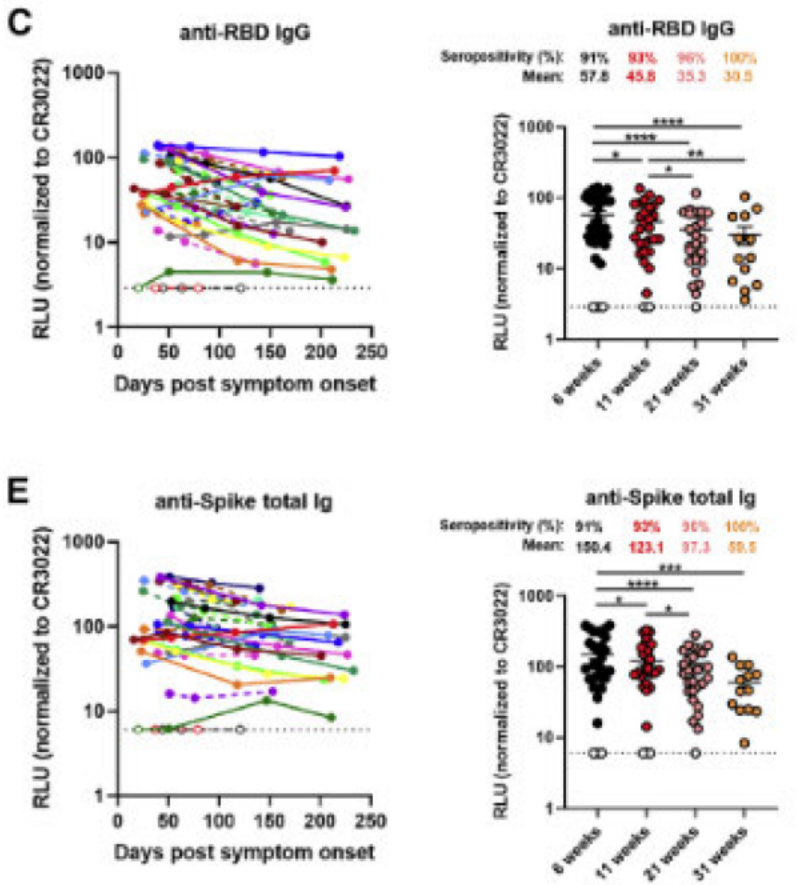
(95% CI: 0.6, 15.8)

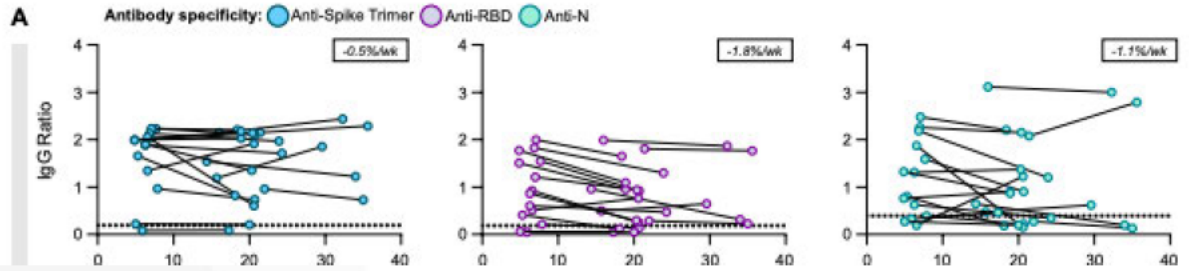
17

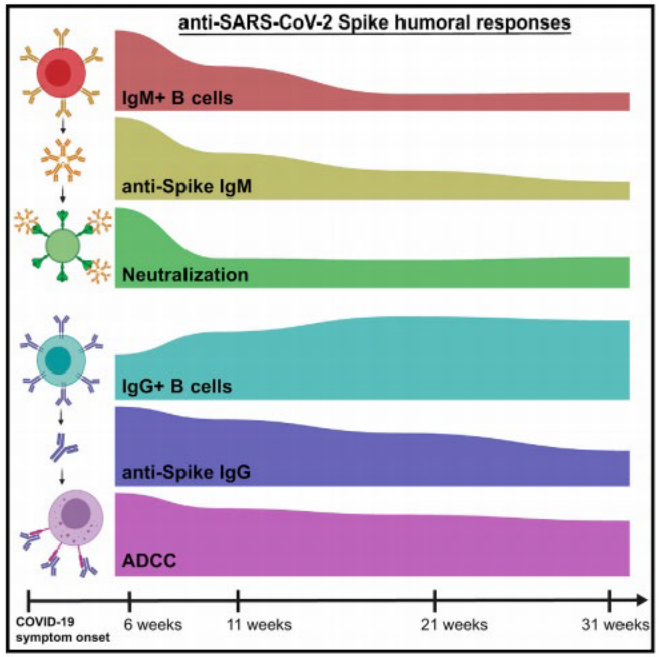

British Columbia
Alberta
Saskatchewan
Manitoba
Ontario
Quebec
Atlantic Provinces
Cumulative percent seropositive
20%
15%
10%
5%
0%
Feb 2020
Jul 2020
Dec 2020
May 2021

18

DURATION OF IMMUNE PROTECTION FROM INFECTION: > 9 MONTHS…..







Sources: Anand et al. Cell Rep Med. 2021 May 4.
Law et al, medRxiv : https://doi.org/10.1101/2021.06.08.21258518;

PHASE 2: COMPREHENSIVE SARS-COV-2 VACCINE SURVEILLANCE PROGRAM

- Understanding vaccines emerging from Phase 3 trials
  - Sample sizes, well studied populations vrs poorly studied populations (elderly, children)
  - Important overlooked stratifiers such as race-ethnicities, co-morbidities, hereditary and acquired immune defects
- Mapping vaccination priorities
  - Beyond age-groups and high risk occupations targeting: previous SARS-CoV 2 infection? seasonal coronavirus? pre-existing conditions (malignancy/chemotherapy, HIV, abnormal IF-1 responses)?
- Proxy measures of vaccine effectiveness
  - Humoral and CMI measures, neutralization assays, high throughput, “Made in Canada”
- Surveillance and Phase 4 studies
  - Protection, Immune response, Safety
  - Mix and Match
  - Changes in prescribed dosing intervals e.g. “first dose fast”

PHASE 2: DECEMBER 2020 – JUNE 2021

- Worked through Vaccine Surveillance Reference Group comprising representation from PHAC, CIRN, NACI and CITF
- Focus on vaccine surveillance: safety, effectiveness, immunogenicity
- Calls for “expressions of interest” – February 2021
- >45 studies supported –

PHASE 2: SELECTED FINDINGS

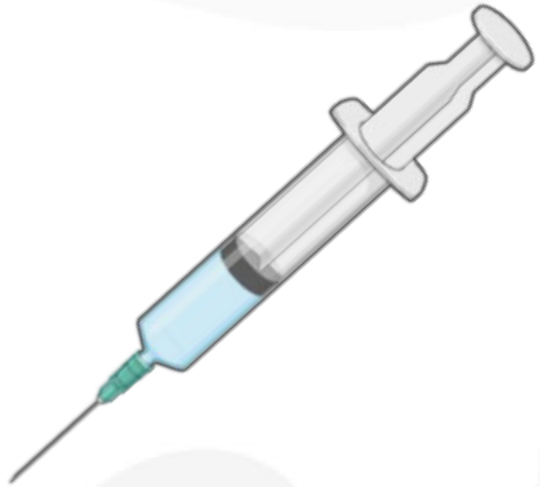
SINGLE DOSE PROTECTION APPEARS IMPRESSIVE!

PROVINCIAL COLLABORATIVE NETWORK, ONTARIO

- **Partial vaccination with Pfizer, Moderna or AstraZeneca vaccines provided good to excellent protection (64-83%) against symptomatic infection from all 4 circulating VOCs;**

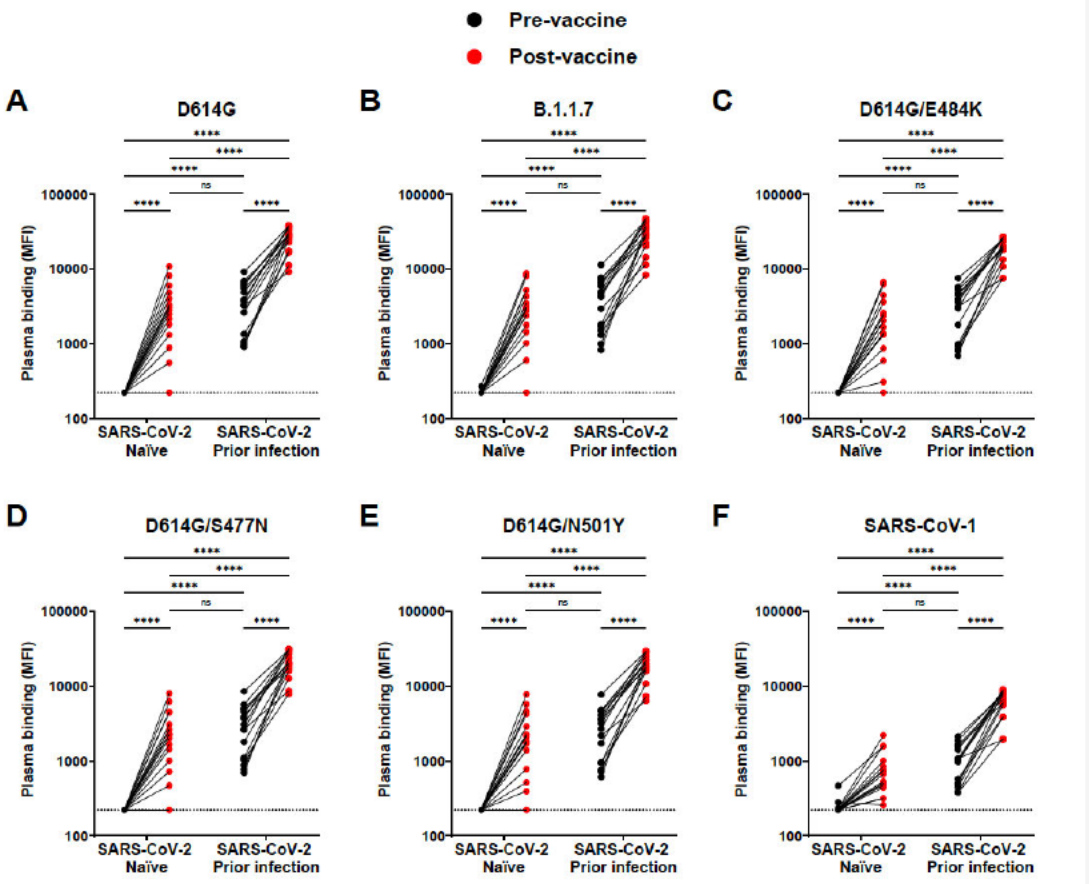
- **full vaccination provides even higher protection 89-92% for Pfizer and Moderna** (AstraZeneca not estimated).

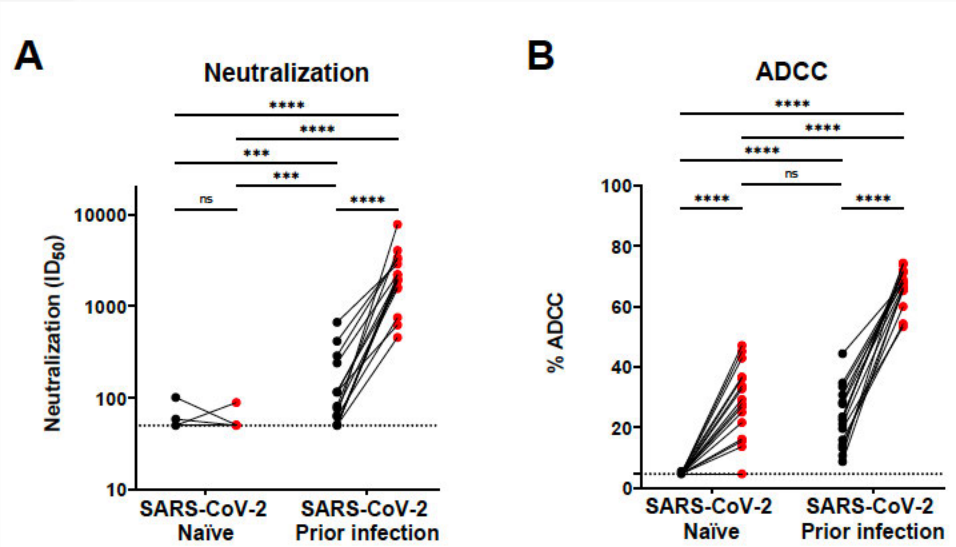
- **There was a reduction of less than 11% vaccine effectiveness for those partially vaccinated with an mRNA vaccine against any variant.**



Nasreen et al medRxiv preprint
doi: https://doi.org/10.1101/2021.06.28.21259420;

SINGLE VACCINE DOSE IMMUNE RESPONSE STRONGER FOR PREVIOUSLY INFECTED COMPARED TO NEVER INFECTED.

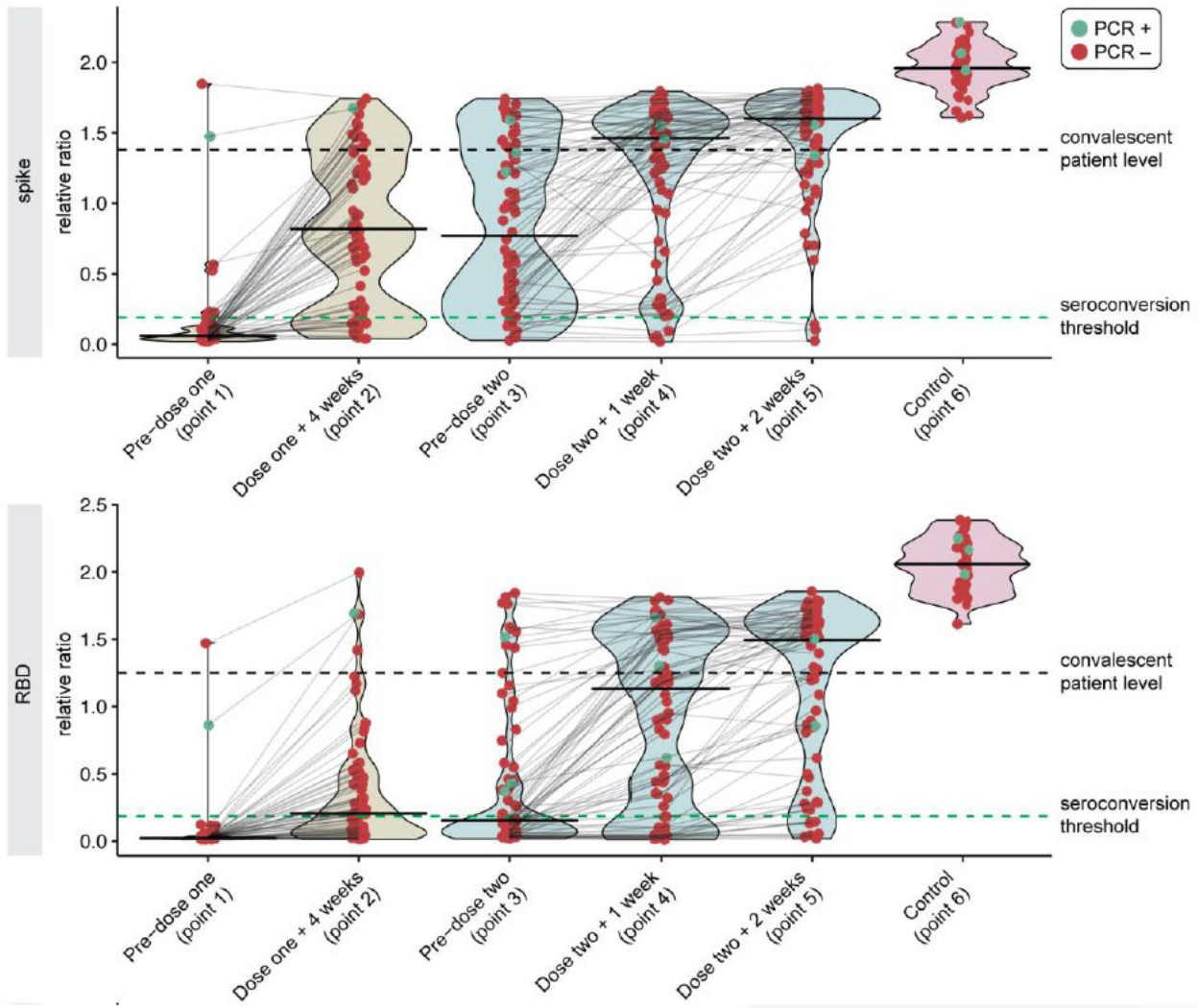


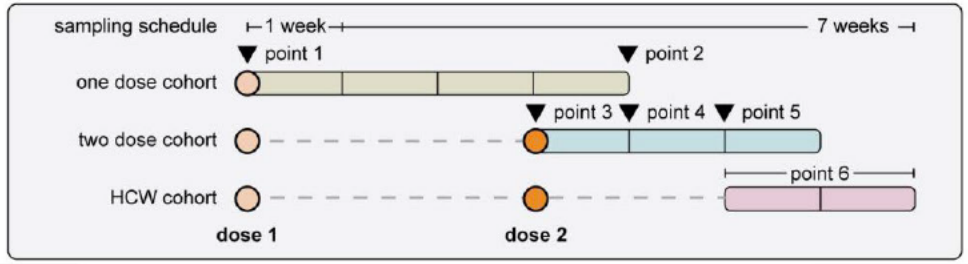


Tauzin et al Cell Host Microbe. 2021 Jun 4:S1931-3128

COVID-19 IMMUNITY TASK FORCE

POST VACCINATION (AZ) : HEMODIALYSIS PATIENTS HAVE LESS ROBUST IMMUNE RESPONSE





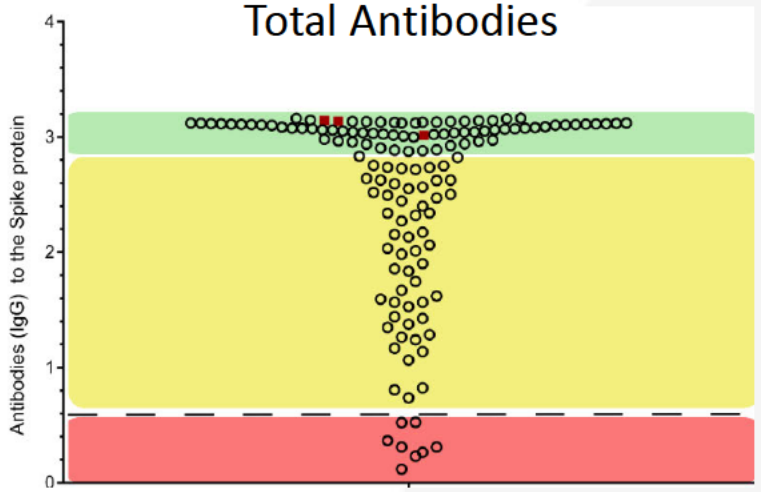
Results Courtesy of: Anne-Claude Gingras, Michelle A. Hladunewich, et al In preparation

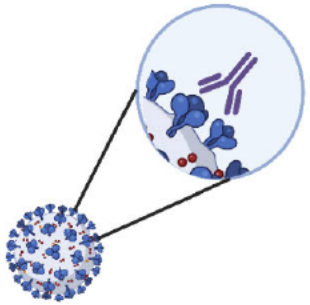
POST-VACCINATION: LTC RESIDENTS LESS ROBUST IMMUNE RESPONSE

Red squares are younger people vaccinated at about the same time

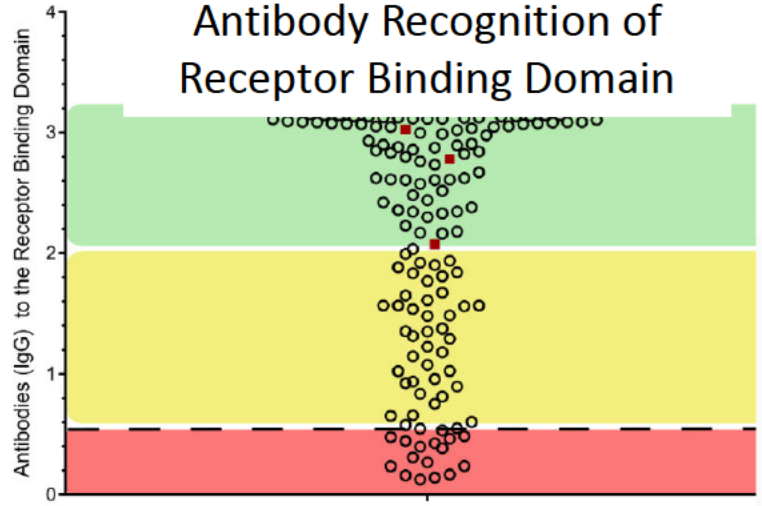
Each open dot represents a different resident. There were 136 residents analyzed in total

Total Antibodies

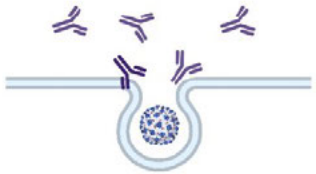


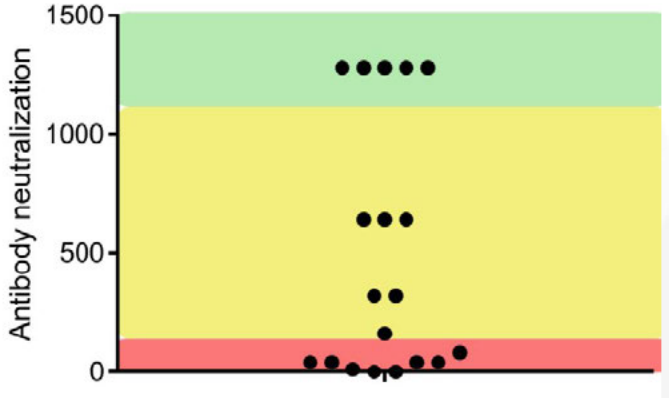


Antibody Recognition of Receptor Binding Domain



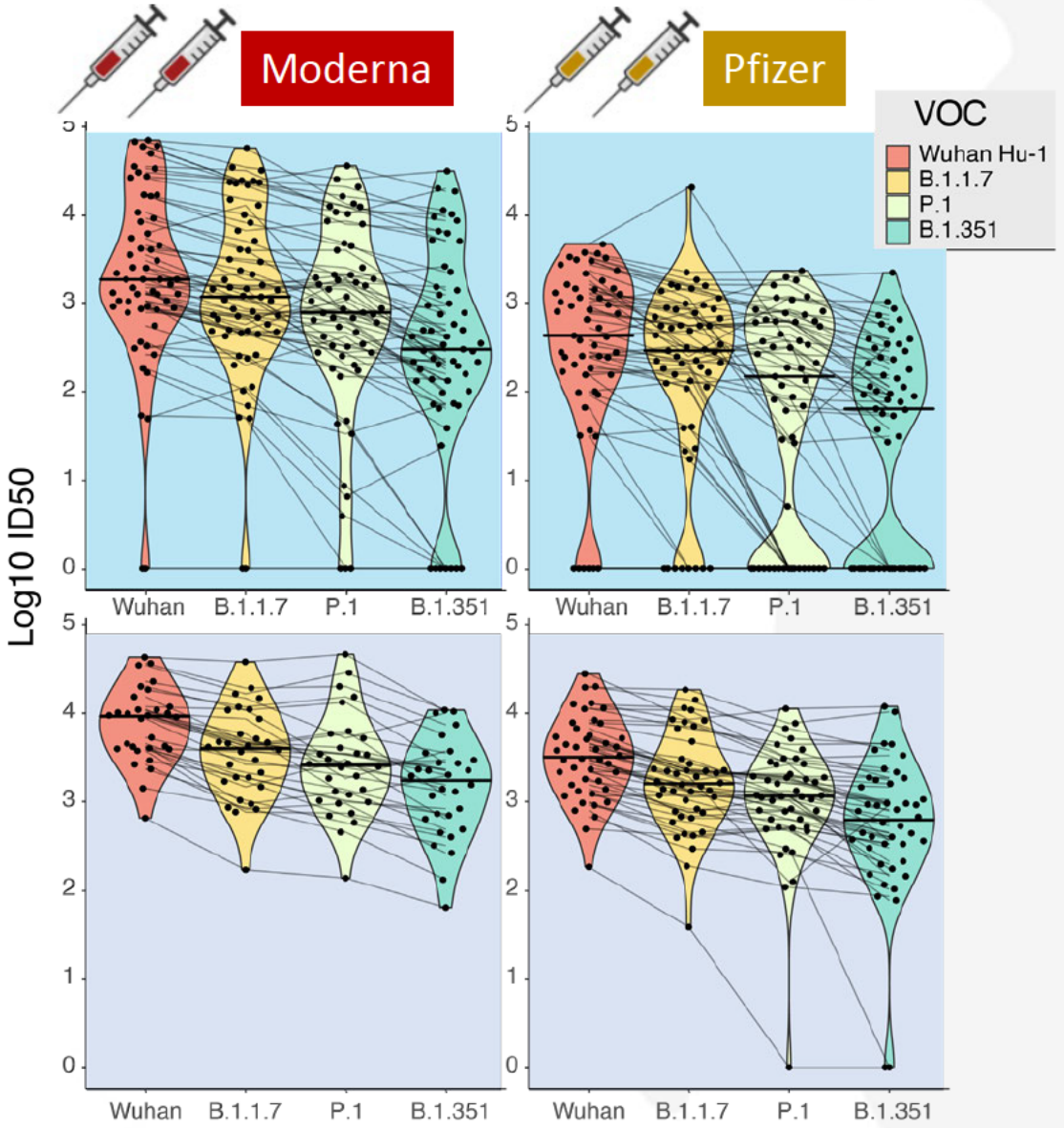
Antibody Neutralization Capacity





Courtesy of Bowdish, Bramson and Costa, In preparation

POST VACCINATION: LTC RESIDENTS HAVE LESS ROBUST IMMUNE RESPONSE FOR VOCS



LTCH residents

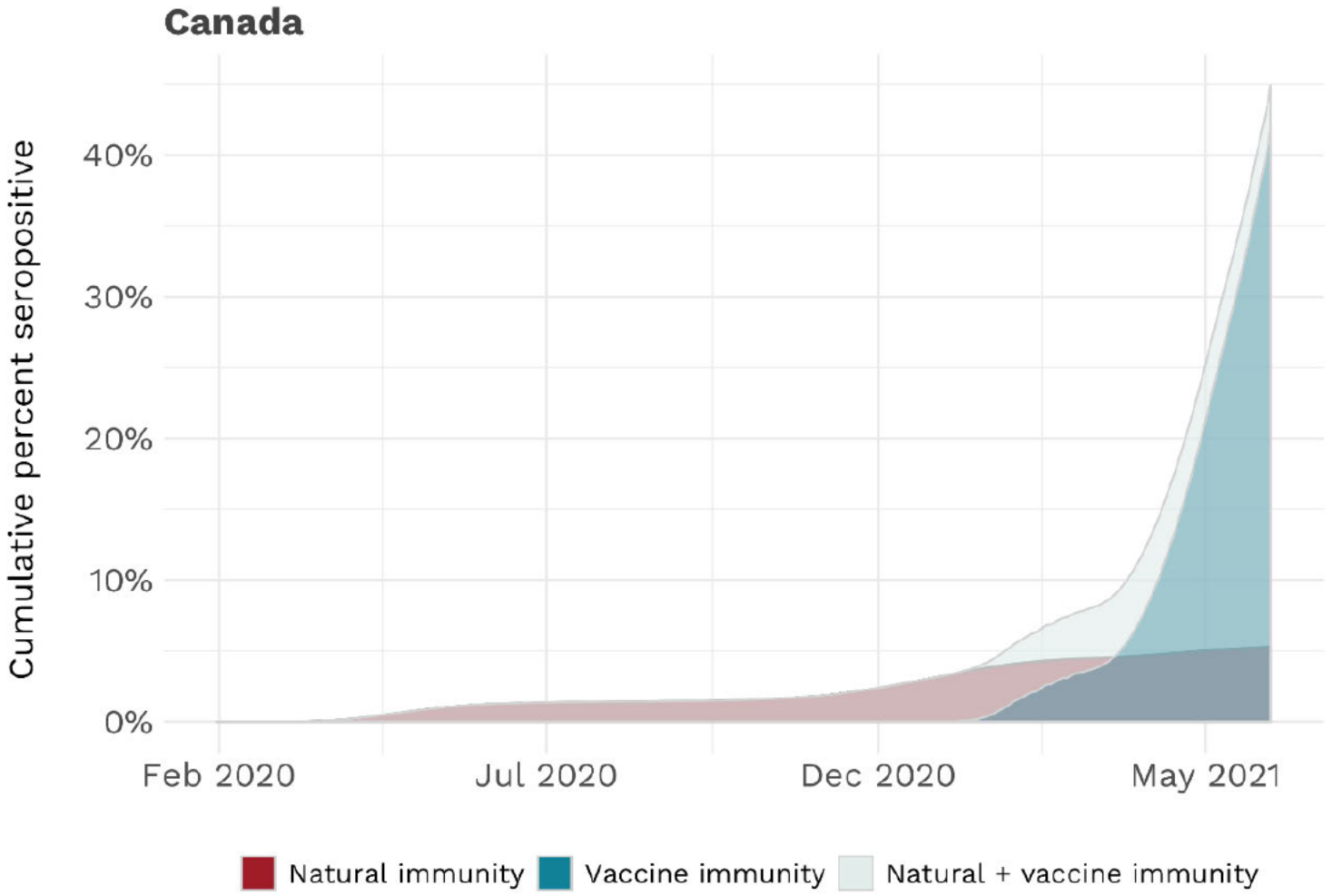
Staff

Neutralization:
Wuhan Hu-1 > B.1.1.7 > P.1 > B.1.351
~1.8, 2.9, 5.8 fold

Several residents are incapable of neutralizing VOCs

Results Courtesy of Hu, Gingras et al, In preparation

AGGREGATE IMMUNITY IN CANADA ARISING FROM NATURAL INFECTION AND VACCINATION



44.9%

(95% CI: 44.2, 45.8)

PHASE 3: CHARTING A COURSE BEYOND THE 3RD WAVE

1. Vaccines and Immunity:

- The Second Dose Opportunity
- Booster Vaccines
- Pediatric Vaccination and its Roll-Out
- Variants of Concern

2. Monitoring of Immunity for policy

- Modelling of herd immunity
- Immune surveillance for safe re-openings

THE SECOND DOSE OPPORTUNITY

- **Rationale**:
  - To evaluate Canada's unique "dosing interval" and "mix and match" approaches to vaccination
- **Key Questions**:
  - What are the benefits and risks of the longer intervals to 2nd dose? Is there an optimal interval?
  - What is the relative efficacy, safety and immunogenicity of different combinations of vaccines and dosing intervals?
  - Can lessons from Canada's approach to second dose inform new options for global vaccine management?
- **Proposed Approaches**:
  - CITF assets -- MOSAIC (mix and match); Serosurveys incl. CBS, HQ, CanPaTH, StatCAN, ABC, LTC (for second dose intervals and immune outcomes)
  - Studies in field now, amplify/tailor to specific questions follow until early 2023

BOOSTER VACCINES

- **Rationale**:
  - To determine the timing and type of booster vaccine to prevent a resurgence of COVID-19.
- **Key Questions**:
  - How best to assess duration of protection arising from vaccination: immune correlates of protection? escape infection? illness? hospitalization? or death? Or all of the above?
  - What is the design of a surveillance system to measure levels of population immune protection post vaccination for different risk groups (age, immunocompromised, vaccination history)?
  - Who are the key populations that will require booster doses of vaccine and when?
  - Can passive antibody infusion (neutralizing monoclonals) protect against disease in vulnerable populations with poor vaccine responses?
- **Proposed Approaches**:
  - Work with Provincial-Territorial authorities to increase scope and scale of vaccine surveillance
  - CITF assets --- VSRG studies, particularly cohorts with impaired immunity

VARIANTS OF CONCERN

- **Rationale**:
  - Variants of Concern are and will continue to be a challenge in managing the pandemic
- **Key Questions**:
  - How best to conduct surveillance for VOCs? e.g. lineage vs specific mutation combinations?
  - What is the impact of VOC on infection/disease transmission and vaccine effectiveness?
  - Is it possible to predict the effects of new mutations in current VOCs e.g. N501Y and E484K in Delta?.
  - Can new tools be developed to sequence VOCs i.e. in waste water?
- **Approaches**:
  - work closely with COVARRNet,
  - CITF assets: provide foundations upon which COVARRNet studies can reach scale
  - National, coordinated effort with sharing of data to achieve scope and scale necessary to answer questions
  - Include wastewater surveillance & sequencing -- as it now a CoVaRR-Net priority

PEDIATRIC VACCINATION AND ITS ROLL OUT

- **Rationale**:
  - Children the largest unvaccinated population with concerns on the risk-benefit ratio of vaccination.
- **Key Questions**:
  - For children <12 years:
    - effectiveness and immunogenicity of COVID vaccination in healthy and unhealthy children?
  - For children, teens and young adults (6 mo–30 yrs):
    - what are the vaccine safety issues by vaccine type e.g. myocarditis and mRNA vaccines?
    - What long term surveillance is required to monitor complications of COVID-19?
- **Proposed Approaches**:
  - Vaccines to focus on: mRNA Vaccines, possibly viral component protein vaccines (Novovax or Medicago)
  - Time to the field --- pending HC approval of vaccines in children<12
  - CITF assets --- Peds Network, CANVAS, IMPACT, Natl Peds COVID Biobank, MIS-C registry, BQC (pediatric)
  - Scope/Scale issues: very low expected rates of illness/disease, sample numbers will have to be very high

MONITORING AND MODELLING OF HERD IMMUNITY

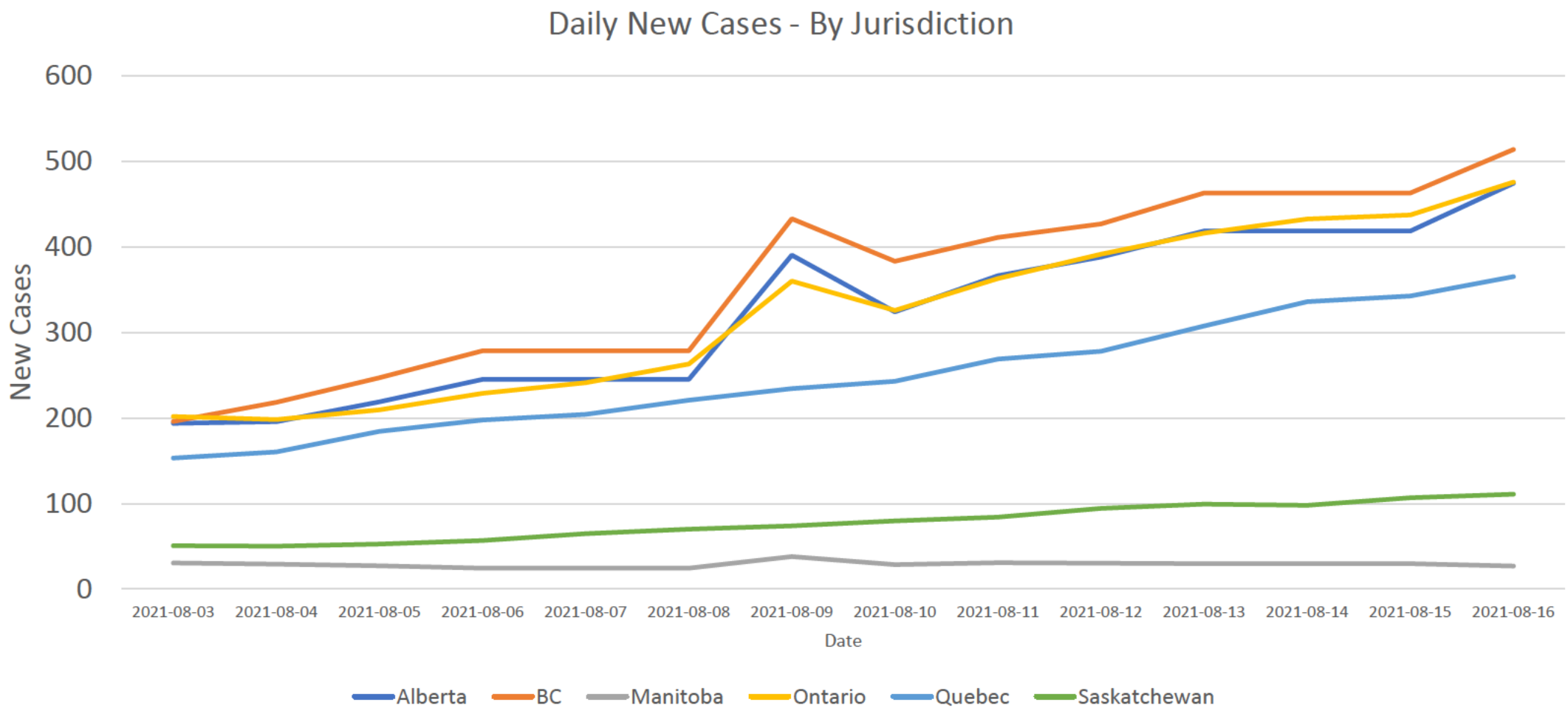
- **Rationale**:
  - Levels of immunity will determine risk of further outbreaks
  - Immune surveillance may help to guide decisions related to re-opening of schools, workplaces and borders
- **Key Questions**:
  - How to improve the robustness and comparability of immunity estimates (e.g., assay characteristics, correlates of protection)?
  - How to model population immunity using Bayesian multilevel models drawing on latest seroprevalence data
  - How do sociodemographic and comorbidity risk factors influence duration of immunity in the context of VOCs?
  - How do immune surveillance strategies compare for re-opening of borders, workplaces and schools?
- **Proposed Approach**:
  - Publish monthly estimates of levels of immunity for Canada as a whole as well as by P/T
  - Mathematical modelling of policy scenarios.
  - Regular scientific exchange with the CITF Modelling Advisory Group (international) and the Canadian Modelling Table
  - Collaboration with Federal and PT public health authorities around opportunities to strengthen immune surveillance as part of efforts to re-open borders, workplaces and schools.

COVID-19 IMMUNITY TASK FORCE

WEBSITE LINK:

https://www.covid19immunitytaskforce.ca/

7-Day Moving Average – Selected Jurisdictions

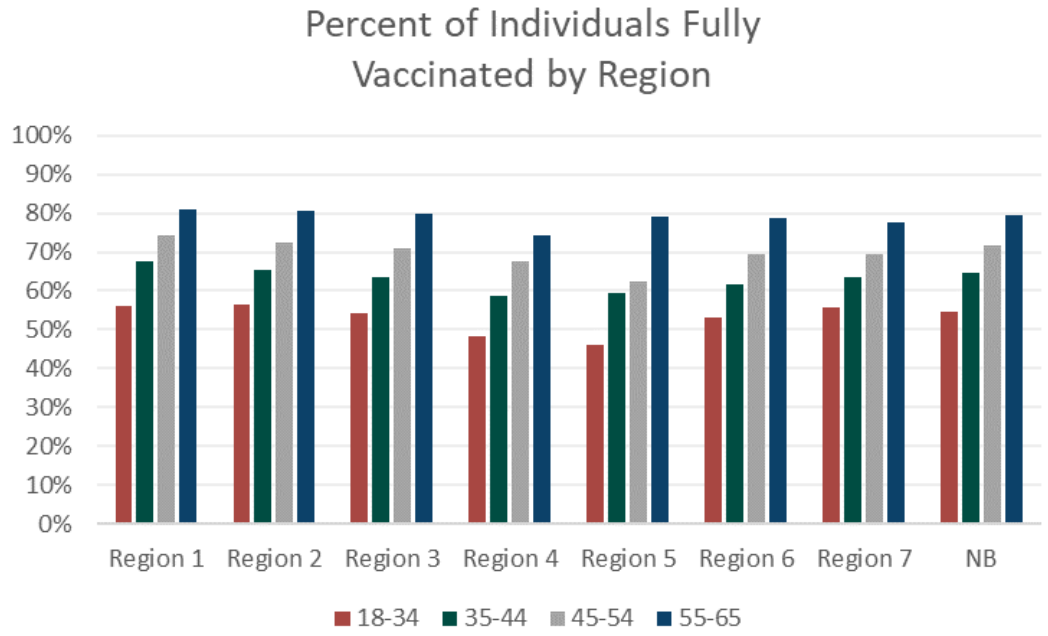


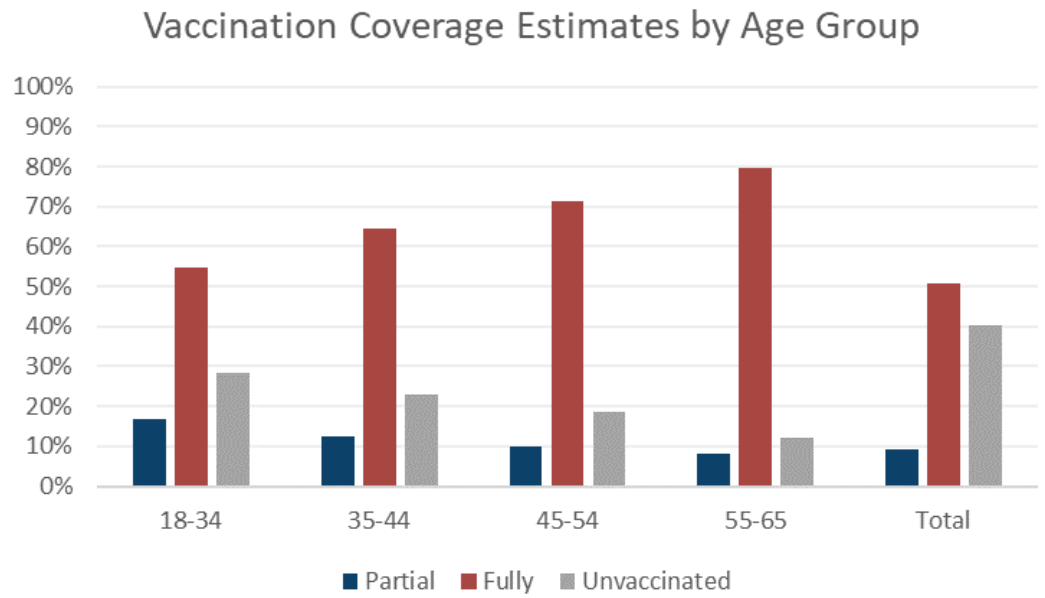
Mandatory COVID-19 Vaccine Framework (Public Sector)

Why - Public Health Risk Assessment

- Public Health endorses as many individuals living in NB be vaccinated as possible to provide a sufficient level of community immunity to protect those who cannot be fully vaccinated or cannot for medical reasons. This includes protection in relation to the health and safety of staff in any sector.
- A high vaccination rate of 80-90% likely protective our health system (see details) owing to the emergence of the Delta variant.
- 75% was the goal for those fully vaccinated. This was based on early data trends of decreasing cases and hospitalizations. Return to near pre-pandemic contact levels may have significant impacts on cases and potential hospitalizations based on NB modelling.
- Health System Human Resources must be judiciously managed.
- More recent data, and revised timelines for vaccine approval and availability for those under 12 years of age.

Coverage estimates for those age 18-65



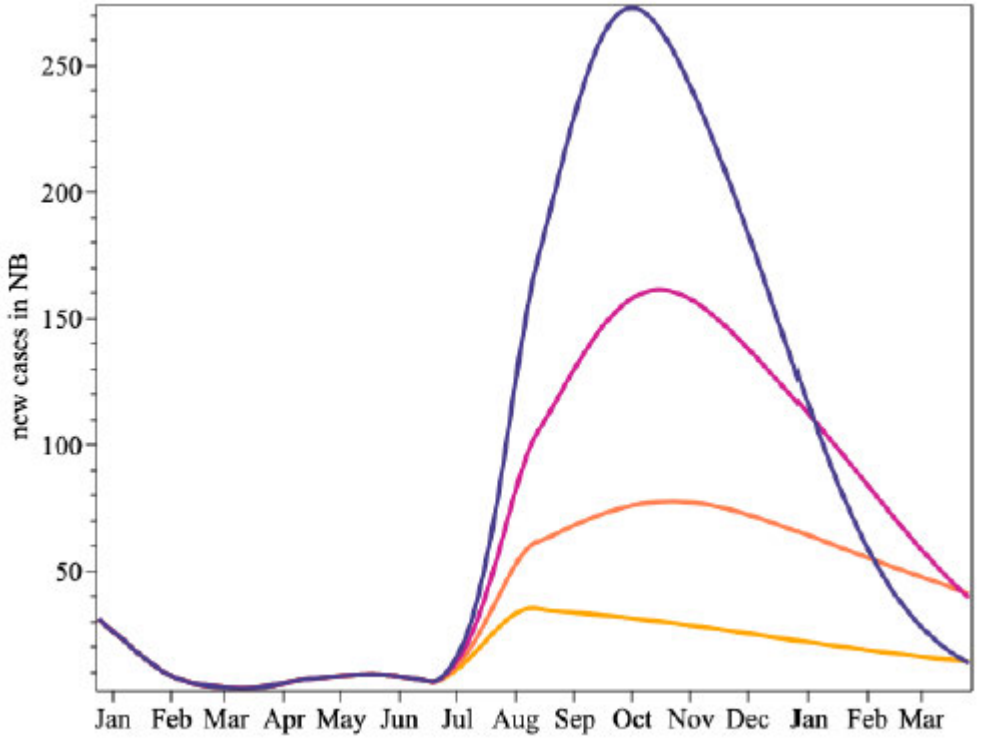


- Assuming the above trends are similar among the NB public workforce, we can expect that there are
  - 12,076 (12%) individuals yet to be vaccinated among the public workforce, and
  - 6,916 (21%) individuals are partially vaccinated, and
  - 40,056 (67%) of individuals are fully vaccinated.
- Given average level of education in Parts 1-4, we expect this assumption to overestimate those who are unvaccinated (percent fully vaccinated likely closer to 77%).

NB Modeling

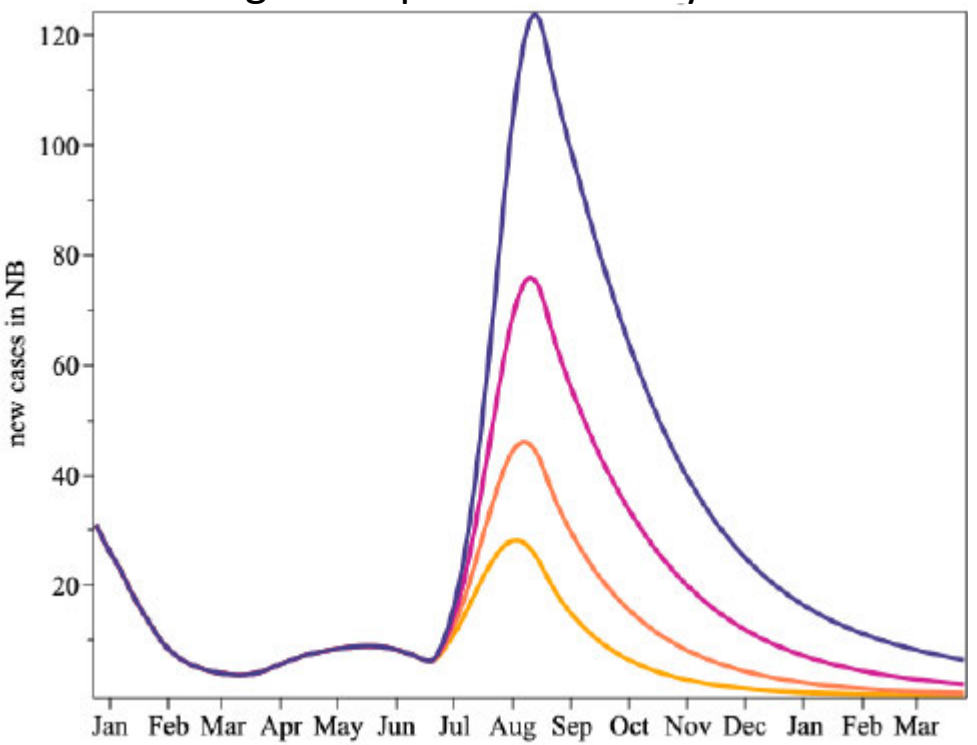
Daily COVID-19 cases by pre-pandemic contact rates and percent of the eligible population fully vaccinated

75% of Eligible Population is Fully Vaccinated



- Contact rate 65% pre-pandemic normal
- Contact rate 70% pre-pandemic normal
- Contact rate 75% pre-pandemic normal
- Contact rate 80% pre-pandemic normal

90% of Eligible Population is Fully Vaccinated



- Contact rate 65% pre-pandemic normal
- Contact rate 70% pre-pandemic normal
- Contact rate 75% pre-pandemic normal
- Contact rate 80% pre-pandemic normal

NB Modeling Summary

Table 3. Summary of expected cases and hospitalizations by second dose coverage and contact rate

Scenario	Contact Rate	Dose 2 Coverage	Cases at Peak	Hospitalizations* at Peak
1	65%	75%	38	5
1	70%	75%	89	13
1	75%	75%	161	23
1	80%	75%	270	38
2	65%	90%	28	4
2	70%	90%	46	6
2	75%	90%	77	11
2	80%	90%	124	17

*None of the hospitalizations expected to be fully vaccinated individuals

- Even at 75% fully vaccinated, if New Brunswicker's return to their pre-pandemic normal contact rate the healthcare system could quickly exceed its capacity.
- COVID-19 investigation provides evidence that New Brunswickers are well on their way to pre-pandemic contacts rates with the average number of contacts doubling since July 1st.

Mandatory COVID-19 Vaccine Framework (Public Sector)

Who
(Policy Scope)

OPTIONS:

- All Public Sector Parts I, 2, and 3 including those employed in licensed Nursing Homes.

or

- All Public Sector Employees (Parts 1 to 4) including those employed in licensed Nursing Homes, licensed Adult Residential facilities, licensed daycares and early learning centres, and staff in post-secondary education establishments.
    - For some of these settings, intent can be expressed but requires either regulatory changes i.e. licensed ARFs, or in the case of universities requires statutory change.

What
(Type of Exemptions)

OPTIONS:

- **Only medical exemptions** (List of medical exemptions provided by Public Health, process in place to approve exceptions for other medical conditions identified by a physician/NP
- Question: Include **religious and conscientious/ personal reasons** as allowable exemptions?

Mandatory COVID-19 Vaccine Framework (Public Sector)

When (Alternative Measures)	Where/How (Alternative Measures)
PROPOSED MEASURES: • Provide thrice (3X) weekly POCT for those exempted for early detection and protection. PCR available if POCT positive or at discretion of individual. • Those with **1 dose** are provided with 6 weeks from date of announcement to allow time to schedule and get their second vaccine dose – **3X/week POCT AND must mask while at work.** • Those with **no doses** provided 8 weeks from date of announcement to get both their first and second vaccine doses – must undergo **3X/week POCT; PCR testing every other week; AND mask while at work.** • Warning issued and management for non-compliance will be dealt with on a case-by-case basis (could include leave without pay) - mask use and testing until such time COVID no longer a risk in the workplace with continued vaccination refusal.	PROCESS: • PCR testing self-scheduled at Assessment Centres • POCT through employer program • Medical exemption certificate issued through MyHealthNB by Regional Public Health (see process) • Vaccination will continue at pharmacy, RHA clinics, special clinics or through employer clinics.

Medical Exemption Eligibility

Permanent Medical Exemption (certificate) may be issued by the primary care provider or specialist physician for individuals with a severe allergy to a component of the COVID vaccine (i.e. Polyethylene glycol PEG, polysorbate, or tromethamine) and an allergist has ruled out vaccination in a controlled setting.

- Other medical exemptions are as follows when there are contraindications to a SECOND dose of COVID vaccine:
  - Severe Allergy: **I**ndividuals who experienced a severe allergic reaction (i.e. anaphylactic reaction) to a previous dose of a COVID vaccine, where an allergist has ruled out vaccination in controlled setting.
  - Thrombosis: Individuals who have consulted with a thrombosis specialist after venous or arterial thrombosis with thrombocytopenia following vaccination with a viral vector COVID-19 vaccine, and it was determined that the risk was too great to use an mRNA vaccine for their second dose.
  - Myocarditis or Pericarditis: Individuals who experienced myocarditis or pericarditis after a previous dose of mRNA vaccine.
- An exceptions process will be available for individuals with conditions not specified but for which a primary care provider of specialist feels strongly would impact health or wellness.

Time-limited medical exemption may be issued by letter from a primary care provider or specialist physician to provide for those participating in immune modulating therapies that would alter the timing of COVID-19 immunization (time-limited).

Process

- Physician/Nurse Practitioner completes the form/letter and sends a copy to Regional Public Health office where the information is uploaded into the Public Health Information Solution (PHIS) and then issued through MyHealthNB

- Exemptions arising due to contraindications from an Adverse Event Following Immunization (AEFI) after a 1st COVID dose will be managed by Public Health through Public Health's AEFI process, the Regional Public Health communicates and issues the completed form for issuance through MyHealthNB.

Testing Requirements:

Test Type	Medically Exempt	Partially Vaccinated	Not Vaccinated
POCT (Pan bio) • 3 times/week • Tests separated by by at least 2 days • Record test result in GNB POCT Result App	✔	✔	✔
PCR • Every other week • Self-scheduled on own time, share negative result with employer	(at any time at their own discretion, or if Pan Bio Positive)	(only if Pan Bio Positive)	✔ (and if Pan Bio Positive)

COVID-19

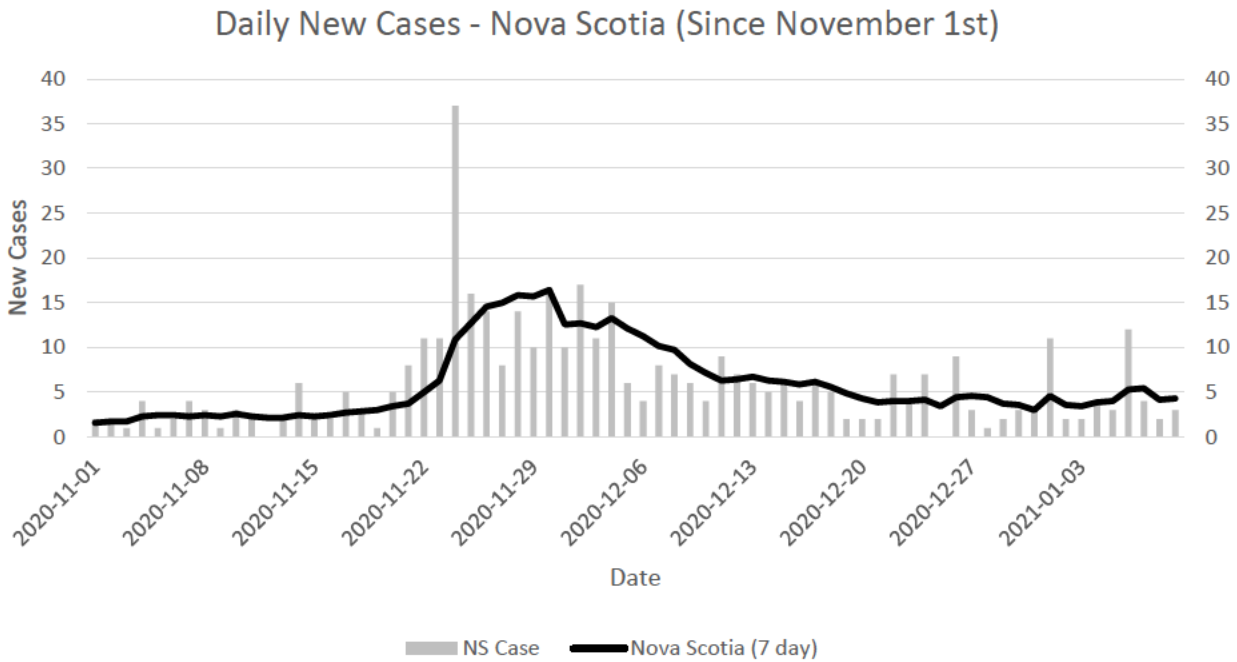
New Brunswick EPI/Phases Update / Vaccine Update and Modelling

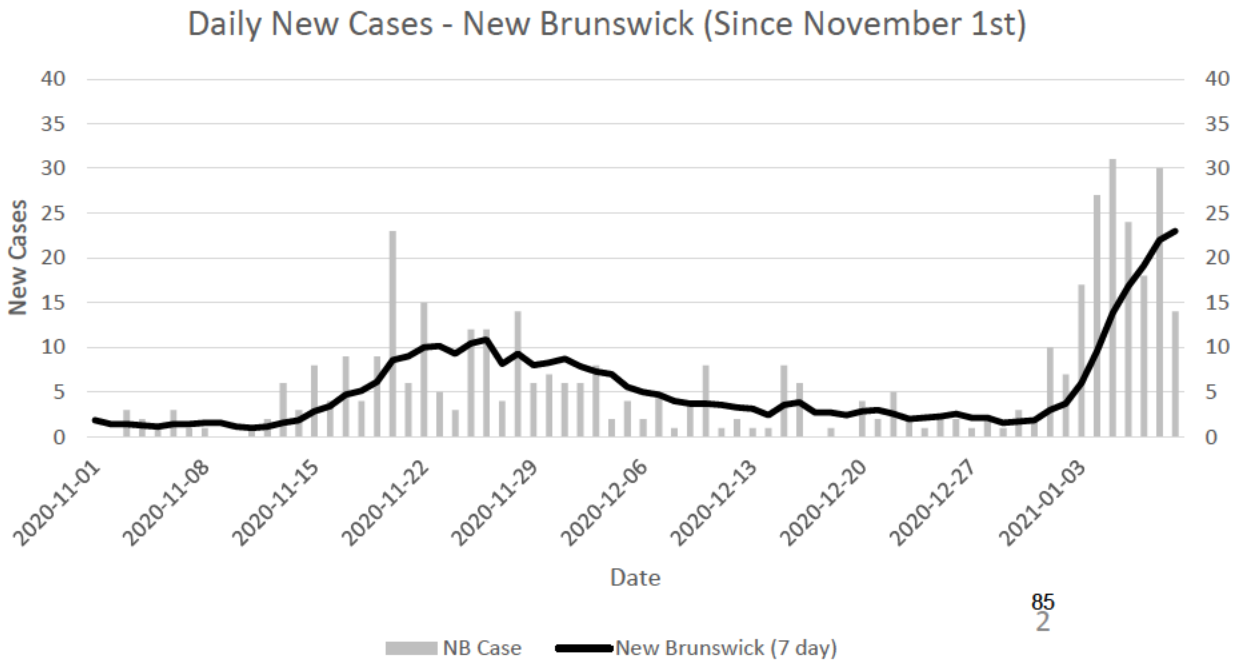
Department of Health

Confidential – Not for Distribution

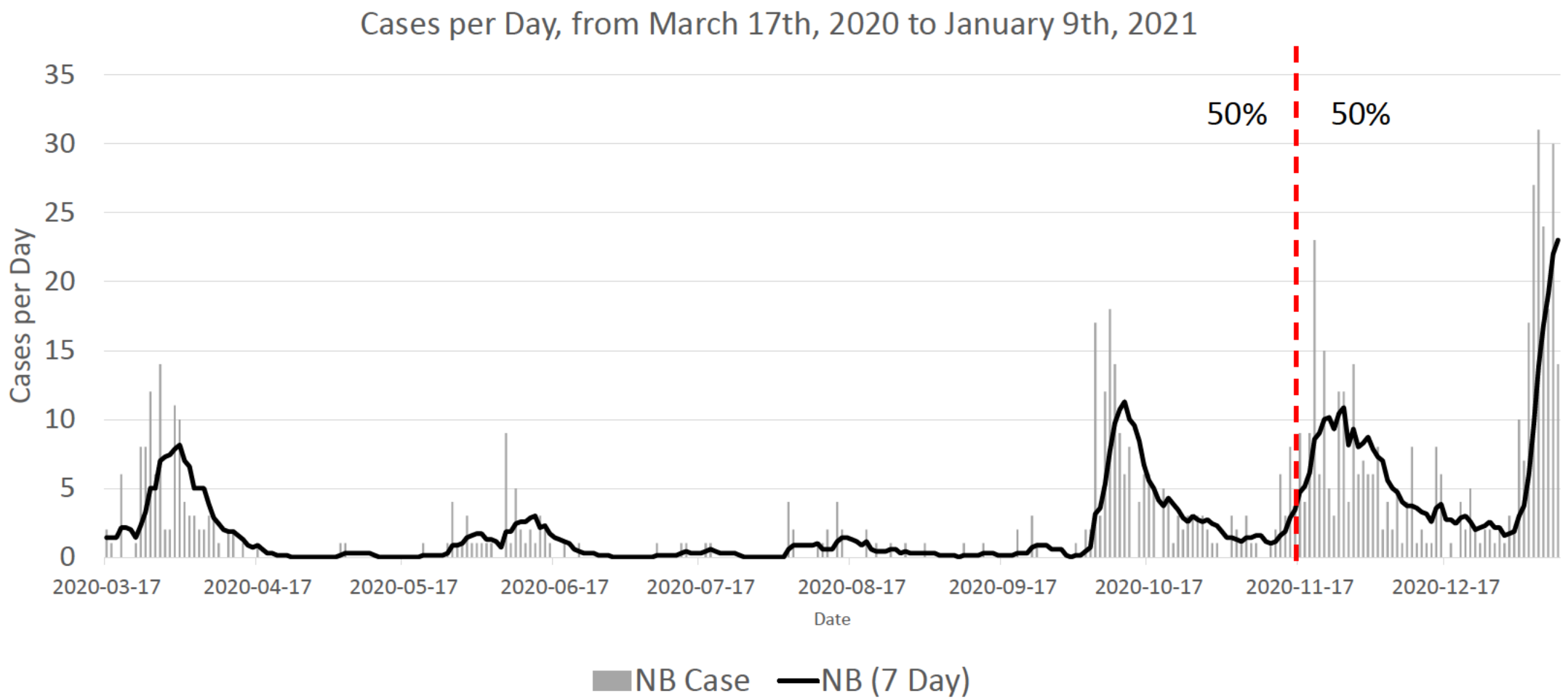
WHERE ARE WE?

- We are at our biggest outbreak since March, having had record-setting outbreaks every month since October.
- During Nova Scotia's latest outbreak in November, they averaged 15 cases per day at their peak; as of today, New Brunswick is averaging 23.
- Between December 7th and January 7th, a total of 200 cases were recorded, with 100 of those recorded between January 4th and January 7th.

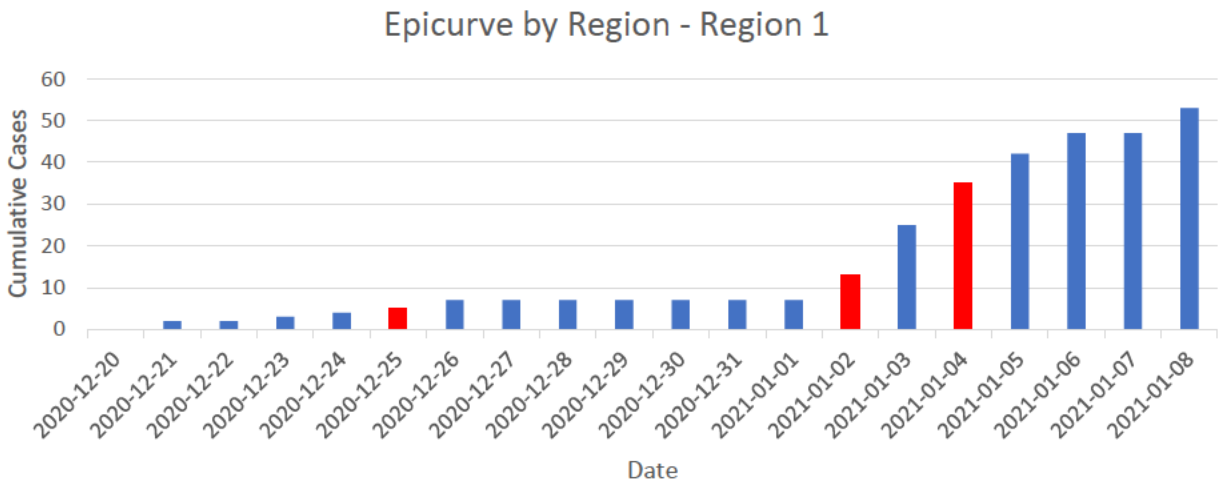


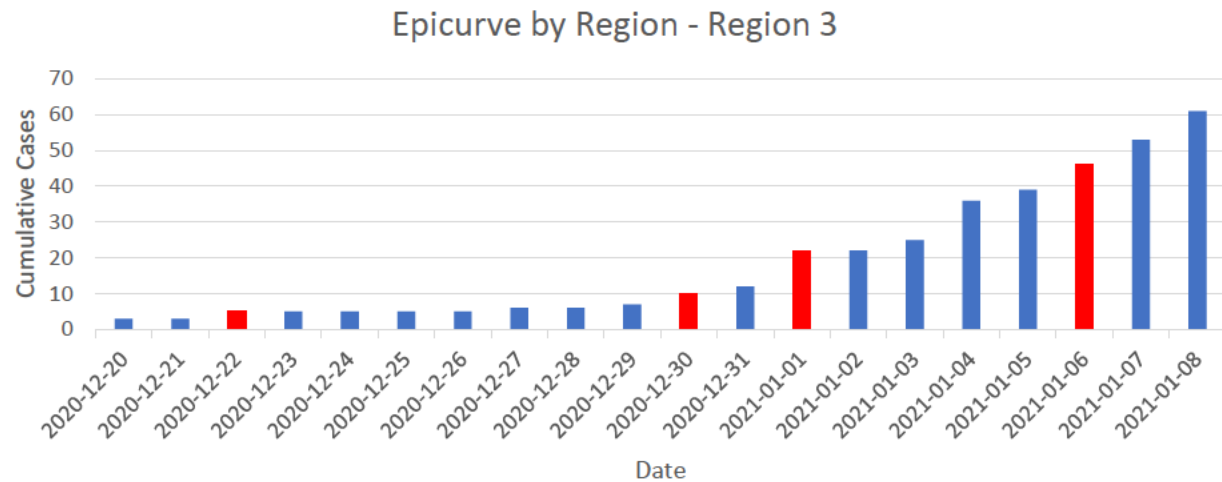


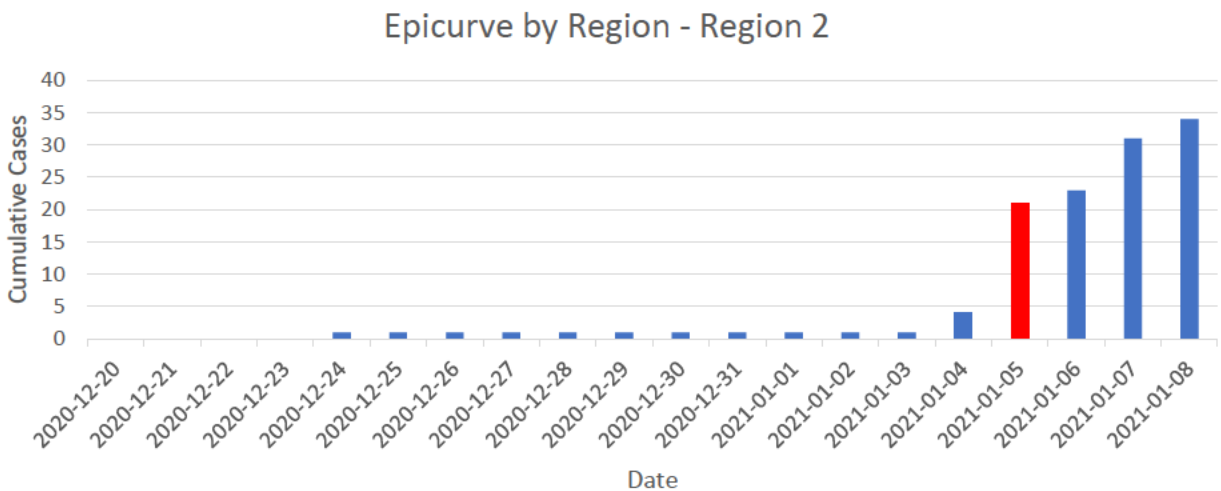
Epicurve

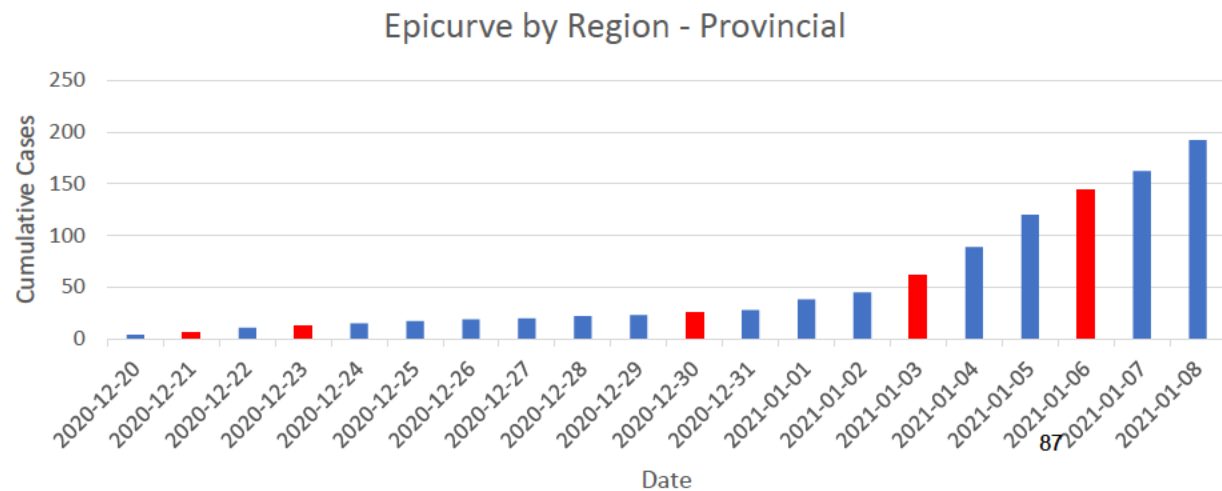

Cases per Day, from March 17th, 2020 to January 9th, 2021
50%
50%
Cases per Day
35
30
25
20
15
10
5
0
2020-03-17
2020-04-17
2020-05-17
2020-06-17
2020-07-17
2020-08-17
2020-09-17
2020-10-17
2020-11-17
2020-12-17
Date
NB Case
NB (7 Day)

Doubling Time (Dec 20th – Jan 8th)

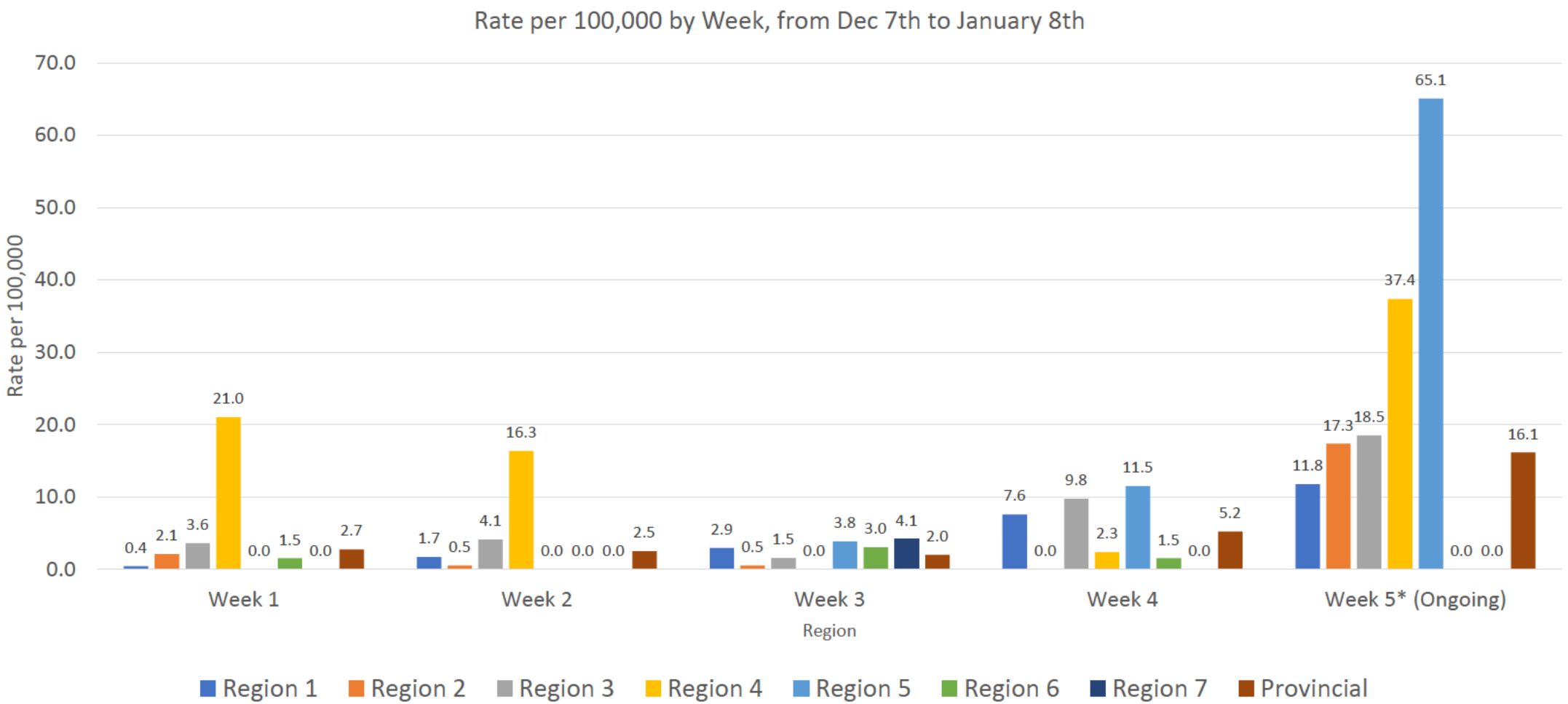




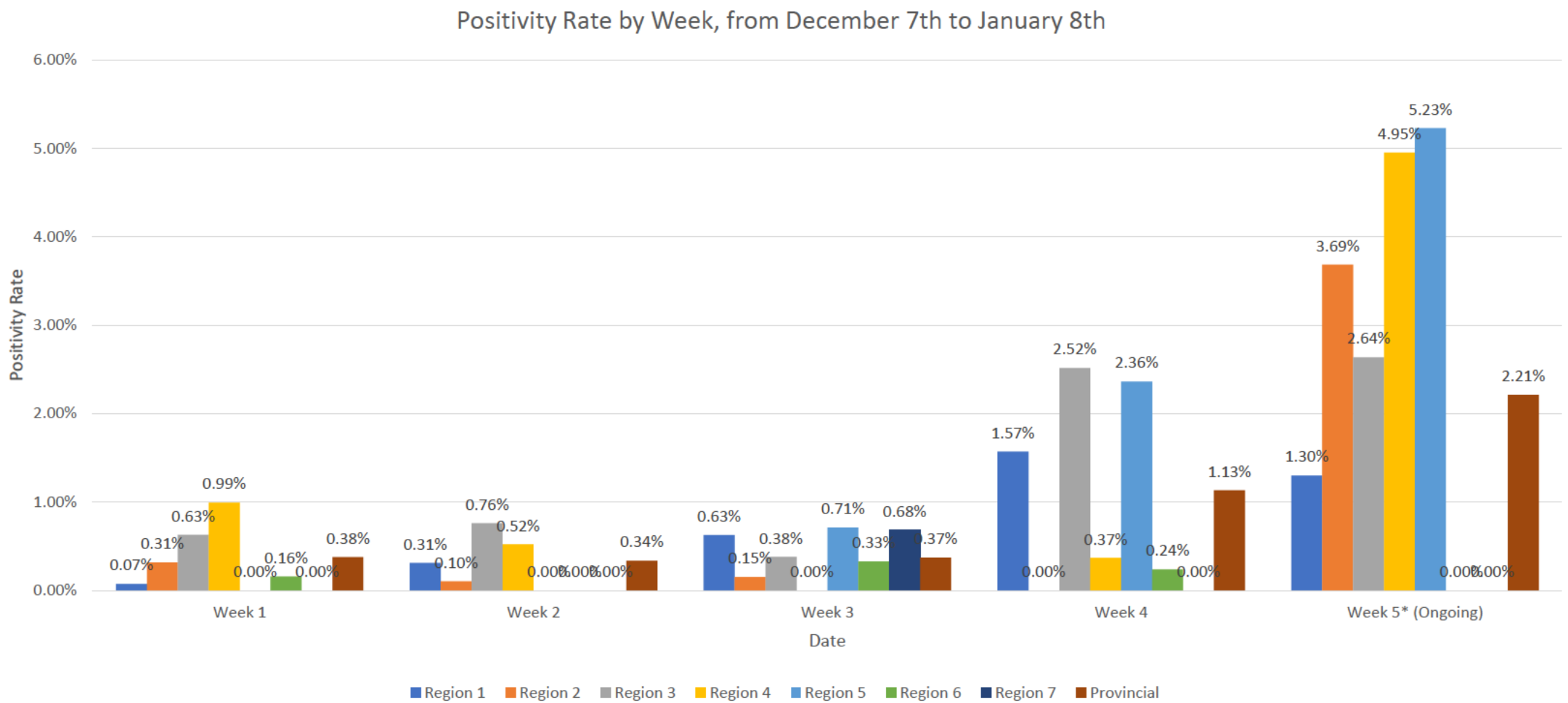




Rate per 100,000 per Week



Positivity Rate per Week



WHY NOT RED?

- “Red” is meant to be triggered as a last effort to contain case counts as it has a *severe* impact on New Brunswicker’s lives.
  - Some will have a temporary loss of income (e.g. business closures).
  - Others will have to make arrangements for at-home care of their children.
- The mechanisms of transmission in New Brunswick remain very focused on households and family / friends holiday gatherings.
- While some of the triggers requirement for the assessment have been met, it has been the opinion of the team at this point that it is not sufficient to recommend a move to the “Red” phase.

CURRENT TRIGGERS FOR RISK ASSESSMENT

Epidemiology

- Doubling time of cases in less than six (6) days (not applicable if we still have low number of cases).
- More than three (3) unlinked chains of community transmission in less than a six (6) day period.
- Outbreaks in high vulnerability settings where there is risk of transmission to the community.

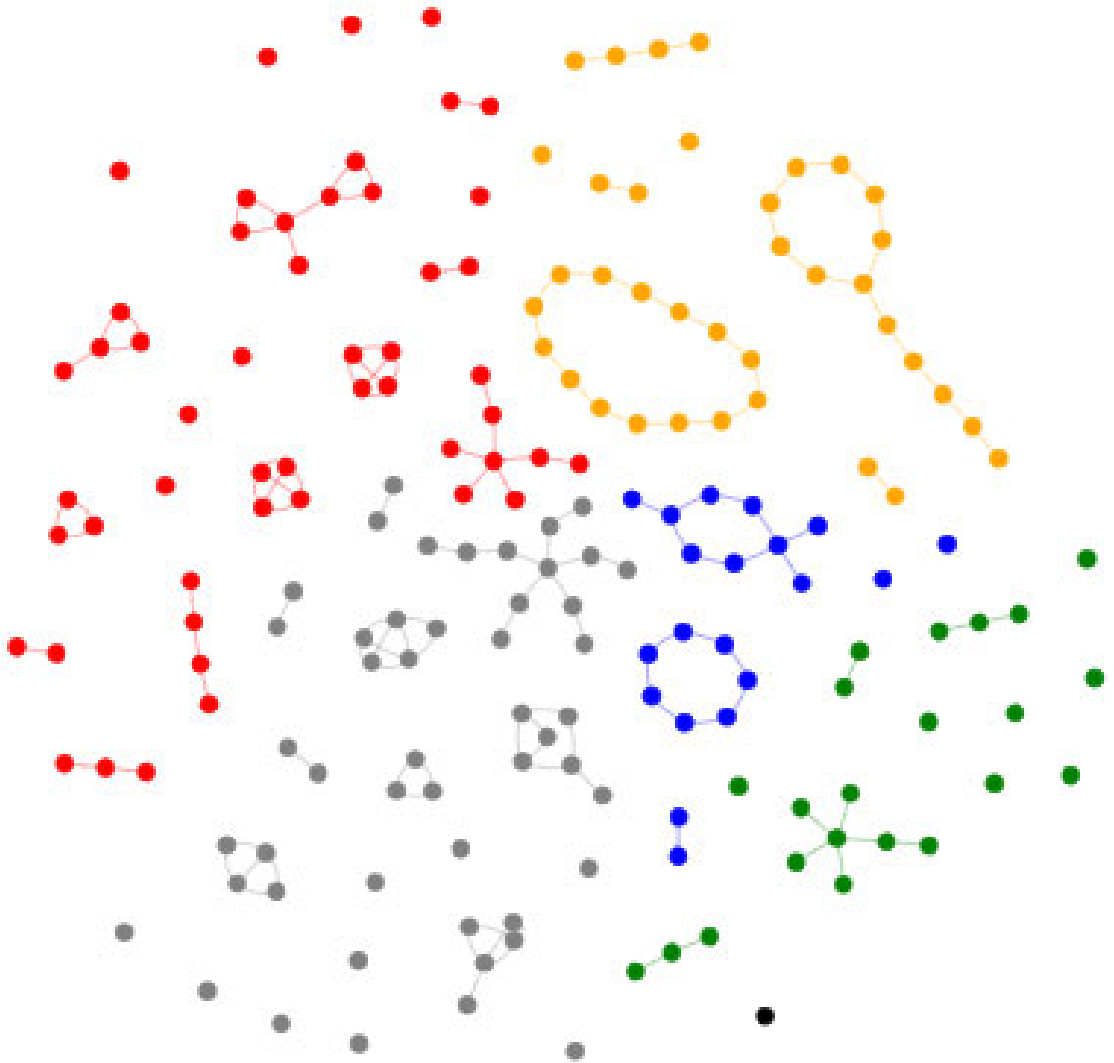
Public Health

- 10% or more of all contacts cannot be reached by Public Health within 24 hours.
- Public Health is not able to reach or actively monitor all identified close contacts within 48 hours.
- Insufficient facilities for non-hospitalized COVID-19 infected people who cannot be safely cared for at home (i.e. vulnerable populations, group settings which do not allow for self-isolation).
- Compliance with public health directives and recommendations are no longer being followed by the public (e.g. physical distancing, masking).

Health Care

- Inability to scale up to 2x the number of ICU patients from current census (including staffing).
- Health system can no longer screen and test the required number of symptomatic patients in a timely manner.
- Less than a four (4) week supply of PPE for double the current case load.
- Insufficient face masks to provide to all patients seeking care even if cases double.
- More admissions than discharges for COVID-19 over three (3) consecutive days.
- Do not have baseline capacity in general health services, including through expansion of telemedicine for Covid-19 and usual care.
- Health-care facilities can no longer be structured to reduce possibility of exposure at triage and all other locations.
- Increasing number of new health-care worker infections for six (6) consecutive days (affect workforce, and indicates poor infection prevention and control practices)

- Since mid-December, a total of 41 cases related to travel (either travelers or their contacts) have been identified.
- A total of twelve clusters have been linked to either sports, holiday gatherings, or recreational activities during the holidays (i.e. cards)
- Five clusters are linked to workplaces, with three having suspected transmission in the workplace.



IF NOT RED, THEN WHAT?

- For the time being, in order to limit the spread of unidentified clusters of infections related to holiday gatherings, all regions should remain in the “Orange” phase for at least a two week period from the time of declaration.
- Following this, a more “usual” approach can be taken, recommending certain regions could be switched to “Yellow” or “Red” or kept in “Orange”, depending on the observed evidence.
- Currently, the epidemiology would not support a continued full provincial approach to the colour phases as we are able to better identify risk areas.

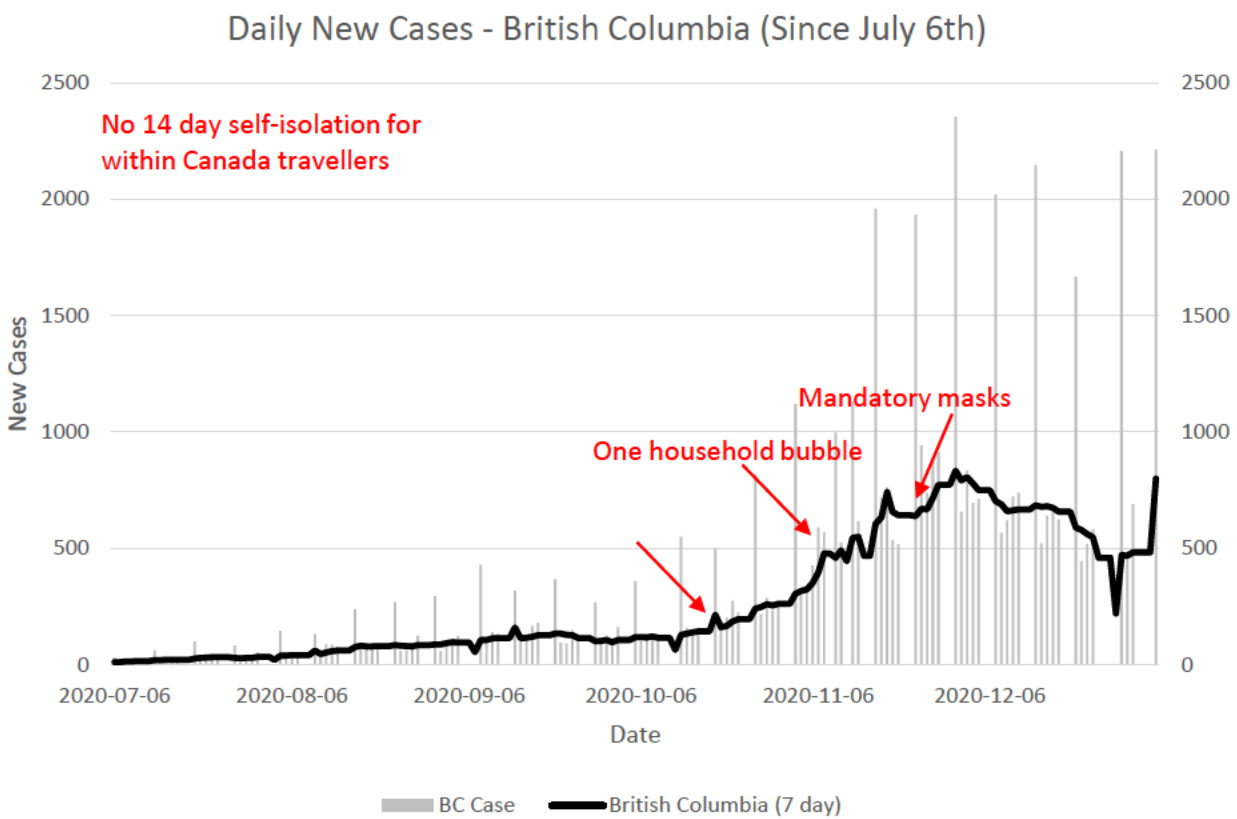
IF RED, WHEN?

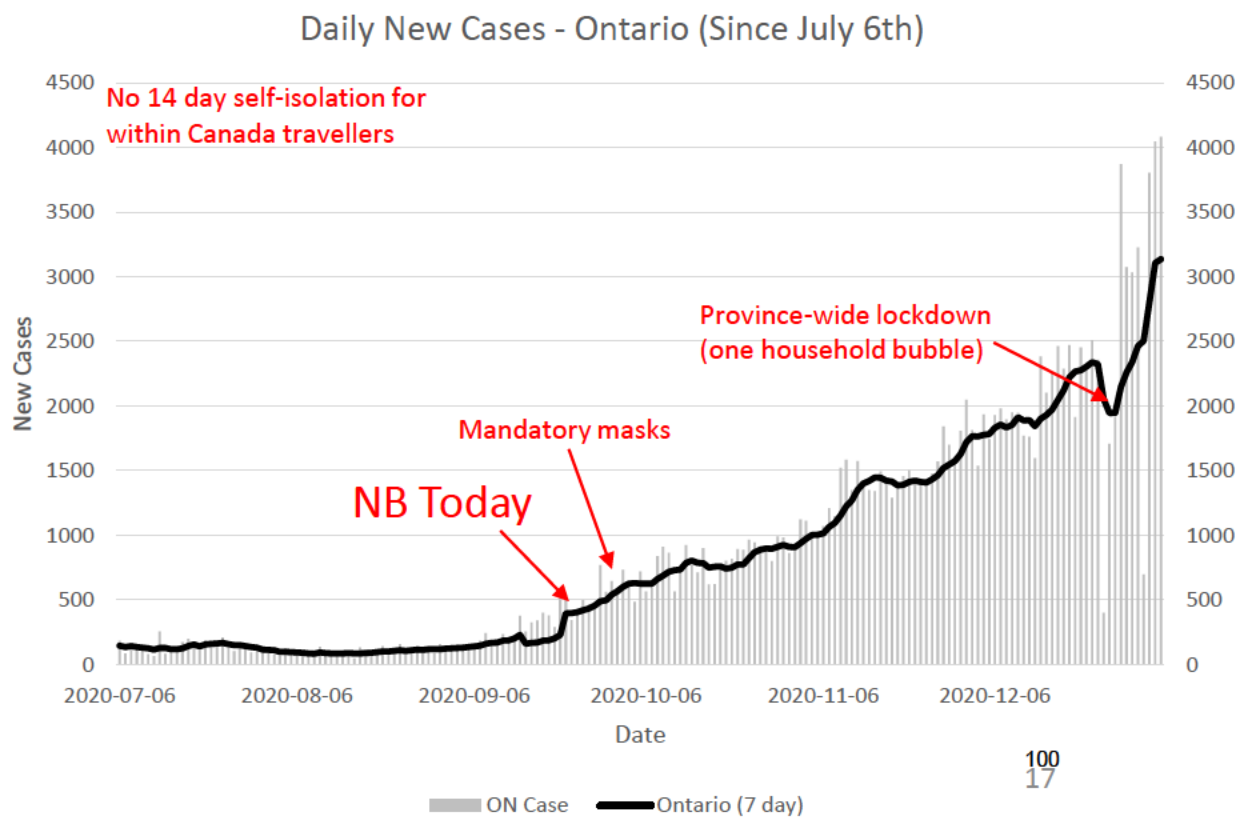
- At our current rate, if Quebec was New Brunswick, they would be declaring ~250 cases per day, a level they last saw in mid-September.

Jurisdiction	Cases per Day at Current NB Average	Cases Declared Today	Last Day at Rate
Alberta	128.55	989	September 24th
British Columbia	148.98	617	October 19th
Manitoba	40.36	203	October 7th
New Brunswick	23.00	23	January 10th
Nova Scotia	28.65	3	N/A
Ontario	427.47	3,717	September 26th
Quebec	250.42	3,127	September 16th
Saskatchewan	34.68	332	October 19th

IF RED, WHEN?

- What is the “inflection” point?
- If “Red” does not achieve the desired effect, additional measures should be considered, such as curfews, travel radius limit, full closure of all non-necessary businesses.





HOW DO WE KEEP FROM RED?

- Communications are not just media requests and annoying deadlines, they are public health and part of our tools of intervention.
- The best “bang for your buck” will cost about 10 cents a word – a solid communication plan to engage the members of the community.
- The best interventions are the simplest:
  - Masking
  - Distancing
  - Having the fewest close contacts as possible.
  - Get tested if symptomatic, even if mild, and stay home.
  - Reducing coming-and-going to essential trips only (e.g. groceries).
- It’s about empowering the communities to realize they are as responsible for the spread of COVID-19 as we are; the JFK method.
  - The day after “Orange”, the Region with the most tests per 100,000 was Zone 5 (about twice as high as the provincial average) – likely as a result of our on-the-ground interventions in October.

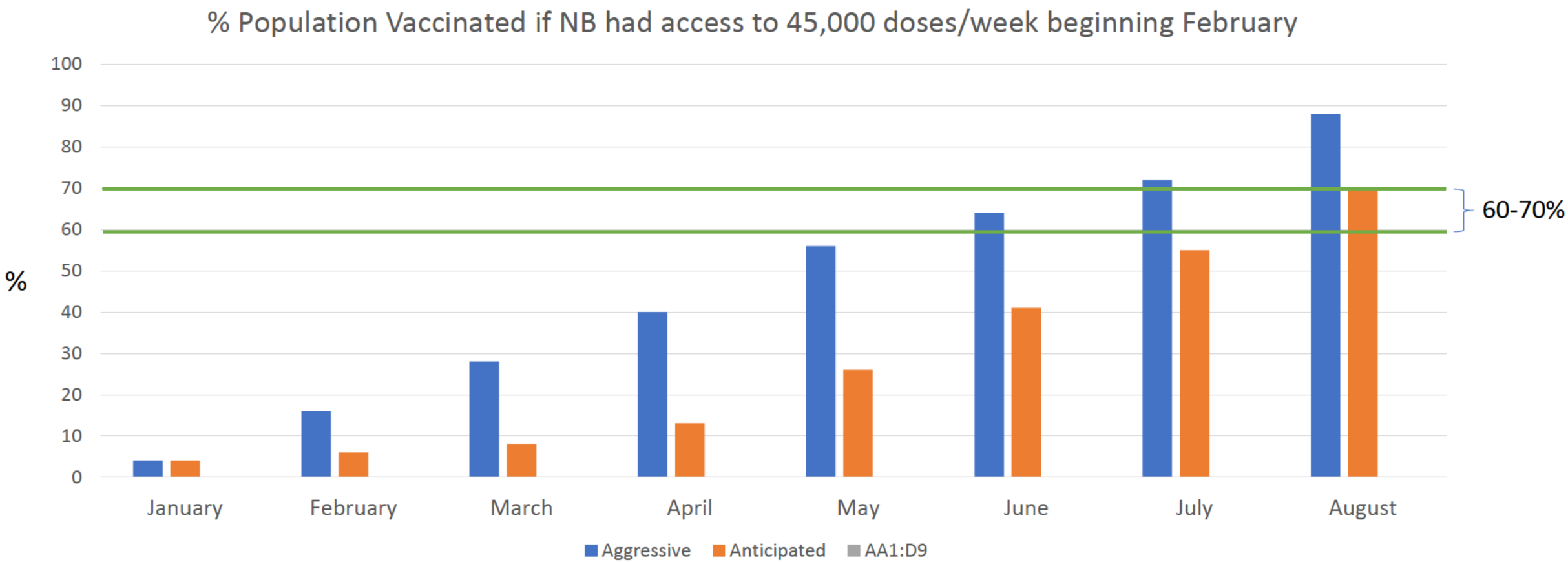
NB Immunization Capacity

Immunizer	Number Immunizations/Week
Public Health Clinics/RHAs*	10,000
Family Medicine/Nurse Practitioners	15,000
Pharmacists	18,000
EM/ANB	2,000
Total	**45,000**

Assumption: At 45,000 doses delivered per week beginning in February it would take to June to vaccinate over 60% of the NB population.

*If necessary, by temporarily reducing some ambulatory and outpatient services NB has access to over 11,000 immunizers.

Timeline Percent of Population Vaccinated*



* Assumes 2 dose regimen, 60-70% vaccinated

From:	Higdon, Penny (DH/MS)
To:	Elliott, Jennifer (DH/MS); Chalifoux, Mathieu (DH/MS); Clair, Suzanne (DH/MS); Landsburg, Shelley (DH/MS); Drisdelle, Nadia (DH/MS); Jardine, Janice (DH/MS)
Cc:	Liston, Heidi (DH/MS)
Subject:	FW: September 9th - SAC on COVID-19 Teleconference - Agenda and supporting material
Date:	September 9, 2021 3:30:11 PM
Attachments:	2. SAC-Modelling-21-09-09V2.pptx

Most recent modeling from SAC.

Good summary - slide 9

Penny

From: Davies, Stephanie (PHAC/ASPC) <stephanie.davies@phac-aspc.gc.ca> **On Behalf Of** CCMOH SECRETARIAT / CMHC (PHAC/ASPC)
Sent: September 9, 2021 12:46 PM
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Subject: RE: September 9th - SAC on COVID-19 Teleconference - Agenda and supporting material

Good day SAC participants,

Please find attached an updated deck for agenda item #2;

- Agenda Item #2: COVID-19 Modelling
  - Deck: Recent modelling updates

Kind Regards

SAC Secretariat

From: Davies, Stephanie (PHAC/ASPC) <stephanie.davies@phac-aspc.gc.ca> **On Behalf Of** CCMOH SECRETARIAT / CMHC (PHAC/ASPC)

Sent: 2021-09-09 10:04 AM

Subject: September 9th - SAC on COVID-19 Teleconference - Agenda and supporting material

Good day SAC participants,

Please find attached the agenda and documents to support today's SAC discussion. Friendly reminder that today's SAC meeting will take place from 2:05 – 3:00 pm EST.

- SAC Agenda
- Agenda Item #2: COVID-19 Modelling
    - Deck: Recent modelling updates
- Agenda Item #3: COVID-19 Vaccination
    - No documents

The agenda and modelling deck have been added to the Public Health Network Council portal on CNPHI. https://www.cnphi-rcrsp.ca

Please do not hesitate to reach out should you have any questions.

Thank you,

SAC Secretariat

Recent modelling updates

Dr Nick H. Ogden

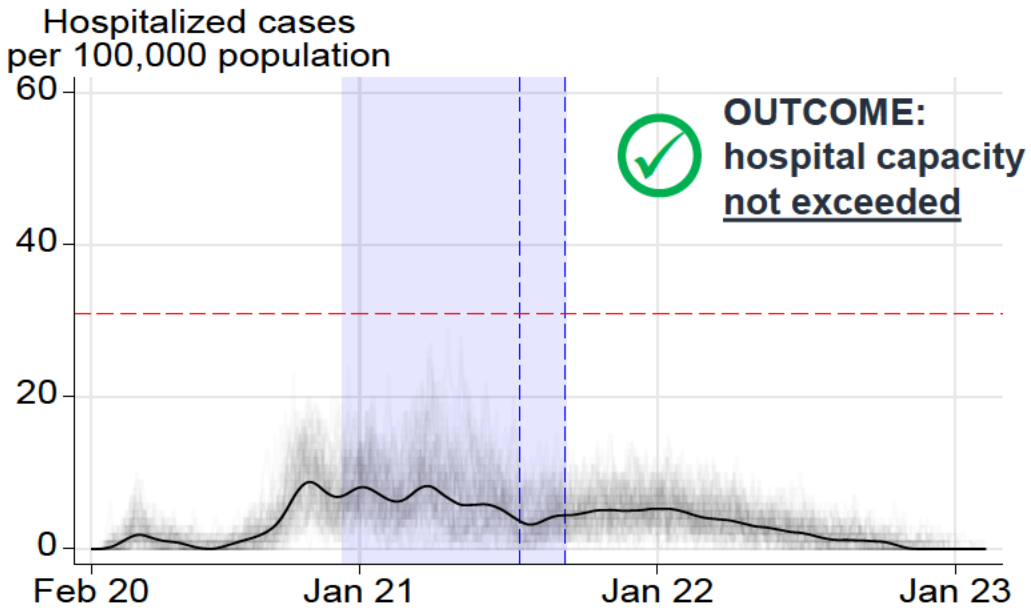
Canada.ca/coronavirus

Public Health Agency of Canada
Agence de la santé publique du Canada

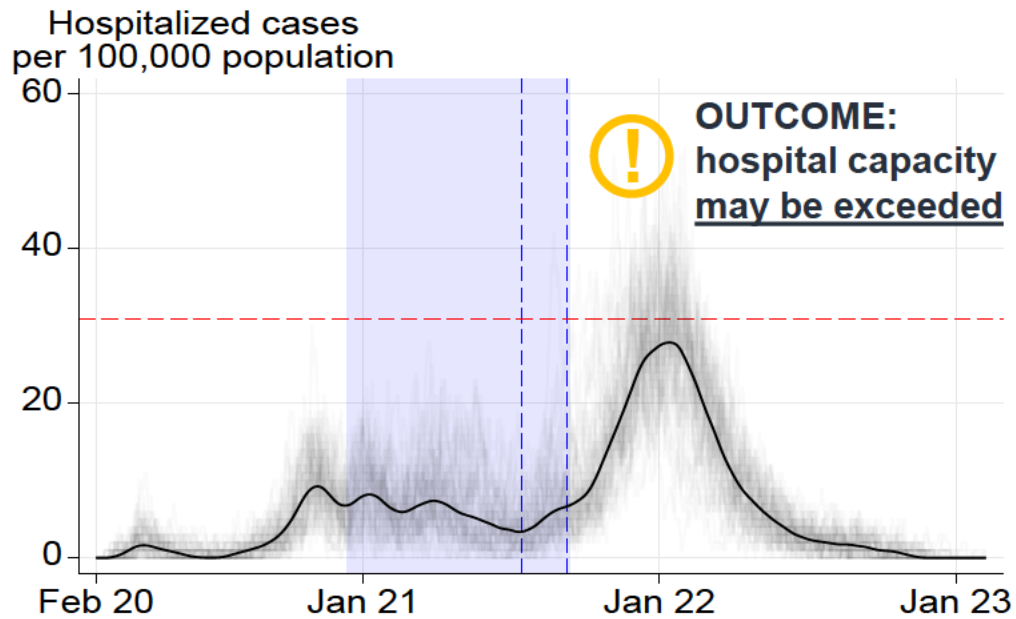
Canada

CPHO modelling presentation June 25th: delta variant may result in greater than previously expected resurgence this fall/winter when measures are eased

WITHOUT delta



WITH delta predominating



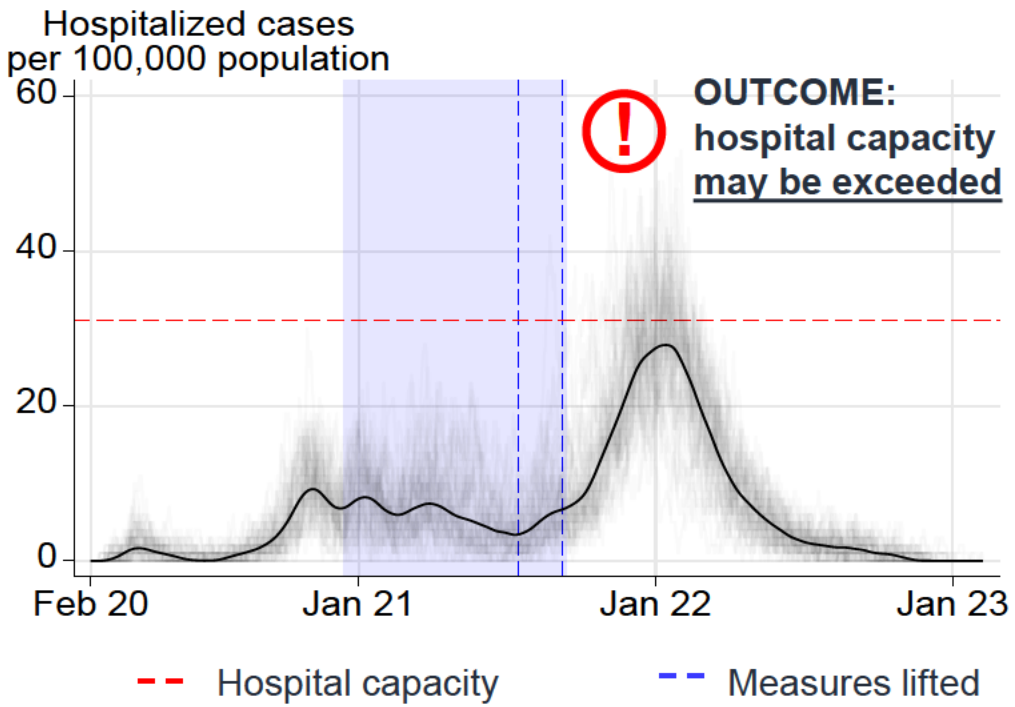
Hospital capacity | Measures lifted | Median hospitalized cases | Vaccination period

The delta variant is assumed to be 1.75x more transmissible and 1.8x more virulent than wild-type

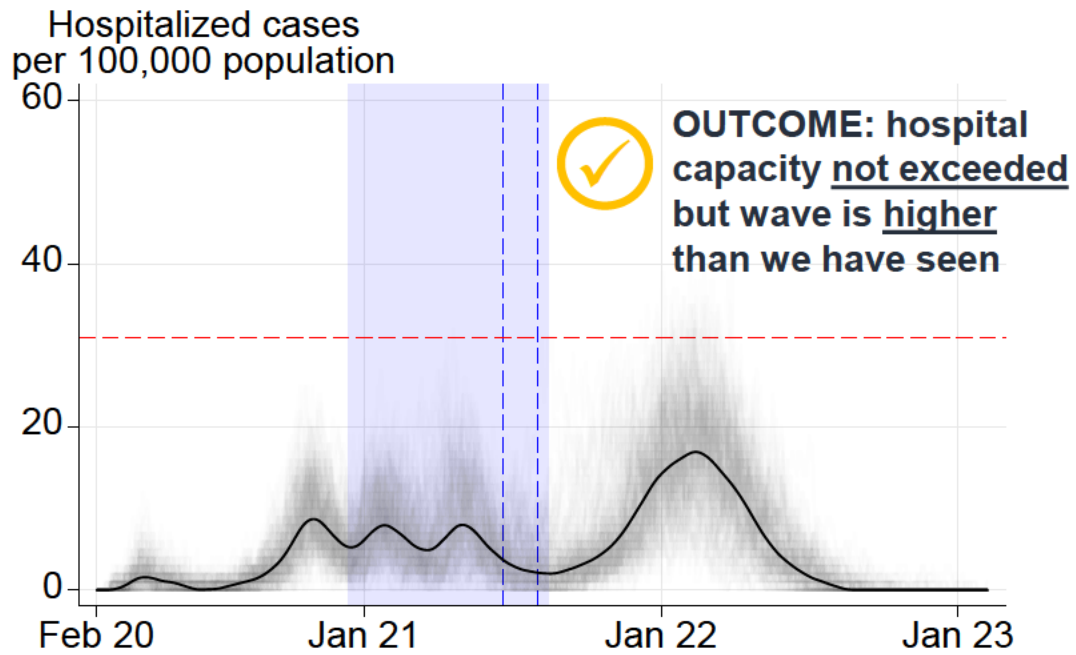
Note: *Refer to annex for detailed assumptions on modelling.*

July 2021: Higher vaccine uptake in older age groups has helped decrease the risk that a delta-driven resurgence could exceed hospital capacity this fall/winter

Vaccine acceptance 79%



Vaccine acceptance 83%



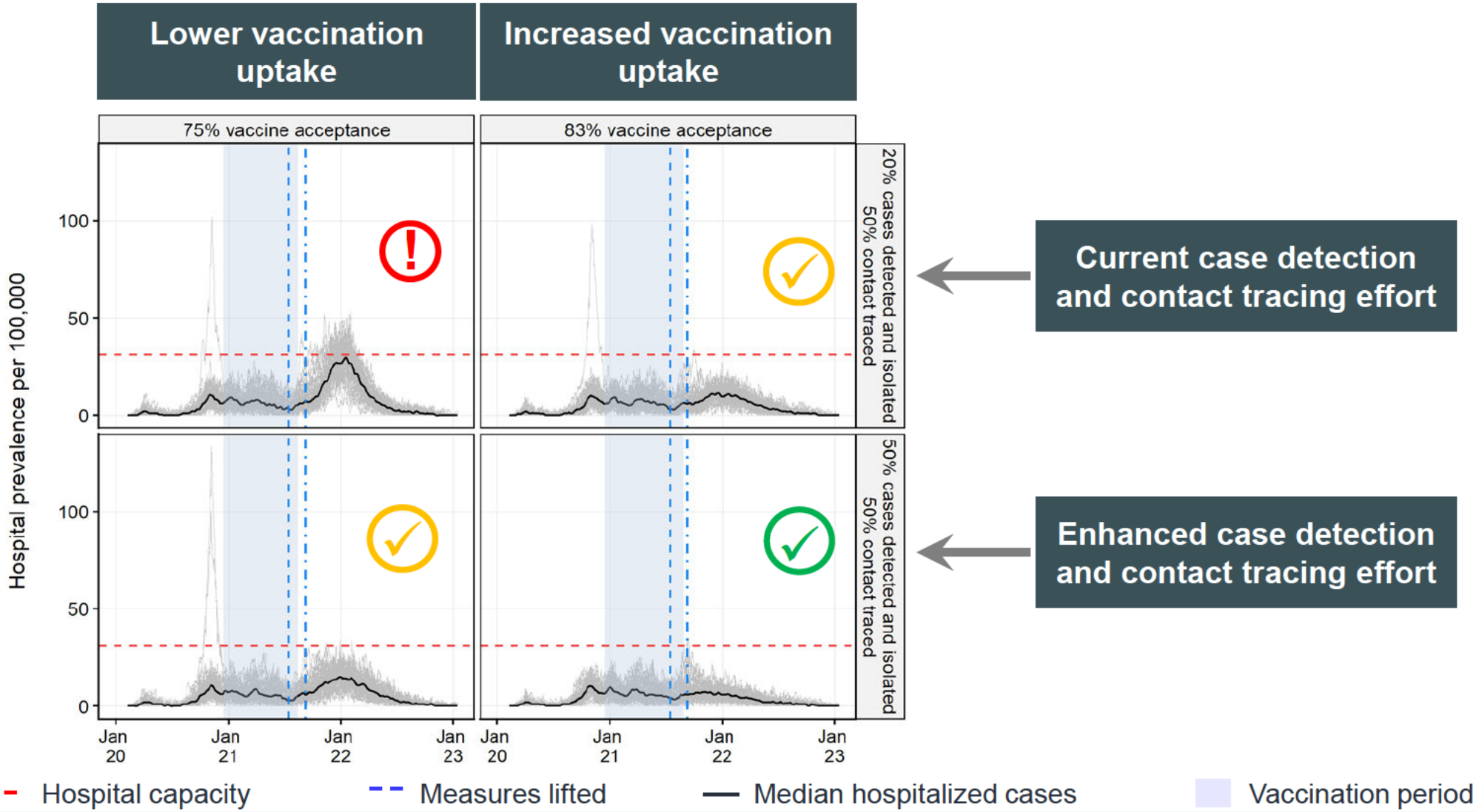
Hospital capacity | Measures lifted | Median hospitalized cases | Vaccination period

Modelled opening in 2 phases:

- Restrictive measures lifted gradually when 75% of ≥ 12 have received dose 1 and 20% dose 2 (~ late June)
- Personal protective measures lifted when 75% of ≥ 12 have received dose 2 (early August, when borders also open partially)
- Current test and tracing efforts are the only public health measures that **remain**

The delta variant is assumed to be 1.75x more transmissible and 1.8x more virulent than wild-type

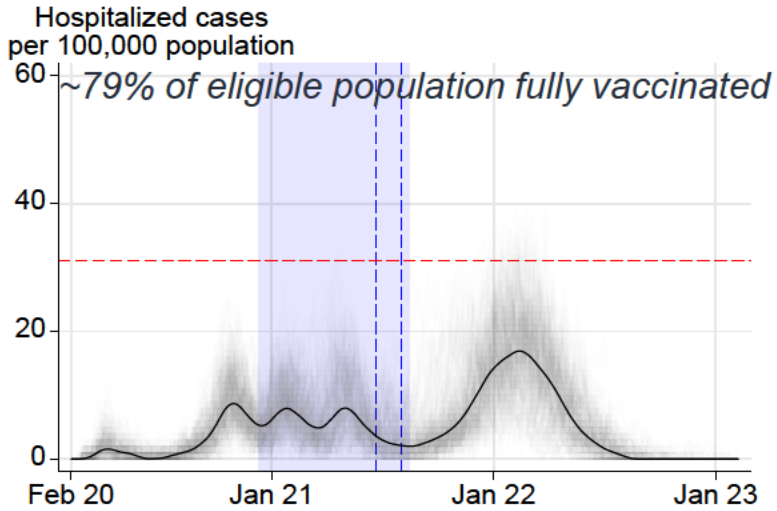
Higher vaccine uptake and enhanced test and trace decrease the risk that a delta-driven resurgence exceeds hospital capacity this fall/winter

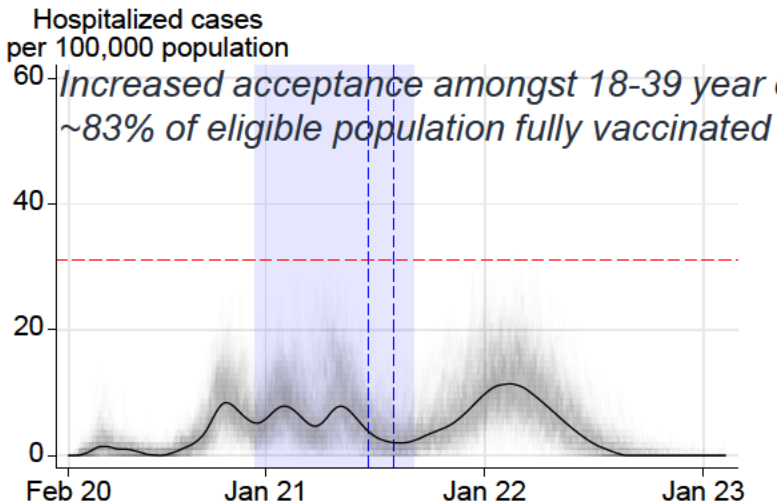


Note: *For all scenarios, a two-step approach to lifting public health measures is modelled. Vaccine acceptance varies by age group. The scenario on the left was informed by Canadian survey data and the scenario on the right uses a combination of Canadian survey data and actual rates of vaccine uptake by age groups (as of July 8, 2021). Refer to annex for detailed assumptions on modelling.*

Scenarios for increased vaccine uptake – then and now

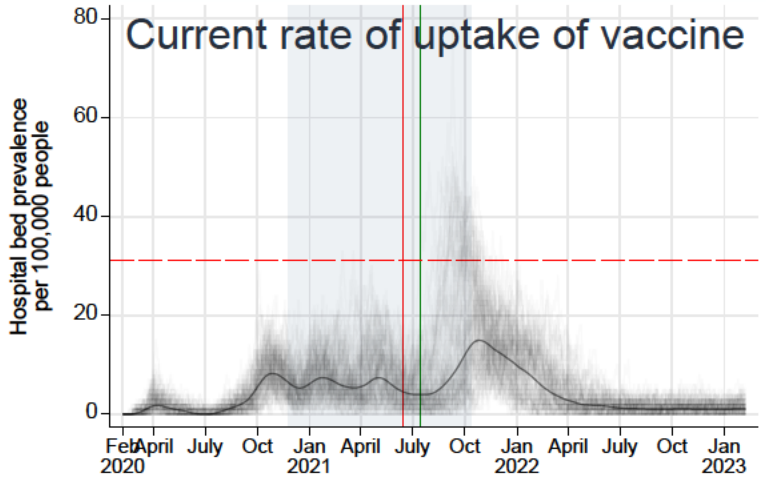
CPHO presentation July 30th

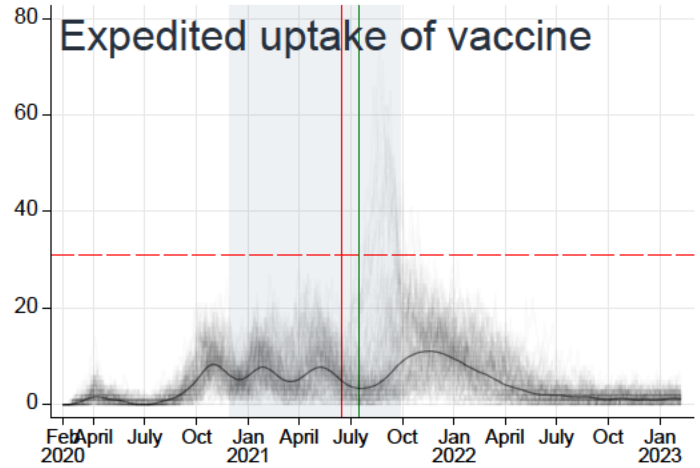




Updated model August 27th

Increased acceptance amongst 18-39 year olds (from 74.5% to 79,8%) - 82.8% to~84.5% of the eligible population fully vaccinated

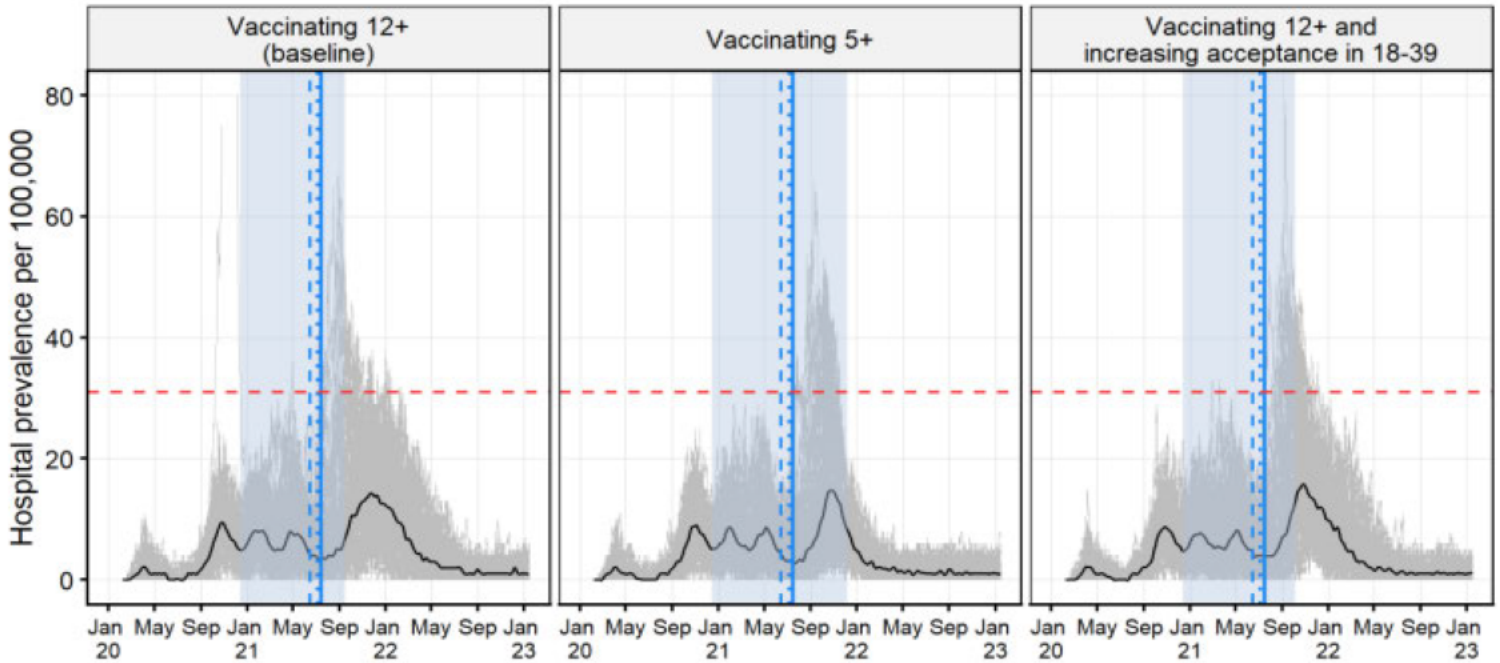




Model update:

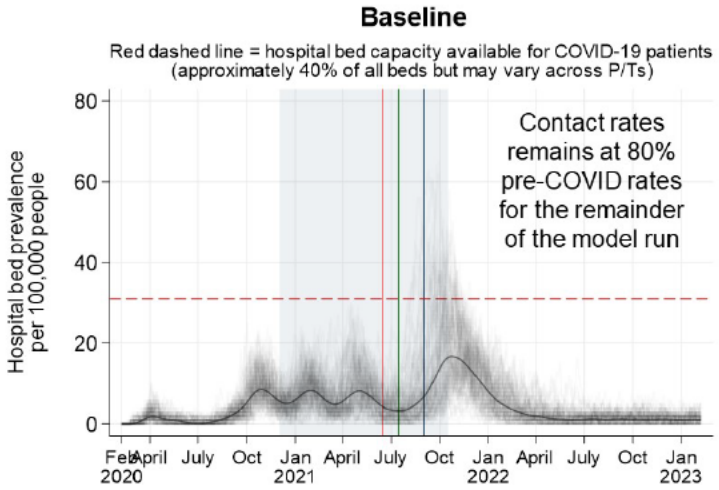
- Observed slowing of vaccine acceptance in the real world
- Wider opening for level of vaccine acceptance
- Allows delta driven fourth wave to begin earlier
- Enhancing vaccination now will not prevent further resurgence unless vaccination happens rapidly
- More simulation runs exceed healthcare capacity

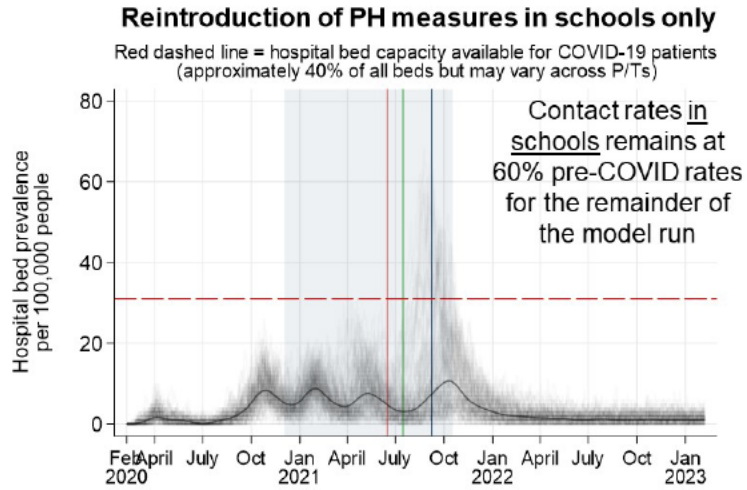
Possible impact of vaccinating 5 – 11 year olds

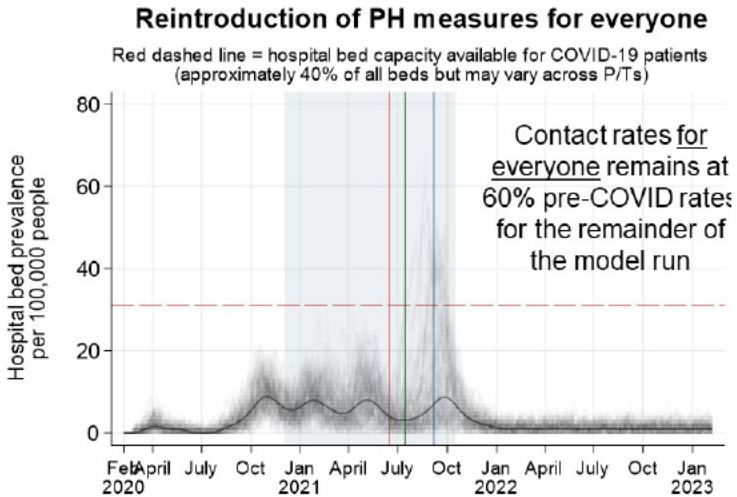


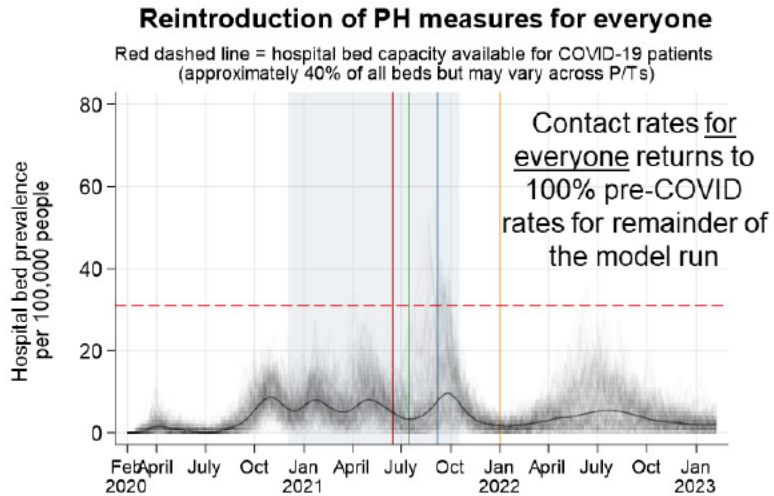
- Vaccinating 5+ would have reduced overall attack rate by ~25% - more realistic scenarios with vaccination beginning in 2022 yet to be done
- Enhancing vaccination of 18-39 year olds from 73-80% reduced attack rate by ~3%
- Fourth wave is under way so….
- Effect is shortening the duration, more than flattening the 4th wave
- Both <u>increasing</u> and <u>expediting</u> vaccination of 18-39 year olds has a greater effect on reducing the 4th wave

Reintroducing distancing measures in the community helps limit the 4th wave







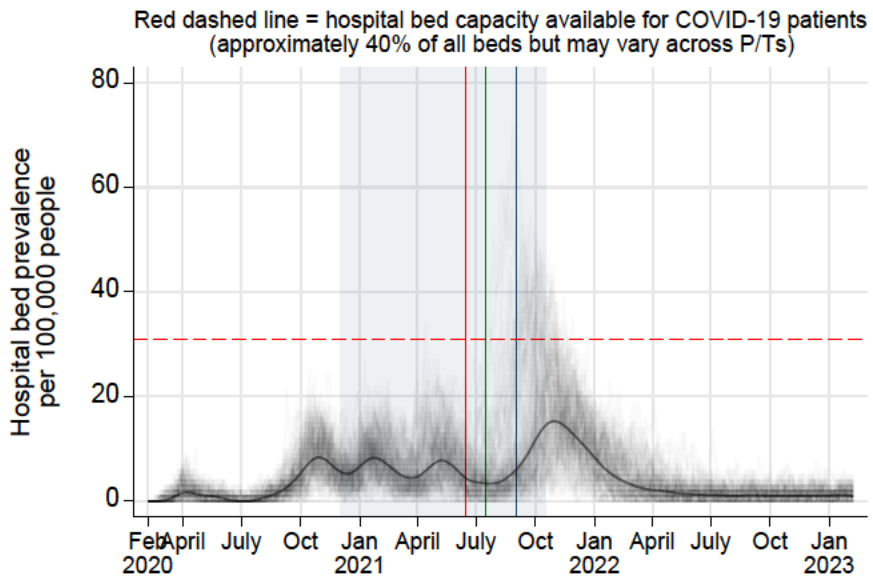


If vaccine acceptance does not increased – controlling 4th wave will depend on NPIs:

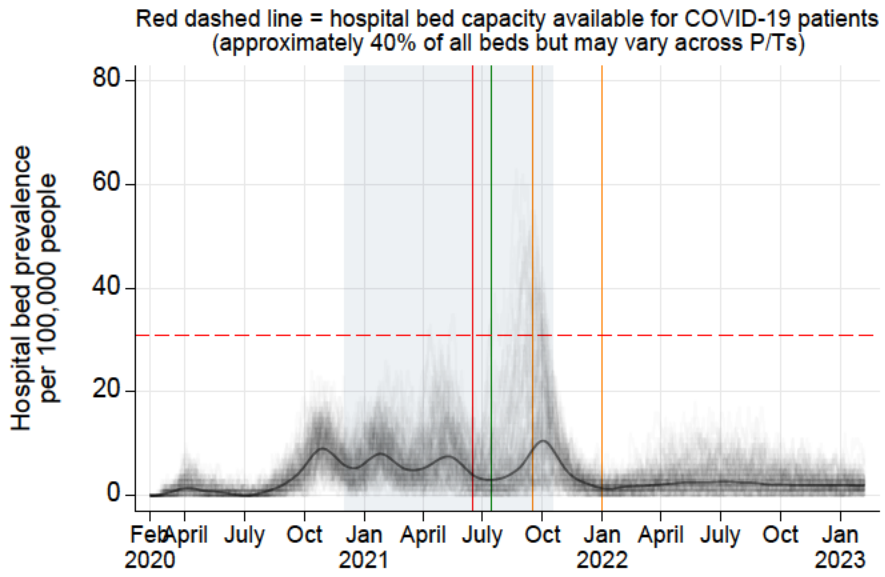
- Reducing contact rates by 25% in schools reduced 4th wave markedly
- Reducing contact rates by 25% for everyone had a more marked effect
- Slight resurgence when contact rates returned to pre-COVID-19 in January

Limiting contacts of the unvaccinated helps limit the 4th wave

Baseline



Non-essential business venues only



Hospital capacity for COVID-19 patients (40% of all beds available for COVID-19 patients, but this will vary across P/Ts)

Median hospitalization prevalence

Restrictive closures gradually lifted

June 15 2021: 75%-15% coverage of the eligible population 12+

Closures fully lifted by September 1, 2021

Personal physical distancing gradually lifted

July 15 2021: 80%-50% coverage of the eligible population 12+

Physical distancing lifted to 80% pre-COVID contact rates by September 1, 2021

Introduction of PH measures to reduce contact between vaccinated and unvaccinated individuals

Begins September 15, 2021: 86%-80% coverage of the eligible population 12+

Ends: December 31, 2021: 86%-86% coverage of 12+

Vaccination period

Dec 14, 2020 to October 15, 2021

Approximately 75.1% of the total population vaccinated or 86.0% of the eligible population 12+

Conclusions

- Vaccine uptake by older age groups has been greater than expected from initial surveys, the observed uptake in the model reduces the size of a fourth, delta-driven wave as Canada opens up.
- Nevertheless, the fourth wave is predicted to be greater (cases, hospitalisations and ICU occupancy – not shown here) than previous waves – for delta, level of vaccination is too low for level of opening
- Reducing testing and contact tracing effort now may increase the size of the fourth wave
- Earlier modelling suggested the fourth wave could be reduced by higher vaccine uptake in younger age groups and higher rates of case detection by increased testing – combining the two is predicted to almost eliminate a fourth wave
- The reality of lower vaccine coverage and wide opening means that increasing vaccine uptake starting now will shorten the duration of a fourth wave rather than reduce the peak unless vaccine uptake is very fast
- Vaccinating children < 12 could have a large effect, but in reality is unlikely to begin until 2022
- Reintroducing distancing measures in the community, and reducing contacts of the unvaccinated may have a marked effect on reducing the height of the fourth wave, allowing all measures to be lifted in January

Model assumptions

- An age-stratified agent-based model was used for exploring the impact of vaccination rates on lifting of public health measures.
- Key model assumptions include:
  - The vaccine is 60% effective at preventing infection and 80% effective at preventing hospitalization after one dose, and 92% effective at preventing infection and 96% effective at preventing hospitalization after two doses;
  - A VOC modelled on B.1.1.7 (alpha) was introduced in December 2020 and is 1.5x more transmissible and 1.4x more virulent than the wild-type strain, but does not have immune breakthrough from vaccines;
  - A second VOC modelled on B.1.617.2 (delta) was introduced in March 2021 and is 1.75x more transmissible and 1.8x more virulent than wild-type with immune escape from vaccines causing a 33% reduction in protection against infection after the first dose and a 6% reduction in protection against infection after the second dose;
  - Hospital bed capacity available for COVID-19 patients in Canada is estimated at 31 per 100,000;
  - The vaccination period begins Dec 14, 2020 and the end date varies depending on the scenario, extending to either mid-August, 2021 (with 75% vaccine acceptance by the eligible population) or late August, 2021 (at least 80% vaccine acceptance by the eligible population). Vaccination roll-out proceeds in order of priority groups as recommended by NACI with a 4-month interval between doses starting from March 4, 2021. The 4-month delay progressively decreases to a 28-day interval by June;
  - Vaccine acceptance by age group was originally estimated from two Canadian surveys (2020 Canadian Community Health Survey – September 2020) and EKOS probability based research panel (January 6-11, 2021) and data from the Canadian Immunization Committee. Since June, vaccine acceptance in some age groups has surpassed survey data and has been used to update the model.
  - For all scenarios, a two-step gradual approach to lifting public health measures was modelled. Restrictive measures are lifted gradually in early summer when at least 75% of those 12 and over have received their first dose and approximately 20% have received their second dose. The easing of personal protective measures occurs in mid-summer when approximately 75% of those 12 and over have received their second dose. Until these time points, the epidemic is controlled by a combination of restrictive closures, case detection and isolation, contact tracing and quarantine, and physical distancing.
  - Model scenarios include expected impacts of 3 stage reopening of the Canadian border to travellers commencing on August 6, 2021

From: Chalifoux, Mathieu (DH/MS)
To: Liston, Heidi (DH/MS); Elliott, Jennifer (DH/MS)
Subject: FW: APPROVAL AND INPUT REQUIRED COVID-19 Modeling NB
Date: September 28, 2021 2:43:37 PM
Importance: High

Good afternoon to the both of you,
We have requests from media (one example below) regarding our modelling for the numbers that were shared at Friday's technical brief.
I'm looking for direction as to whether we will be sharing additional information or whether the answer below will suffice for the time being? Technically, we have nothing currently prepared for public consumption, but happy to discuss further as needed.
Thanks,
Matt

From: Macfarlane, Bruce (DH/MS) <Bruce.Macfarlane@gnb.ca>
Sent: September 28, 2021 2:13 PM
To: Day, Barbara (DH/MS) <Barbara.Day@gnb.ca>; Campbell, Tyler (ECO/BCE) <Tyler.Campbell@gnb.ca>; Chalifoux, Mathieu (DH/MS) <Mathieu.Chalifoux@gnb.ca>; Liston, Heidi (DH/MS) <Heidi.Liston@gnb.ca>; Elliott, Jennifer (DH/MS) <Jennifer.Elliott@gnb.ca>; Greene, Paul (ECO/BCE) <Paul.Greene@gnb.ca>; Bowie, Adam (ECO/BCE) <Adam.Bowie@gnb.ca>; Vass, Alex (ECO/BCE) <Alex.Vass@gnb.ca>
Cc: Power, Michaela (ECO/BCE) <Michaela.Power@gnb.ca>; Harding, Gail (ECO/BCE) <Gail.Harding@gnb.ca>
Subject: APPROVAL AND INPUT REQUIRED COVID-19 Modeling NB
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Cell 506-476-1376

From: Day, Barbara (DH/MS) <Barbara.Day@gnb.ca>
Sent: Tuesday, September 28, 2021 2:05 PM
To: Macfarlane, Bruce (DH/MS) <Bruce.Macfarlane@gnb.ca>; Power, Michaela (ECO/BCE) <Michaela.Power@gnb.ca>; Campbell, Tyler (ECO/BCE) <Tyler.Campbell@gnb.ca>; Chalifoux, Mathieu (DH/MS) <Mathieu.Chalifoux@gnb.ca>
Cc: Greene, Paul (ECO/BCE) <Paul.Greene@gnb.ca>
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From: Macfarlane, Bruce (DH/MS) <Bruce.Macfarlane@gnb.ca>
Sent: September 28, 2021 1:59 PM
To: Power, Michaela (ECO/BCE) <Michaela.Power@gnb.ca>; Day, Barbara (DH/MS) <Barbara.Day@gnb.ca>; Campbell, Tyler (ECO/BCE) <Tyler.Campbell@gnb.ca>
Cc: Greene, Paul (ECO/BCE) <Paul.Greene@gnb.ca>
Subject: FW: COVID-19 Modeling NB

Going to need some follow up answer quickly to this

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From: 21(1) [redacted] cbc.ca>
Sent: Tuesday, September 28, 2021 1:58 PM
To: Macfarlane, Bruce (DH/MS) <Bruce.Macfarlane@gnb.ca>
Cc: Harding, Gail (ECO/BCE) <Gail.Harding@gnb.ca>; Power, Michaela (ECO/BCE) <Michaela.Power@gnb.ca>
Subject: Re: COVID-19 Modeling NB

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Just so I am clear on this: ***We have no further modelling projections available at this time,***

We have no projections? Flying blind? How then are decisions being made? I find this hard to believe.

If it is untrue, and the numbers do actually exist, then my question is why does the province refuse to release this information?

Please respond by 4:00.

Thank you,

21(1)

On Tue, Sep 28, 2021 at 1:42 PM Macfarlane, Bruce (DH/MS) <Bruce.Macfarlane@gnb.ca> wrote:

> 21(1)
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Sent: Tuesday, September 28, 2021 9:27 AM
To: Macfarlane, Bruce (DH/MS) <Bruce.Macfarlane@gnb.ca>
Subject: Re: COVID-19 Modeling NB

Hi Bruce,
Sending a reminder I am still looking for the COVID-19 projections/modeling.
Thank you,
21(1) [redacted]

On Mon, Sep 27, 2021 at 2:33 PM Macfarlane, Bruce (DH/MS) <Bruce.Macfarlane@gnb.ca> wrote:

> Received and checking to see what is available
>
> **Bruce Macfarlane**
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> Tel/tél 506-444-4583
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>
> **From:** 21(1) [redacted]@cbc.ca>
> **Sent:** Monday, September 27, 2021 2:32 PM
> **To:** Macfarlane, Bruce (DH/MS) <Bruce.Macfarlane@gnb.ca>
> **Subject:** Re: COVID-19 Modeling NB
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> Hi Bruce,
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> Thank you,

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On Mon, Sep 27, 2021 at 9:21 AM 21(1) @cbc.ca> wrote:

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> Could you please provide me with the current COVID-19 modeling for the province (projections on case numbers, hospitalizations and ICU admissions)?
> Deadline is 4:00 today, please.
> Thank you,
> 21(1)
>
> --
> 21(1)
> Senior Producer
> Atlantic Investigative Unit
> CBC News

From:	Vass, Alex (ECO/BCE)
To:	Elliott, Jennifer (DH/MS); Macfarlane, Bruce (DH/MS); Day, Barbara (DH/MS); Campbell, Tyler (ECO/BCE); Chalifoux, Mathieu (DH/MS); Liston, Heidi (DH/MS); Greene, Paul (ECO/BCE); Bowie, Adam (ECO/BCE)
Cc:	Power, Michaela (ECO/BCE); Harding, Gail (ECO/BCE)
Subject:	RE: APPROVAL AND INPUT REQUIRED COVID-19 Modeling NB
Date:	September 28, 2021 3:25:55 PM

Good on this end.
Alex

From: Elliott, Jennifer (DH/MS) <Jennifer.Elliott@gnb.ca>
Sent: September 28, 2021 3:25 PM
To: Macfarlane, Bruce (DH/MS) <Bruce.Macfarlane@gnb.ca>; Day, Barbara (DH/MS) <Barbara.Day@gnb.ca>; Campbell, Tyler (ECO/BCE) <Tyler.Campbell@gnb.ca>; Chalifoux, Mathieu (DH/MS) <Mathieu.Chalifoux@gnb.ca>; Liston, Heidi (DH/MS) <Heidi.Liston@gnb.ca>; Greene, Paul (ECO/BCE) <Paul.Greene@gnb.ca>; Bowie, Adam (ECO/BCE) <Adam.Bowie@gnb.ca>; Vass, Alex (ECO/BCE) <Alex.Vass@gnb.ca>
Cc: Power, Michaela (ECO/BCE) <Michaela.Power@gnb.ca>; Harding, Gail (ECO/BCE) <Gail.Harding@gnb.ca>
Subject: RE: APPROVAL AND INPUT REQUIRED COVID-19 Modeling NB
This looks good.
Jennifer

From: Macfarlane, Bruce (DH/MS) <Bruce.Macfarlane@gnb.ca>
Sent: Tuesday, September 28, 2021 3:22 PM
To: Day, Barbara (DH/MS) <Barbara.Day@gnb.ca>; Campbell, Tyler (ECO/BCE) <Tyler.Campbell@gnb.ca>; Chalifoux, Mathieu (DH/MS) <Mathieu.Chalifoux@gnb.ca>; Liston, Heidi (DH/MS) <Heidi.Liston@gnb.ca>; Elliott, Jennifer (DH/MS) <Jennifer.Elliott@gnb.ca>; Greene, Paul (ECO/BCE) <Paul.Greene@gnb.ca>; Bowie, Adam (ECO/BCE) <Adam.Bowie@gnb.ca>; Vass, Alex (ECO/BCE) <Alex.Vass@gnb.ca>
Cc: Power, Michaela (ECO/BCE) <Michaela.Power@gnb.ca>; Harding, Gail (ECO/BCE) <Gail.Harding@gnb.ca>
Subject: RE: APPROVAL AND INPUT REQUIRED COVID-19 Modeling NB
Looping Amanda
I need input by 4 p.m.

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> > Atlantic Investigative Unit
> > CBC News

Public Health Agency of Canada | Agence de la santé publique du Canada

Canada

Vaccine escape early warning surveillance

Learnings from the national P.1 investigation

PROTECTING AND EMPOWERING CANADIANS TO IMPROVE THEIR HEALTH

Objectives

- Identify and discuss on-going challenges and gaps related to variant surveillance, assessment and response with a focus on vaccine escape
  - Propose priority areas for action to maximise our ability to detect and respond to a vaccine escape variant promptly
  - Review the successes and challenges of the national P.1 investigation
  - Review routine variant signal detection processes to enhance vaccine escape early warning

How do we move towards more rapid identification of a vaccine escape variant?

How do we share and communicate information early to inform national and global response?

Background

- Viruses mutate naturally, but other factors are necessary for the spread of new variants.

- Ongoing surveillance of COVID-19 is key input to maintaining situational awareness of the virus, and by extension, the potential trajectory of the pandemic.

- As a result of rising vaccination levels, we can expect that ongoing evolution of the virus will favour variants that better escape vaccine-induced immunity.

- There is a small but non-zero chance that a vaccine escape variant emerges, potentially derived from an existing high transmissibility variant, for example within the Delta family of Variants of Concern (VOC) with additional mutations that affect
  - the ability to infect immunized individuals,
  - transmissibility among individuals
  - ability of the virus to go undetected in infected individuals
  - and/or the severity of the disease.

Variants are a diverse moving set of targets that take time to detect, identify, and understand

Uncertainty

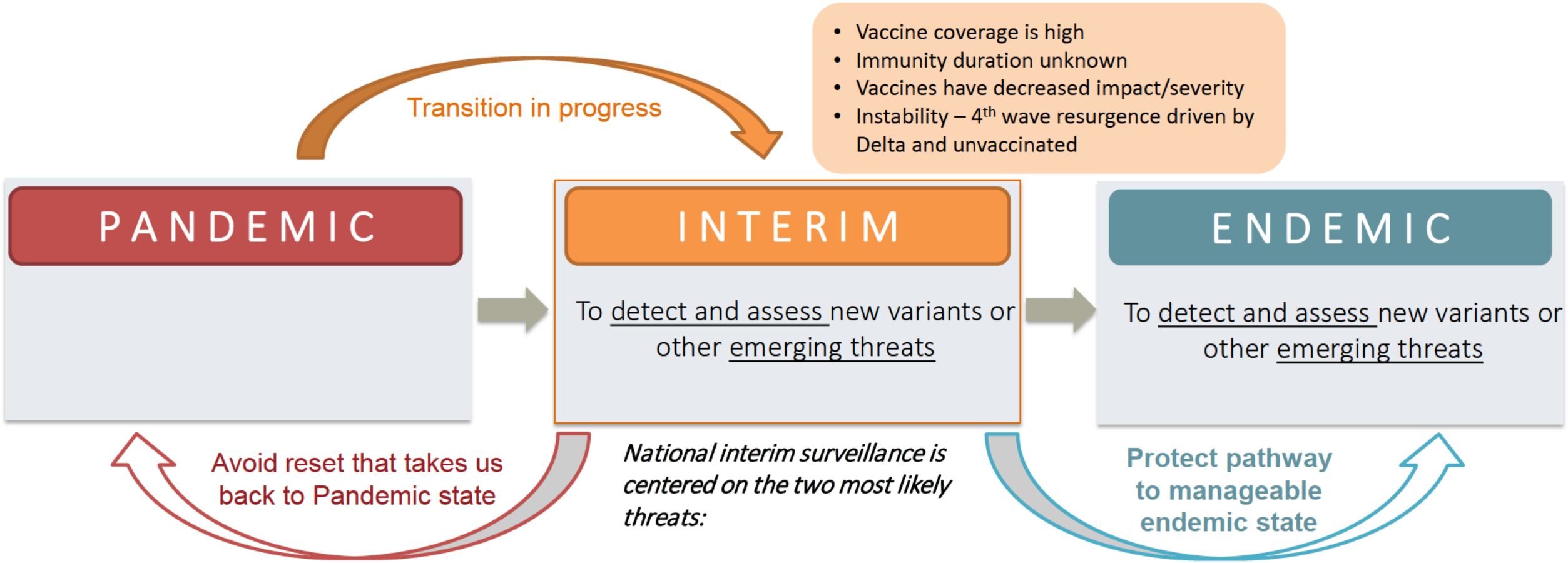
- Viruses evolve and change all the time, especially under pressure
- Most, but not all variants, originate internationally, arrive through borders and disperse
- Surveillance provides situational awareness (with unavoidable time lags) and can inform public health decisions

Analysis & Action

- **Early identification** of risk is a challenge since most mutations do not change the behaviour of the virus and individual mutations do not predict change in the virus function.
- ***Most new mutations are not a source of risk.***
- **Identification** of a new variant must be informed by epidemiologic analyses, which take time and requires sufficient case numbers.
- The **scale of the response** will vary depending on available data
  - A variant with a small transmission advantage takes weeks to identify and may be managed by core public health measures.
  - By contrast, an early signal of significant vaccine escape might warrant broad-based FPT action even if signal is uncertain
  - Ability to respond also depends on background pandemic state; overwhelmed system due to a wave may not be able to have a targeted response against a given variant and require use of a lockdown

A vaccine escape variant takes time to identify,
limiting the very narrow window of opportunity within which to limit impacts

Evolution of Canada's national surveillance goals: flexibility remains important



- Emergence of **variants** associated with increased severity, vaccine immune escape, diagnostic escape
- Decreased **vaccine** effectiveness or waning immunity

Surveillance objectives align with Canada's pandemic response objective and will evolve

Canada's goal in responding to COVID-19 continues to be
to minimize serious illness and overall deaths while minimizing societal disruption as a result of the COVID-19 pandemic

- Monitor the demographic, temporal, geographic distribution, and clinical severity of COVID-19 cases and the relationships between these factors, immunization status and viral lineage
- Characterize and monitor new, emerging and circulating SARS-CoV-2 variants,
- Determine and monitor the distribution of risk factors for severe disease (i.e. hospitalization and death)
- Monitor the prevalence of COVID-19 in travellers to Canada and timely detection of new variant importations to Canada
- Monitor COVID-19 outbreak trends by setting, population and geographic location
- Assess the impact and burden of COVID-19
- Contribute to global surveillance activities

Processes exist for signal detection and assessment to trigger response

Monitor and detect signals at border and domestically:

- ✓ Broad spectrum of signals.
- ✓ Wide range of credibility.
- ✓ Initial lack of substantiation.
- ✓ Focus on surveillance strategy
- ✓ Shared responsibility: may be lab or epi signal, identified by PHAC or PTs
  - ✓ e.g. Rapidly increasing cases among vaccinated, mutation detected in multiple PTs in similar timeframe.

Validation and assessment of signals: Identification

- ✓ Review of trusted information sources.
- ✓ Review available lab and epidemiological data.
- ✓ Lab/epi join assessment within jurisdiction.
- ✓ Alert senior officials and FPT partners.

FPT Consultation and Recommendation

- ✓ PHAC convene initial FPT assessment call (call can also be requested by PT).
- ✓ Request all lab data for variant.
- ✓ Request epi data potentially linked to variant.
- ✓ Trigger VOI/VOC consideration.

Alert and Respond: based on assessment and response level

Actions (Alert and Respond)

- ✓ PHAC senior management.
- ✓ CPHLN, SAC, TAC
- ✓ Public declaration.
- ✓ IHR notification.
- ✓ Lab surveillance priority shift.
- ✓ Public health response.

Progress: Interim surveillance including vaccine escape early warning surveillance

Completed:

- Implementation of the process for detection and response to COVID-19 variants is underway
- National variant of concern and potential vaccine escape early warning processes have been put in place
- Routine review and assessment of weekly signals is occurring at Federal SARS-CoV-2 Variant Surveillance Group (FSVSG) and Vaccine Booster Monitoring Group meetings
- Wastewater surveillance data integrated into early signal detection assessments
- PT partners have been encouraged to utilise CNPHI Public Health Alerts for timely notification of unusual clusters/signals
- Established mechanism to rapidly convene adhoc FPT assessment of a possible threat
- Shared booster monitoring report and weekly feedback is being facilitated from CCMOH, SAC, TAC, federal family
- Revised epidemiologic analysis and approach to investigating P/T identified signals at the national level
- Improved communication of signals and evidence summaries to senior officials and FPT partners
  - Identification and assessment of signals are summarized weekly in the FSVSG report and vaccine booster monitoring report; both circulated by email
  - Issues requiring more timely notification are disseminated internally via routine channels

In progress:

- Establish Canadian SARS-CoV-2 Variant Surveillance Group (CSVSG) for routine FPT monthly monitoring
- Implement collaboration centre to support and facilitate communication between FPT laboratories and epidemiologists

Focus on next steps:

- **Dynamic surveillance** approach that responds to changing case loads and capacity, and includes transparency of annotation to support subsequent analyses
- **Connecting lab and case data** at source and throughout internal PT and FPT analyses
- **Routine and timely sharing** of lab and case data against a consistent and agreed set of principles (including consideration of privacy and public release)

Why is P.1 relevant to Vaccine Escape preparation?

- In March and April 2021, cases of P.1 (Gamma) were increasing in Canada and a large community outbreak in BC at a ski resort town resulted in ~1500 associated cases.

- Rare example of an immune escape variant (Gamma) competing with an increased transmission variant (Alpha, and later Delta)

- Discussions at SAC and TAC in April 2021 identified the need and support for a collaborative laboratory and epidemiologic investigation of early P.1 cases in Canada
  - The purpose for an investigation of early P.1 (Gamma) cases in Canada was to:
    - inform national and international public health communities about what was currently known of P.1 cases, transmission, and control.
    - inform the establishment of routine laboratory and epidemiologic FPT operations with respect to national VOC investigation

Apply lessons learned to ensure readiness

Information sharing can be more timely based on P.1 experience

April
- FPT investigation convened (PHAC, BC, AB, ON)

May
- Gap analysis and objective setting
- Review of results from preliminary case and lab based analyses

June/July
- Preliminary report prepared and shared for validation with FPT partners

Sept
- Summary of key findings approved for presentation to TAC

Insight from analyses available in May

?

Insights from analyses approved for release in September

Sharing information is critical to performing a rapid variant assessment

Indicator	Currently Available Nationally	Additional P/T Information
1. Transmissibility between humans	• Increase in genomic detections and/or case counts over time • Outbreak clusters • Case demographics • Screening & sequencing results • Dwelling/residence types • Populations of interest (ie: HCW) • Modeling to predict selective advantage • Sampling, screening and sequencing strategies	• Specific outbreak or cluster analyses • Specific analyses on secondary attack rates • Across PT border information • Exposure/contact with animals • Modeling to predict selective advantage • Sampling, screening and sequencing strategies
2. Infection Severity	• Hospitalization • ICU • Death	• Symptom/asymptomatic status • Treatments provided • Duration of hospitalization • Time between onset and outcome • Co-morbidities • Immune status • CT/Viral load
3. Vaccines/Immune escape	• Vaccination status • Product type • Time between 1st and 2nd (and 3rd) • Time since last dose • Re-infection	• Coverage data by vaccine parameters (to calculate rates)
4. Immunity after natural infection	• Re-infection • Experimental evidence	• Re-infection

Applying learnings from the national P.1 investigation will ensure readiness

Activity	Successes	Challenges
Monitor and detect signals	– Large increase of new variant in Canada was detected quickly – The FPT sharing of anecdotal information / situational awareness was valuable to understand the evolving situation across the country	– Systems were overwhelmed within the context of the pandemic
Validation and assessment of signals	– Laboratory and epidemiology colleagues conducted a joint review of available information	– Inability to link national sequence data with case data
FPT Consultation	– PHAC convened FPT joint assessment calls – Investigation facilitated the integration of wastewater and clinical specimen information – Request for all lab and epi data for variant – **The analysis of severity from early case data conducted in the first three weeks of the investigation was not significantly different than analysis on data completed months later**	– Limited and constrained sharing of data, analyses, and information within the FPT group reduced the completeness and timeliness of sharing insights – Inability for all P/Ts to link sequence data with case data – More emphasis was put on publication rather than sharing information for public health action.
Actions	– Outbreak publications and public reporting from single jurisdictions	– Lack of agreement for early dissemination of national summary in the public domain ahead of publication

Operationalising Genomics – Canadian Roadmap Status Summary

Prior to March 2020

Initial State

Prior investment in Canadian sequencing capabilities in public health, hospitals, universities and other federal partners (pre-COVID)

April 2020 to Dec 2020

Mobilisation

Capacity building leads to increase in sequencing rates from 125 per week (Oct 2020) to 1200 per week (May 2021).

Approach builds on diversity of FPT capabilities and shared public health responsibilities

Summer 2020 to Summer 2021

Scale-up

Standards and skills development align genomic pipeline consistency, including training 150 technical staff to sequence 150,000 samples within 2 years (210,000 sequences achieved in 17 months) and 60% of Canadians covered by pilot wastewater monitoring.

Canada has one of the highest sequencing rates.

Current Phase

Acceleration

Transition to Operational "Analysis-Ready" data – emphasis on turnaround times for high quality and timely information, rapid data sharing between lab/epi and across FPT, and data connectivity to limit data aging and obsolescence

Canada lags other industrialised countries in genomic turnaround time.

Further work is needed to turn capacity into fully operational capability and effective decision support.

The fragmented origins of distributed genomic sequencing are limiting the timeliness and effectiveness of information produced.

Linking genomic and case data is essential for monitoring variant activity

- Differences across jurisdictions and changes in sampling, screening and sequencing strategies impact our ability to interpret trends needed to monitor emerging variants and vaccine escape
  - Does a national increase in severity indicators signal the emergence of a new variant that is capable of causing severe disease or is it a result of targeted sampling of severe outcomes?
  - Sequencing is completed on representative and targeted samples. The reason for sequencing is available in the national genomic database but not the national case database

- Updated lineage information in the national case dataset is needed to monitor and assess variants for their potential to emerge as a future threat

Discussion

- **How do we confirm early signals and detect a new variant?**
  - Robust data and surveillance
- **How do we assess the potential impact of that variant?**
  - Joint FPT assessment lab, epi, modelling
- **What are our objectives for the response?**
  - Possible containment at source
  - Prompt control of transmission
  - Targeted outbreak response
  - Increased understanding
- **What needs to be enhanced, adjusted, re-focused, and/or stood-up?**
  - Developing scenarios to address different objectives
- **How do we assess and communicate risk with multiple and scattered sources of evolving evidence?**
  - Coordinated approach to communication regarding variants

How do we move towards more rapid identification of a vaccine escape variant?

How do we share and communicate information early to inform national and global response?

From: Chalifoux, Mathieu (DH/MS)
To: Boudreau, René (DH/MS); Elliott, Jennifer (DH/MS)
Subject: RE: Cab Presentation
Date: October 21, 2021 1:27:34 PM
Attachments: COVID-19 - PH Update 201021_Final.pptx

Good afternoon team,
Please find attached the presentation that was given to Cabinet this morning.
Thanks,
Matt

From: Boudreau, René (DH/MS) <Rene.Boudreau@gnb.ca>
Sent: October 21, 2021 1:08 PM
To: Elliott, Jennifer (DH/MS) <Jennifer.Elliott@gnb.ca>; Chalifoux, Mathieu (DH/MS) <Mathieu.Chalifoux@gnb.ca>
Subject: Cab Presentation
Send my way please for muni brief. H is having telecommunication issues

R

René Boudreau

Associate Deputy Minister/ Sous-ministre délégué
Corporate Services and Francophone Affairs / Services ministériels et Affaires francophones
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Phone / Téléphone : 506-453-3759
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Canada

Excess Mortality – a review of methods, applications and considerations

October 28, 2021

PROTECTING AND EMPOWERING CANADIANS
TO IMPROVE THEIR HEALTH

Purpose

- To share the outcome of the assessment of the methods, analysis and implications of the findings of the Royal Society of Canada policy briefing entitled *Excess All-Cause Mortality During the COVID-19 Epidemic in Canada.*

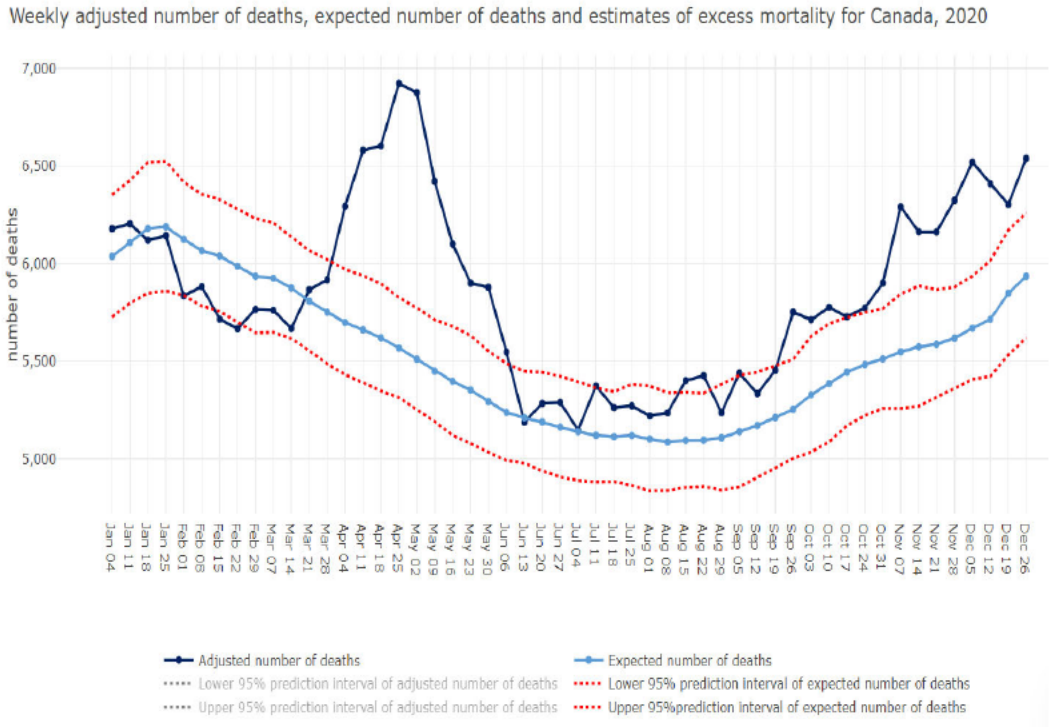
- To highlight public health applications of excess mortality.

- To provide an overview of the Chief Coroners, Chief Medical Examiners – Public Health Collaborative Model and its potential to improve comparability and access to national death investigation data to inform policies and programs.

- To facilitate a FPT discussion on use, considerations and initiatives related to mortality data for public health.

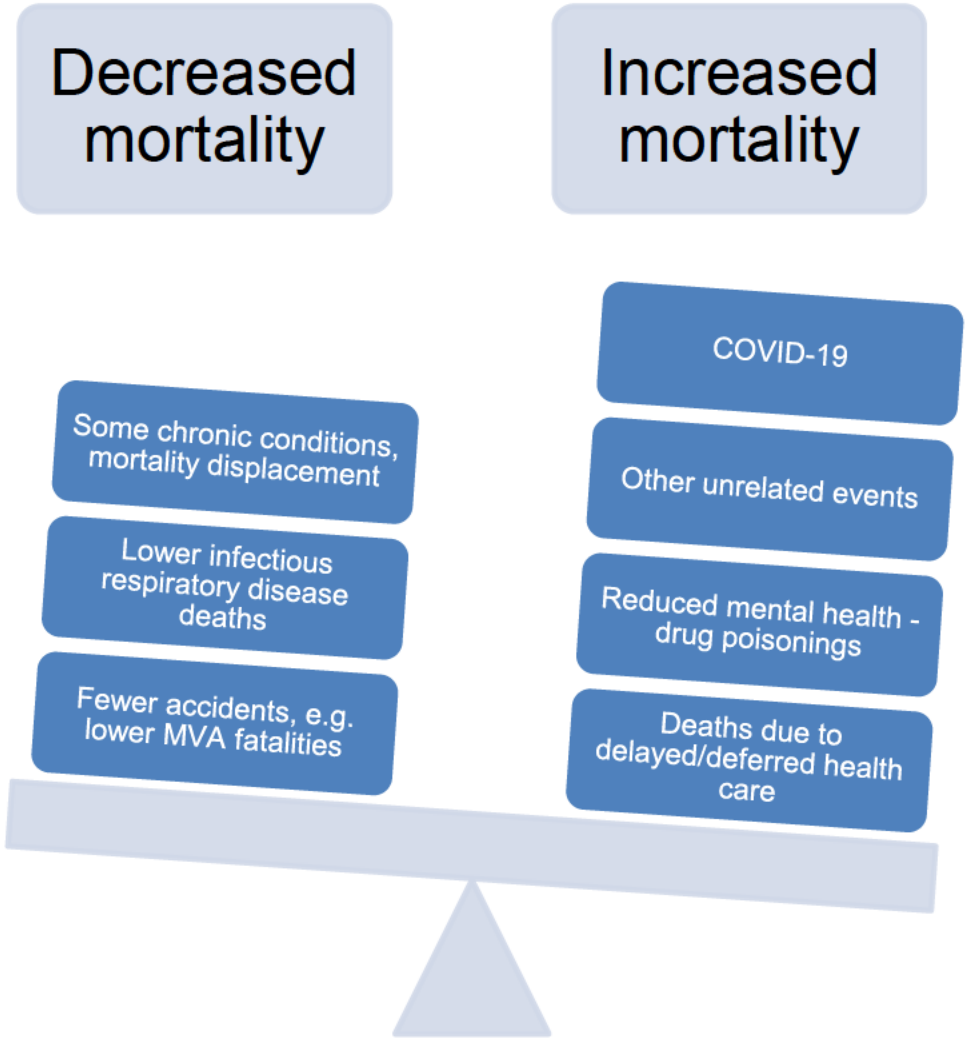
Excess mortality

- Excess mortality is mortality beyond what would normally be expected, usually during a crisis
- **Excess deaths = Observed deaths – Expected deaths**



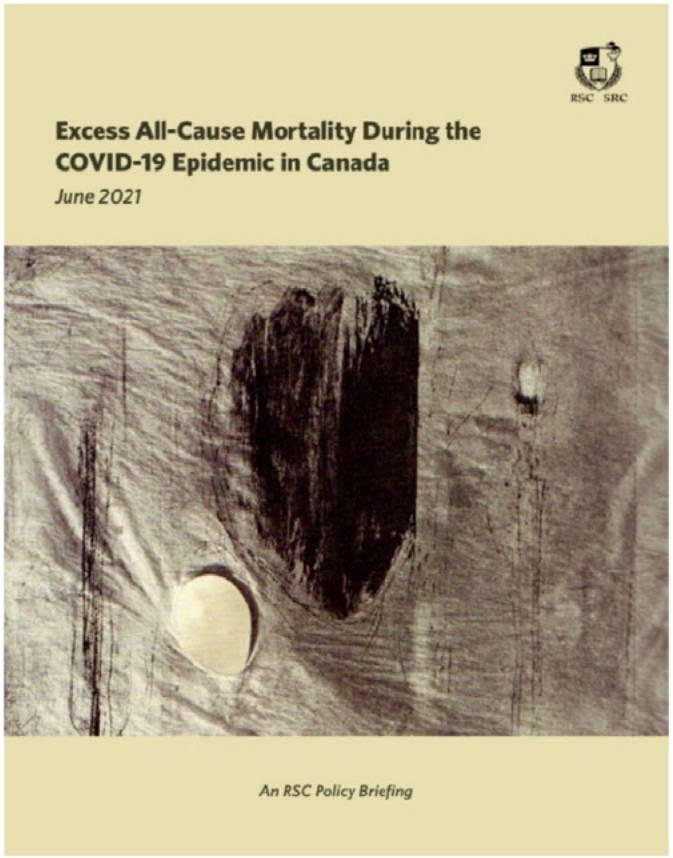
https://www150.statcan.gc.ca/n1/pub/71-607-x/71-607-x2020023-eng.htm

Countervailing forces of mortality



REVIEW OF RSC REPORT

RSC Excess Mortality Report: Findings



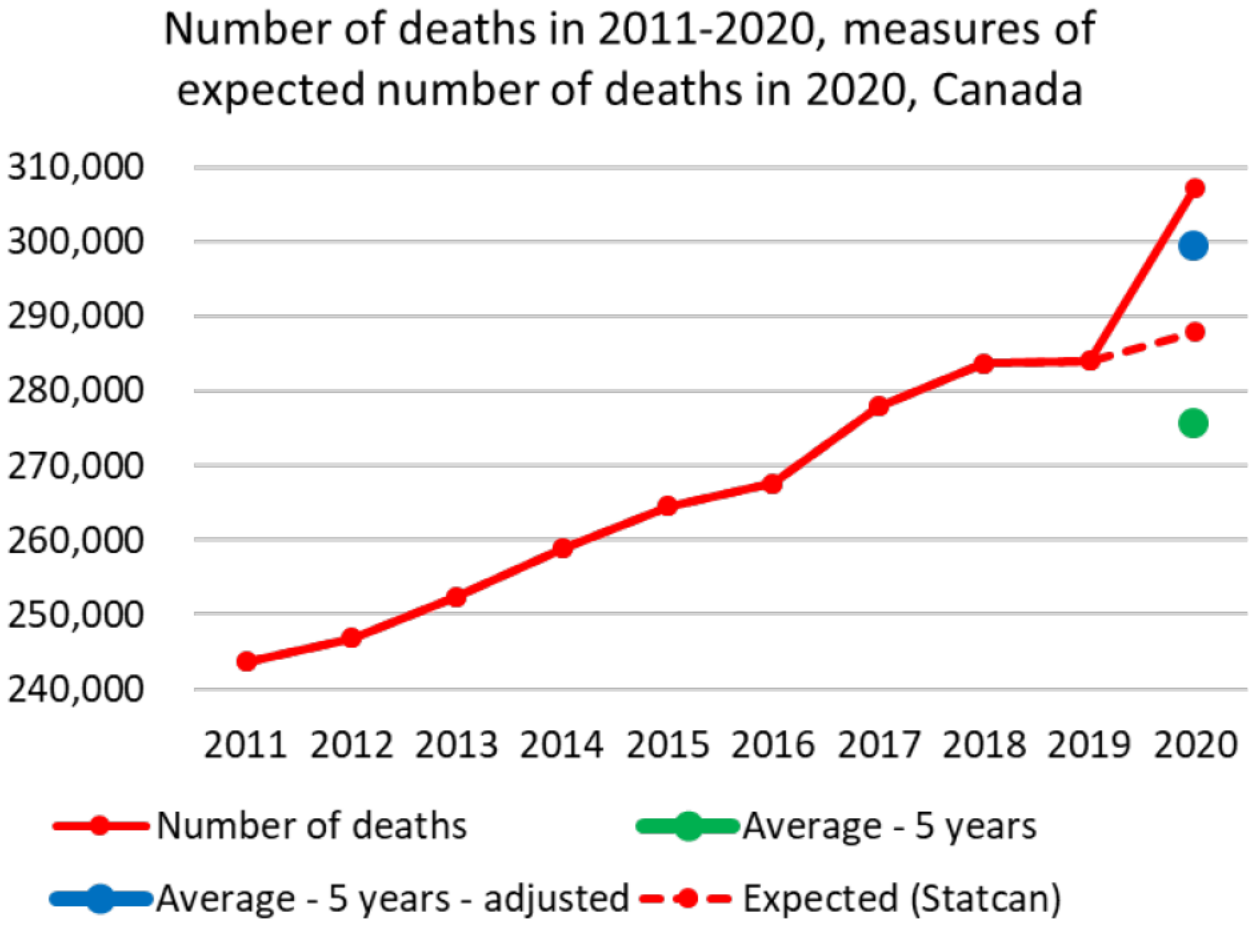
https://rsc-src.ca/en/covid-19-policy-briefing/excess-all-cause-mortality-during-covid-19-epidemic-in-canada

Observed mortality

- RSC report used:
  - Provisional Vital Statistics data for all-cause mortality (Statistics Canada)
  - Case-based surveillance for COVID-19 mortality (PHAC)
- These are complementary but distinct sources of data

- RSC report used five-year average for expected mortality (2014 – 2019)
- Removed increases in mortality due to apparent opioid toxicity deaths (PHAC surveillance data)
- Negative deaths set to 0

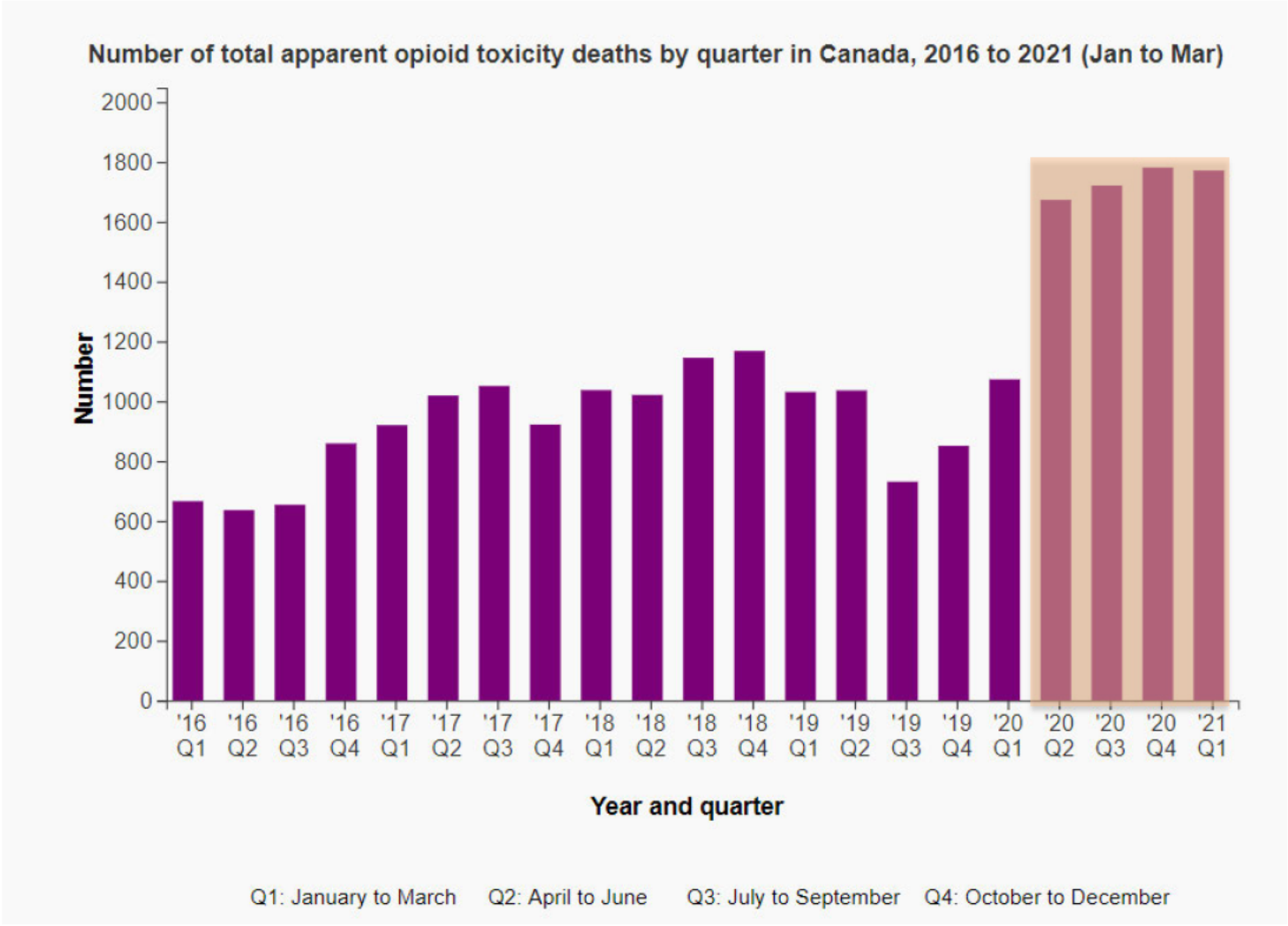
Expected deaths – impact of methods



Attribution of excess deaths to COVID-19

- Authors interpreted that excess deaths largely represented unreported COVID-19 deaths, particularly those in the community-dwelling population aged 45+, using the following information:
  - Comparison of COVID mortality, cases, and excess deaths in LTCs in Canada and other OECD countries
  - Timing of excess deaths
  - Antibody surveillance indicating increased expected COVID-19 deaths
  - Trends in other causes of death
  - Studies of cremation data showing at home vs hospital deaths

Indirect effects - increased drug poisoning deaths



Relative and Absolute Excess Mortality

Absolute and Relative Mortality by Age Group in Canada, March 2020 - July 2021

Age Category	Observed deaths	Expected deaths	Absolute excess deaths	Relative excess deaths
0 to 44 years	21,006	17,684	3,322	18.8%
45 to 64 years	57,189	52,652	4,537	8.6%
65 to 84 years	169,225	161,818	7,407	4.6%
85+ years	142,675	138,363	4,312	3.1%
All ages	390,131	370,630	19,501	5.3%

Statistics Canada Table 13-10-0792-01
Period: Week ending March 28, 2020 to July 3, 2021 (most recent data)
Data release: https://www150.statcan.gc.ca/n1/daily-quotidien/211014/dq211014b-eng.htm

Conclusion

- The RSC report generated a useful discussion on excess mortality in Canada during the COVID-19 pandemic.
- The magnitude of excess deaths estimated in the RSC report and the attribution of these to COVID-19 have been assessed.
- Considerations include:
  - Different methods of calculating excess mortality may lead to different estimates
  - Differences between Vital Statistics and case-based surveillance data on COVID-19 are expected, due to differences in data collection methods, case definitions, etc.
  - Indirect sources of evidence are used by the RSC report authors to attribute all excess deaths, excluding drug poisoning deaths, to COVID-19
- Excess mortality continues to be an important metric to understand the broader public health impacts of the COVID-19 pandemic.

Chief Coroners and Chief Medical Examiners - Public Health Collaborative Model

Context

- The importance of national mortality data was highlighted at the start of the opioid crisis back in 2016 and again during the COVID-19 pandemic.

Canada has two mortality reporting systems:

- **Death certification via Vital Stats Registrar:** Statistics Canada, in collaboration with the provincial and territorial vital statistics registrars, has been compiling, analyzing and publishing national information on births and deaths since 1921.

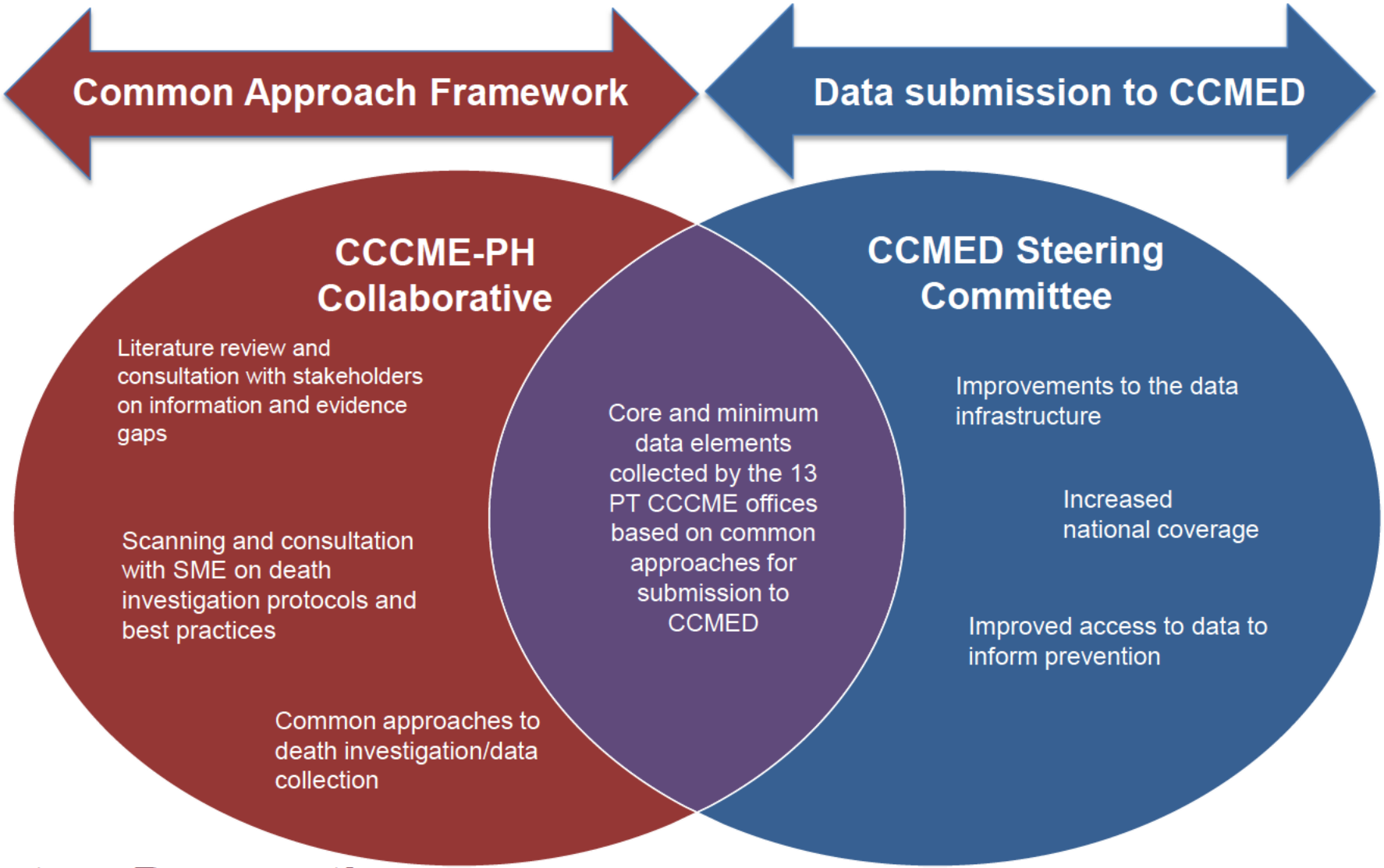
- **Death Investigation systems:** Provincial and Territorial (PT) Chief Coroners and Chief Medical Examiners (CC/CME) submit death investigation data in the Canadian Coroner and Medical Examiner Database (CCMED) held by Statistics Canada.

How do we improve death investigation data to facilitate national surveillance on priority causes of death? What are the underlying issues?

- **Key gaps and challenges** include a lack of:
  - Structure to support collaboration and knowledge exchange between CC/CME
  - Common approaches to death investigation
  - Resources at PT level (paper processes, no research/ data management units)
  - Ability to consistently identify, evaluate and monitor mortality trends at a national level reducing the opportunity for intervention or prevention.

- **Key limitations** with Canadian Coroner and Medical Examiner Database (CCMED):
  - Not nationally comparable (no common approaches to death investigation)
  - Not comprehensive (some PTs don't submit)
  - Not timely (delayed submission and availability)
  - Not easily analyzed (cause and circumstance of deaths is mostly text; lack of core and minimum data sets)

A Collaborative Model to address gaps and challenges in the overall system to improve timely access to national comparable death investigation data on public health issues



System Perspective

What is the end state that we want to achieve?

- A refined CC/CME/ CCMED/ public health surveillance system to address ongoing data needs and rapidly address data needs related to emerging public health threat/issues.

- Centralized national database with common core/ minimum data sets across coroner/ medical examiner investigation services on priority causes of preventable death – accessible to PTs, GoC departments, research and media.

- Death prevention policies and measures have a stronger evidence base, and create a more meaningful impact- benefiting across sectors, including Public Health, Justice, Public Safety and Health.

Priorities established within the COVID-19 context

Public health priorities within the COVID-19 context

- Substance-related deaths
  - Suspected substance-related deaths
  - All substances – capturing the polysubstance nature of the crisis
- Suicides
- Intimate/family/domestic Violence

Other priorities

- Maternal/perinatal
- Infant and child
- Motor vehicle and/or subset (substance-related, and/or ATV and snowmobile)
- In homeless people
- Indigenous populations
- Climate changes - heath-related deaths

Priorities for common approaches under the CC/CME – Public Health Collaborative

- Drug related deaths (including alcohol)
- Suicides

Next steps – Public Health Agency of Canada

- Continue to engage PTs through TAC, SAC and other fora to facilitate information exchange and best practices.

- Continue to examine excess mortality through a public health lens, including social inequalities in COVID-19 mortality and excess mortality (precision):
  - https://www150.statcan.gc.ca/n1/daily-quotidien/211014/dq211014b-eng.html
  - https://www.canada.ca/en/public-health/services/diseases/coronavirus-disease-covid-19/epidemiological-economic-research-data/excess-mortality-impacts-age-comorbidity.html
  - https://health-infobase.canada.ca/covid-19/inequalities-deaths/technical-report.html

- Continue to explore and advance existing initiatives to enhance mortality data, e.g. through the Chief Coroners and Chief Medical Examiners – Public Health Collaborative.

Discussion

- To facilitate a FPT discussion on use, considerations and initiatives related to mortality data for public health.

APPENDICES

Review of International Approaches on Excess Mortality

- purpose of analysis: COVID-19 only, or direct and indirect effects;
- method for estimating expected deaths;
- treatment of values less than zero; and
- sources of data about all cause mortality and COVID-19.

PAN-CANADIAN PUBLIC HEALTH NETWORK | RÉSEAU PANCANADIEN DE SANTÉ PUBLIQUE

Special Advisory Committee Teleconference
COVID-19

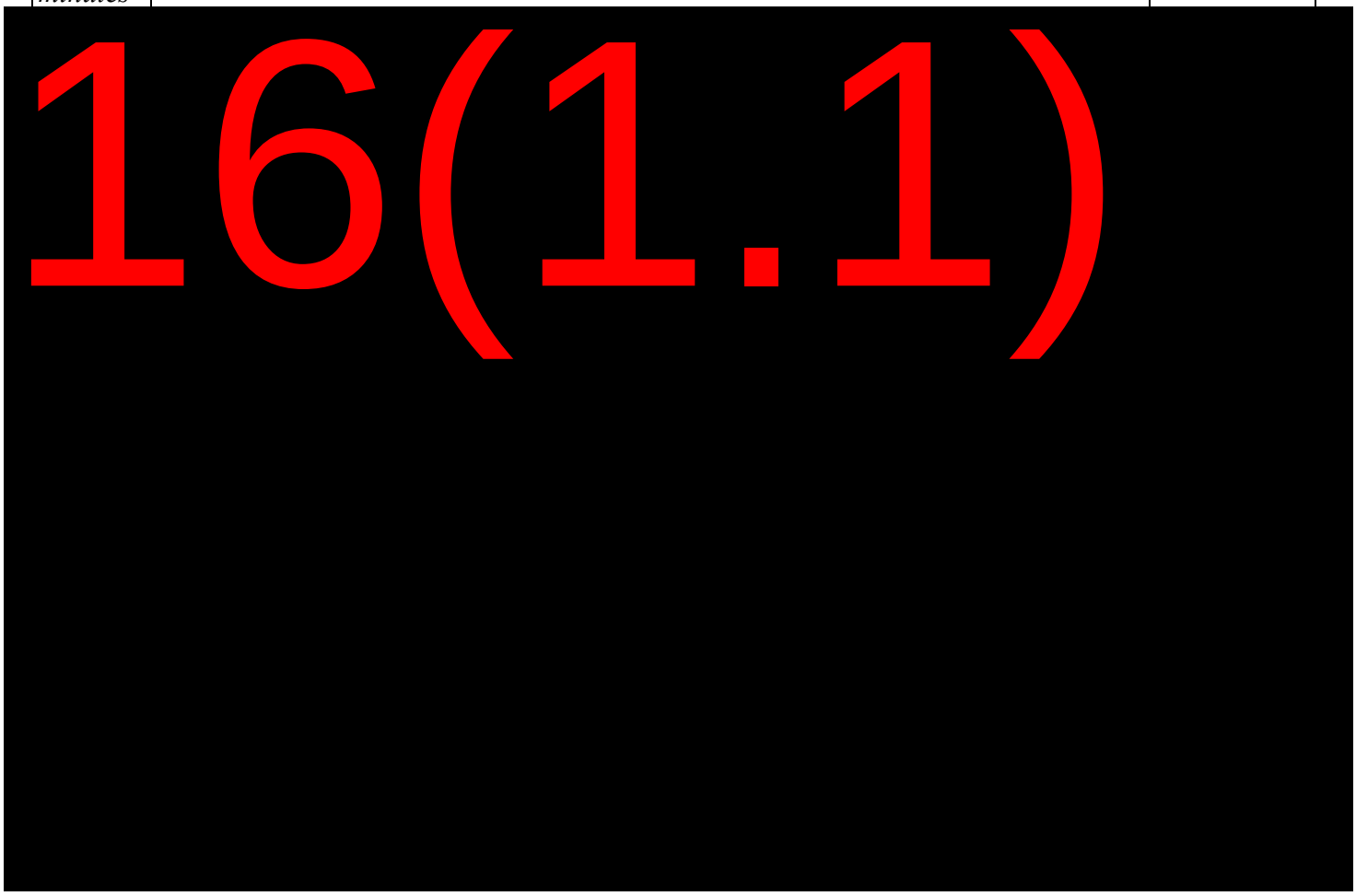
AGENDA
October 28th, 2021
1:30 – 3:00 pm EST

MOCOMP Learning Objectives

At the end of this session, participants will be able to:

- Report on public health perspectives that inform the management of requirements for vaccinated and unvaccinated travelers at the international border, including testing.
- Identify and share jurisdictional efforts and best practices to improve vital statistics data to facilitate pan-Canadian surveillance on the broader impacts of COVID-19.

1:30 – 1:35 **1.** *5 minutes*	**Welcome and Opening Remarks** ➢ Welcome & roll call ➢ Approval of agenda	**Dr. Janice Fitzgerald Chair**

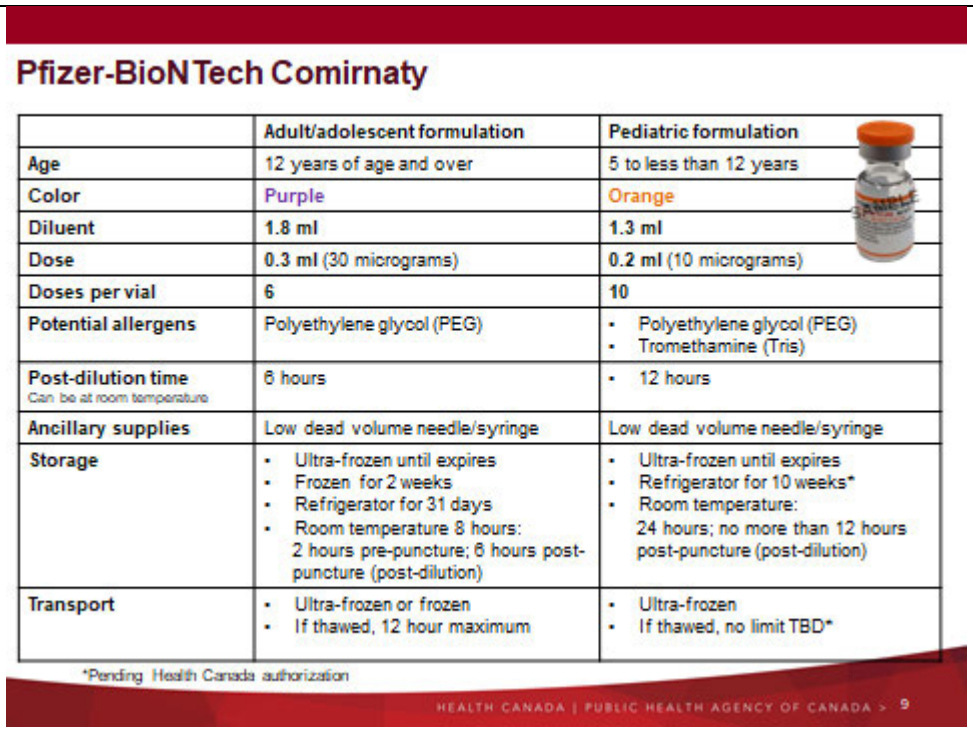


16(1.1)

2:20 – 2:50 **3.** *30 minutes*	**COVID- 19 Surveillance** ➢ *For discussion* Excess Mortality during COVID-19 • Highlight PH applications of excess mortality. • It is mortality beyond normally expected during the pandemic; observed deaths minus expected deaths. • Always variability year to year; 95% expected intervals. • For COVID pandemic, there are other forces; public health interventions, such as stay at home orders may have reduced MVA fatalities, Masking may have prevented other lower infectious respiratory disease deaths. However, some increased mortality may be related to reduced mental health, drug poisoning, deaths due to delayed/deferred health care. • RSC Excess Mortality Report findings which appears there were 6,000 undetected, unreported, and unattributed COVID-19 deaths (45-84 years)	**Dr. Heather Orpana, Lyne Cantin PHAC**

	• 2/3 of COVID deaths went undetected, mostly in underserved populations.
	• Expected deaths was probably unrealistic as based on previous 5 years.
	• RSC authors used this; rate of expected deaths was much lower than what was calculated by Stats Can.
	• Authors largely represented information not on direct evidence.
	• What was reported by RSC report are broadly different on different methodology and data. We recommend additional analysis and research to better understand COVID-19 on mortality.
	• RDC also took into account the increased drug poisoning deaths. It increased by 88% over this past year, then previous year. We need a full accounting of that in perspective with the COVID pandemic.
	• While total absolute excess deaths were higher in 65-84; in reality the relative excess deaths were highest in 0-44 years and this data changes who was most affected by the pandemic.
	• We need to take caution when indirect evidence is used in the assertion of mortality.
	• Excess mortality continues to be an important metric to understand the broader PH impacts of the pandemic.
	
	Chief Coroners and Chief Medical Examiners:
	
	• Looking at gaps in use access in national death investigation data.
	• Canada has two mortality reporting systems
	  o Death Certification via Vital Stats Registrar
	  o Death Investigation systems
	• Key gaps/challenges in the system include knowledge exchange, common approaches to death investigation, resources at PT level and ability to see trends at a national level.
	• Key limitations in the database is that it is not nationally comparable, not comprehensive as some PT don't submit, not timely due to delayed submission (some investigations take up to 24 months to be concluded), and not easily analyzed.
	• Want a refined surveillance system to address data needs; centralized national database with minimum data sets across PT, GoC departments, etc.
	• Multiple PH priorities, pilot will focus on drug related deaths (including alcohol) and suicides.
	• Agency involvement in improving mortality data; want to encourage continued conversation with TAC/SAC.
	• There are a few resources; mortality in the lens of social inequities.
	Questions:
	• AB: With respect to work being done by Coroners, I have missed meetings at SAC and wonder if this is the first time we have been formally consulted? My concern is if a lot of work has been done without looking at sensitivity; more rigor would be useful as there is criticism that COVID is being over-represented. I think we need more discussion in partnership with CCMOH.	

	• Coroner: The collaborative model is not reporting on anything yet. The hope is to report quarterly on opioid related deaths and suicides. There will be multiple stakeholder engagements to fix some of the issues in the system to make investigation data more accessible. • AB: The problem is that this is provincial data being reported; shouldn't be done separately from PH in regards PH Data. PH is not a stakeholder, but the owner of the data. • FNIHB: Should engage FN in this. • SK: We need to understand COVID mortality better; in other mid-lower income countries mortality has been underestimated by a factor of 10. In Canada, we swabbed for COVID upon death. Coroners have sensitively reported data in the past; non-stigmatizing.	
2:50 – 3:00 **4.** *10 minutes*	**Emerging Issues** ➢ *For discussion* • CCMOH statement on the use of boosters following NACI guidance on November 1st. • 16(1.1) [redacted]	**Julie Auger SAC Secretariat**



Pfizer-BioNTech Comirnaty

	Adult/adolescent formulation	Pediatric formulation
Age	12 years of age and over	5 to less than 12 years
Color	Purple	Orange
Diluent	**1.8 ml**	**1.3 ml**
Dose	**0.3 ml** (30 micrograms)	**0.2 ml** (10 micrograms)
Doses per vial	**6**	**10**
Potential allergens	Polyethylene glycol (PEG)	• Polyethylene glycol (PEG) • Tromethamine (Tris)
Post-dilution time Can be at room temperature	6 hours	• 12 hours
Ancillary supplies	Low dead volume needle/syringe	Low dead volume needle/syringe
Storage	• Ultra-frozen until expires • Frozen for 2 weeks • Refrigerator for 31 days • Room temperature 8 hours: 2 hours pre-puncture; 6 hours post-puncture (post-dilution)	• Ultra-frozen until expires • Refrigerator for 10 weeks* • Room temperature: 24 hours; no more than 12 hours post-puncture (post-dilution)
Transport	• Ultra-frozen or frozen • If thawed, 12 hour maximum	• Ultra-frozen • If thawed, no limit TBD*

*Pending Health Canada authorization

HEALTH CANADA | PUBLIC HEALTH AGENCY OF CANADA > 9

- Nov 4 Discussion of impact of COVID on Mental Health
- Nov 25 Data on long-haul COVID

3:00 **5.**	**Conclusion / Next Teleconference**	**Dr. Janice Fitzgerald** **Chair**

Upcoming Teleconferences:

- SAC meeting on Thursday, November 4th

COVID-19
PHNB/VTF
Operation ONE TEAM

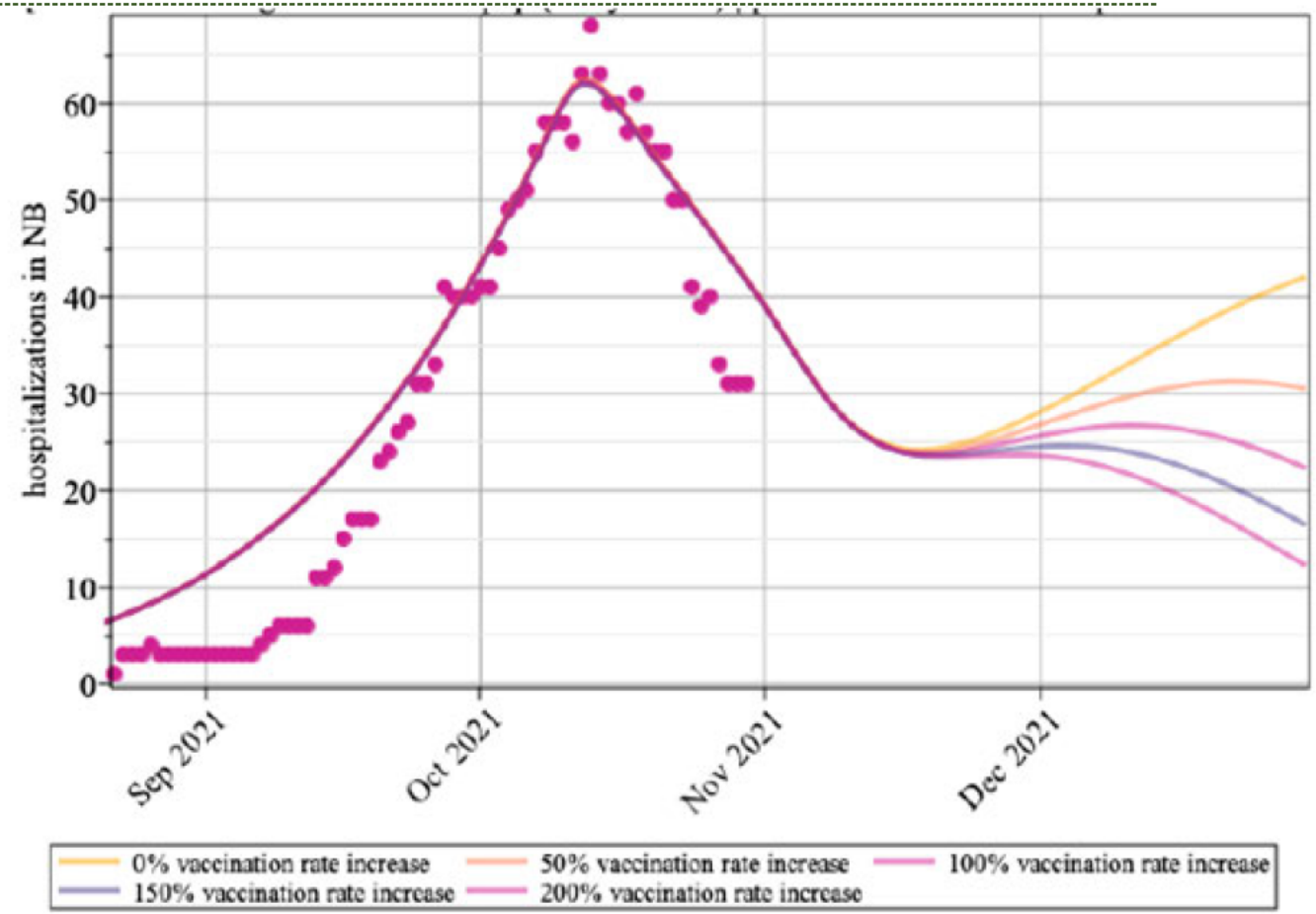
New Nouveau Brunswick

MODELING

- The COVID-19 Model, developed in collaboration with UNB, considers the effects of wild, alpha, and delta variant, provincial vaccination rates, and importations rates. Due to the computational intensity, it requires roughly 24 hours per run. It requires several mini-models to operate correctly including:
    - A vaccination model built based on NB's vaccination rollout, which requires constant updating as the schedule updates.
    - Importation model build to adjust over time to our border restrictions and assess the risk that each traveller is infectious based on COVID-19 activity in surrounding areas.
    - Social distancing model is used based on the provincial alert level scheme (regulations, mandatory order, circuit breaker). This model determines regional level contact rates and assess regional level burden of disease.
- The model is to be improved on iteratively; the following information is being worked on for integration in the future:
    - Effects of waning immunity,
    - Implementation of a third dose strategy, going from the most vulnerable to the least vulnerable,
    - Varying coverage rates for those 5-11 years old, incorporating the data from Communications,
    - Refining the importation model to account for international changes in policy and important events (e.g. holiday period) and,
    - Six-month forecast.

MODELING

- Estimates of active COVID-19 cases in hospital as a result of introducing vaccination to those 5-11 years old.
- This models presumes that following the removal of the circuit breaker, we would have a ~20% increase in contact rates compared to before the circuit breaker was implemented.
    - While importations are not modelled explicitly, general movement within the population should increase with removal / attenuation of national border measures.



From:	Chalifoux, Mathieu (DH/MS)
To:	Liston, Heidi (DH/MS); Elliott, Jennifer (DH/MS); Russell, Dr. Jennifer (DH/MS); Muecke, Dr. Cristin (DH/MS); Higdon, Penny (DH/MS)
Subject:	Fwd: Winter Action Plan
Date:	November 15, 2021 5:51:48 PM
Attachments:	New Brunswick COVID-19 Winter Action Plan_V1.docx COVID-19 - Forward Plan_V4.pptx

---

As an FYI.

From: Chalifoux, Mathieu (DH/MS)
Sent: Monday, November 15, 2021 5:48:32 PM
To: Clair, Suzanne (DH/MS) <suzanne.clair@gnb.ca>; Dickinson, Joel (ECO/BCE) <Joel.Dickinson@gnb.ca>; Awad, Melissa (ECO/BCE) <Melissa.Awad@gnb.ca>
Subject: Winter Action Plan

Good evening team,

You can find attached the first draft of the Winter Action Plan.

The contents were based on the attached presentation.

At this point, I realize there's likely a lot of care that still needs to go into flow / presentation order / style, etc., but would still seek your feedback to see if there's anything missing or that we need to modify.

Joel, I'm not sure where we landed on the "tiered" approach for circuit breaker. I have left as is for the time being, but certainly open to feedback on that end.

Thank you all for your help and looking forward to building a great plan together,

Mathieu Chalifoux, M.Sc (Epidemiology) – Epidemiologist / Épidémiologiste
COVID Response Team / Équipe d'intervention COVID
Department of Health / Ministère de la santé
Phone / Téléphone : (506) 470-9627
E-mail / Courriel : Mathieu.Chalifoux@gnb.ca

From:	Chalifoux, Mathieu (DH/MS)
To:	Awad, Melissa (ELG/EGL); Dickinson, Joel (ECO/BCE); Hansen, Cheryl (FTB/FCT)
Cc:	Elliott, Jennifer (DH/MS); Liston, Heidi (DH/MS); Clair, Suzanne (DH/MS)
Subject:	Draft Winter Plan
Date:	November 16, 2021 7:53:06 PM
Attachments:	New Brunswick COVID-19 Winter Action Plan_V2.docx

Good evening team,

First of all, thank you to everyone who provided feedback for this document.

You can find attached the latest draft. As you know, some of the measures and triggers are still awaiting Cabinet approval.

Please let me know if you have any further feedback or questions.

Thank you,

Mathieu Chalifoux, M.Sc (Epidemiology) – Epidemiologist / Épidémiologiste
COVID Response Team / Équipe d'intervention COVID
Department of Health / Ministère de la santé
Phone / Téléphone : (506) 470-9627
E-mail / Courriel : Mathieu.Chalifoux@gnb.ca

From:	Awad, Melissa (ECO/BCE)
To:	Chalifoux, Mathieu (DH/MS)
Cc:	Elliott, Jennifer (DH/MS); Liston, Heidi (DH/MS); Clair, Suzanne (DH/MS); Dickinson, Joel (ECO/BCE); Hansen, Cheryl (FTB/FCT)
Subject:	RE: Draft Winter Plan
Date:	November 17, 2021 9:11:52 AM
Attachments:	New Brunswick COVID-19 Winter Action Plan_V2_ECO edits.docx
Importance:	High

Good morning Mathieu,
This document looks great! I added a few additional edits and comments for your consideration.
Thank you,
Melissa

From: Chalifoux, Mathieu (DH/MS) <Mathieu.Chalifoux@gnb.ca>
Sent: November 16, 2021 7:51 PM
To: Awad, Melissa (ECO/BCE) <Melissa.Awad@gnb.ca>; Dickinson, Joel (ECO/BCE) <Joel.Dickinson@gnb.ca>; Hansen, Cheryl (FTB/FCT) <cheryl.hansen@gnb.ca>
Cc: Elliott, Jennifer (DH/MS) <Jennifer.Elliott@gnb.ca>; Liston, Heidi (DH/MS) <Heidi.Liston@gnb.ca>; Clair, Suzanne (DH/MS) <suzanne.clair@gnb.ca>
Subject: Draft Winter Plan
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Thank you,

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Department of Health / Ministère de la santé
Phone / Téléphone : (506) 470-9627
E-mail / Courriel : Mathieu.Chalifoux@gnb.ca

From:	Chalifoux, Mathieu (DH/MS)
To:	Awad, Melissa (ELG/EGL); Dickinson, Joel (ECO/BCE); Hansen, Cheryl (FTB/FCT)
Cc:	Elliott, Jennifer (DH/MS); Liston, Heidi (DH/MS); Clair, Suzanne (DH/MS)
Subject:	RE: Draft Winter Plan
Date:	November 17, 2021 10:24:55 AM
Attachments:	New Brunswick COVID-19 Winter Action Plan_V3.docx

Good morning all,
Thank you to Melissa for her comments.
You can find the latest copy attached.
I believe at this time it can be shared with the Premier.
Thank you,
Matt

From: Chalifoux, Mathieu (DH/MS)
Sent: November 16, 2021 7:51 PM
To: Awad, Melissa (ECO/BCE) <Melissa.Awad@gnb.ca>; Dickinson, Joel (ECO/BCE) <Joel.Dickinson@gnb.ca>; Hansen, Cheryl (FTB/FCT) <cheryl.hansen@gnb.ca>
Cc: Elliott, Jennifer (DH/MS) <Jennifer.Elliott@gnb.ca>; Liston, Heidi (DH/MS) <Heidi.Liston@gnb.ca>; Clair, Suzanne (DH/MS) <suzanne.clair@gnb.ca>
Subject: Draft Winter Plan
Good evening team,
First of all, thank you to everyone who provided feedback for this document.
You can find attached the latest draft. As you know, some of the measures and triggers are still awaiting Cabinet approval.
Please let me know if you have any further feedback or questions.
Thank you,

Mathieu Chalifoux, M.Sc (Epidemiology) – Epidemiologist / Épidémiologiste
COVID Response Team / Équipe d'intervention COVID
Department of Health / Ministère de la santé
Phone / Téléphone : (506) 470-9627
E-mail / Courriel : Mathieu.Chalifoux@gnb.ca

From: Chalifoux, Mathieu (DH/MS)
To: Russell, Dr. Jennifer (DH/MS); Muecke, Dr. Cristin (DH/MS); Liston, Heidi (DH/MS); Elliott, Jennifer (DH/MS)
Subject: Draft Winter Plan
Date: November 17, 2021 10:33:42 AM
Attachments: New Brunswick COVID-19 Winter Action Plan_V3.docx

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Good morning team,
Please find attached the Winter Plan that was sent to ECO this morning.
This will be reviewed by Cabinet tomorrow. Following their direction, we will modify as necessary.
Thank you,
Matt

From:	Liston, Heidi (DH/MS)
To:	Shephard, Dorothy Hon. (DH/MS); Sully, Jason (DH/MS); Russell, Dr. Jennifer (DH/MS); Brown, Jennifer (DH/MS); Elliott, Jennifer (DH/MS); Chalifoux, Mathieu (DH/MS)
Cc:	Macfarlane, Bruce (DH/MS)
Subject:	One pager on winter plan
Date:	November 17, 2021 5:56:21 PM
Attachments:	NB Covid-19 Winter Action Plan one-pager.pptx

Here is the one pager for the winter action plan that ECO put together for us in place of the slides for tomorrow as it would be easier for Ministers to review.

Heidi

Get Outlook for iOS

From:	Fetter, Tom (DH/MS)
To:	Liston, Heidi (DH/MS); Boudreau, René (ELG/EGL); Levesque, Eric J. (DH/MS); Burkhardt, Tracey (DH/MS); Elliott, Jennifer (DH/MS)
Cc:	Dell, Dave (DH/MS)
Subject:	January 5 2022 CDM TC notes
Date:	January 5, 2022 5:41:53 PM
Attachments:	January 5 2022 CDM TC notes.docx

Key discussion points:

Epidemiological Update

- Omicron now dominant strain in Canada – modeling suggests even higher case counts, though to date have not seen large increases in hospitalization or severe illnesses – though these are lagging indicators, and some modeling says ICU pressures within 2 weeks.
- UK data suggests that 2 doses provides some reasonable protection against severe disease and hospitalization/death, but that 8 doses is much better. Unclear how long a booster's immunity benefits last.
- Case counts can expect to rise – even among pediatric pops – because of sheer # of overall cases.

Vacc supply and administration

- Overall progress across all jurisdictions (some variation) with present focus on boosters and pediatric
- Enough doses will arrive to be sufficient for all such rollouts.

Rapid tests, surge supports, treatments

- Rapid test orders incoming – 140M more tests in January, allocated on per capita basis
- Some logistical and supply chain challenges
- HHR concerns – Feds described ongoing supports they're supplying themselves and through Red Cross, and noted may need to triage some PT requests if significant demand requires.
- Brief discussion of antiviral approvals – Pfizer product expects approval within 2 weeks, and PHAC will have interim guidance for use at the same time. Other products (Merck) will take longer.
- Allocation typically done at ADM drug shortages table – leaning towards per capita.

Ongoing PT challenges

- All PTs described challenges of rising case counts, pressures re HHR sufficiency, demand for rapid tests. Some mentioned communications challenges also – and the need to transition to different coms messaging.

HMM call tomorrow, another CDM next week

From:	Graham, Jennifer (DH/MS)
To:	Boudreau, René (ELG/EGL); Burkhardt, Tracey (DH/MS); Elliott, Jennifer (DH/MS); Liston, Heidi (DH/MS); Russell, Dr. Jennifer (DH/MS); Macfarlane, Bruce (DH/MS); Turgeon, Laura (DH/MS); Levesque, Eric J. (DH/MS)
Cc:	MacDonald, Natalie (DH/MS)
Subject:	Daily Update-Jan. 11
Date:	January 11, 2022 12:08:06 PM
Attachments:	slide_0110_ENFR_v3-03.png slide_0110_ENFR_v3-04.png slide_0110_ENFR_v4-01.png slide_0110_ENFR_v4-02.png
Importance:	High

Today's daily update is below for your review.
We intend to issue it at 2:30 p.m., **just as the technical briefing begins.**
Please let me know if you have any concerns.
Thanks!
Jen
****

Good afternoon everyone,
Un message français suit:

26(1)(a) [redacted]

- [redacted]
- [redacted]
  - [redacted]
  - [redacted]
  - [redacted]

Take good care.
Your EMC Team

From:	Graham, Jennifer (DH/MS)
To:	Elliott, Jennifer (DH/MS); Boudreau, René (ELG/EGL); Burkhardt, Tracey (DH/MS); Liston, Heidi (DH/MS); Russell, Dr. Jennifer (DH/MS); Macfarlane, Bruce (DH/MS); Turgeon, Laura (DH/MS); Levesque, Eric J. (DH/MS)
Cc:	MacDonald, Natalie (DH/MS)
Subject:	RE: Daily Update-Jan. 11
Date:	January 11, 2022 12:35:04 PM

Revised in yellow.

From: Elliott, Jennifer (DH/MS) <Jennifer.Elliott@gnb.ca>
Sent: Tuesday, January 11, 2022 12:17 PM
To: Graham, Jennifer (DH/MS) <Jennifer.Graham@gnb.ca>; Boudreau, René (DH/MS) <Rene.Boudreau@gnb.ca>; Burkhardt, Tracey (DH/MS) <Tracey.Burkhardt@gnb.ca>; Liston, Heidi (DH/MS) <Heidi.Liston@gnb.ca>; Russell, Dr. Jennifer (DH/MS) <Jennifer.Russell@gnb.ca>; Macfarlane, Bruce (DH/MS) <Bruce.Macfarlane@gnb.ca>; Turgeon, Laura (DH/MS) <Laura.Turgeon@gnb.ca>; Levesque, Eric J. (DH/MS) <Eric.Levesque2@gnb.ca>
Cc: MacDonald, Natalie (DH/MS) <Natalie.MacDonald@gnb.ca>
Subject: RE: Daily Update-Jan. 11

26(1)(a) [redacted]

Jennifer

From: Graham, Jennifer (DH/MS) <Jennifer.Graham@gnb.ca>
Sent: Tuesday, January 11, 2022 12:08 PM
To: Boudreau, René (DH/MS) <Rene.Boudreau@gnb.ca>; Burkhardt, Tracey (DH/MS) <Tracey.Burkhardt@gnb.ca>; Elliott, Jennifer (DH/MS) <Jennifer.Elliott@gnb.ca>; Liston, Heidi (DH/MS) <Heidi.Liston@gnb.ca>; Russell, Dr. Jennifer (DH/MS) <Jennifer.Russell@gnb.ca>; Macfarlane, Bruce (DH/MS) <Bruce.Macfarlane@gnb.ca>; Turgeon, Laura (DH/MS) <Laura.Turgeon@gnb.ca>; Levesque, Eric J. (DH/MS) <Eric.Levesque2@gnb.ca>
Cc: MacDonald, Natalie (DH/MS) <Natalie.MacDonald@gnb.ca>
Subject: Daily Update-Jan. 11
Importance: High

Today's daily update is below for your review.
We intend to issue it at 2:30 p.m., **just as the technical briefing begins.**
Please let me know if you have any concerns.
Thanks!
Jen

****

Good afternoon everyone,
Un message français suit:

26(1)(a) [redacted]

26(1)(a) [redacted]

- [redacted]
- [redacted]
  - [redacted]
  - [redacted]
  - [redacted]

Take good care.
Your EMC Team

From:	MacDonald, Natalie (DH/MS) on behalf of Burkhardt, Tracey (DH/MS)
Subject:	FW: Daily Update-Jan. 11 / Mise-à-jour quotidien le 11 jan.
Date:	January 11, 2022 2:37:12 PM
Attachments:	slide_0110_ENFR_v3-03.png slide_0110_ENFR_v3-04.png slide_0110_ENFR_v4-01.png slide_0110_ENFR_v4-02.png
Importance:	High

Good afternoon everyone,
Un message français suit:

COVID-19 Modeling

The attached slides will be presented at a technical briefing shortly. A peak of more than 5,000 daily cases of COVID-19 and 220 active hospitalizations is being forecasted by early February. The number of people isolating with COVID-19 could impact the health-care system, other critical services and businesses. New Brunswickers are being asked to reduce their contacts and follow public health guidance as the health system prepares for a steep increase of cases forecasted for the coming weeks.
As a reminder, the Bridge the Gapp website is a great resource for information on mental wellness.

COVID-19 Information

Statistics

- Public Health is reporting one death and 88 people in hospital with 14 in intensive care units (ICUs).
- Vaccination rates of eligible population:
    - One dose: 90.8%
    - Two doses: 83.2%
    - Three doses: 26.5%

Take good care.
Your EMC Team
****

Bonne après-midi à tous:
Modélisation de la COVID-19

Les diapositives ci-jointes seront présentées à une séance d'information technique sous peu. Un sommet de plus de 5 000 cas quotidiens de COVID-19 et de 220 hospitalisations actives est prévu d'ici le début de février. Le nombre de personnes qui s'isolent à cause de la COVID-19 pourrait avoir une incidence sur le système de soins de santé, d'autres services essentiels et des entreprises. On demande aux Néo-Brunswickois de réduire leurs contacts et de suivre les directives de santé publique alors que le système de santé se prépare à une forte augmentation du nombre de cas prévus pour les prochaines semaines.
Petit rappel, le site Navigapp est une excellente ressource d'information sur le mieux-être mental.

Informations sur la COVID-19

Statistiques

- La santé publique rapporte un décès, 88 personnes hospitalisées, dont 14 dans

des unités de soins intensifs (USI).

Taux de vaccination de la population éligible:

Une dose: 90,8%

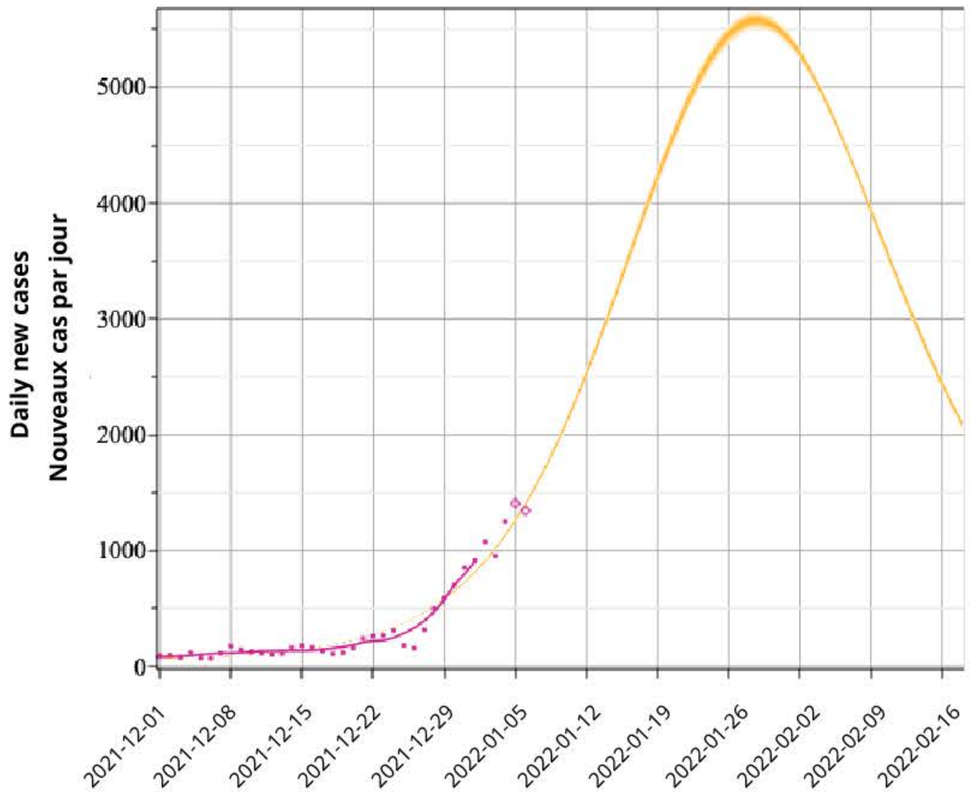
Deux doses: 83,2%

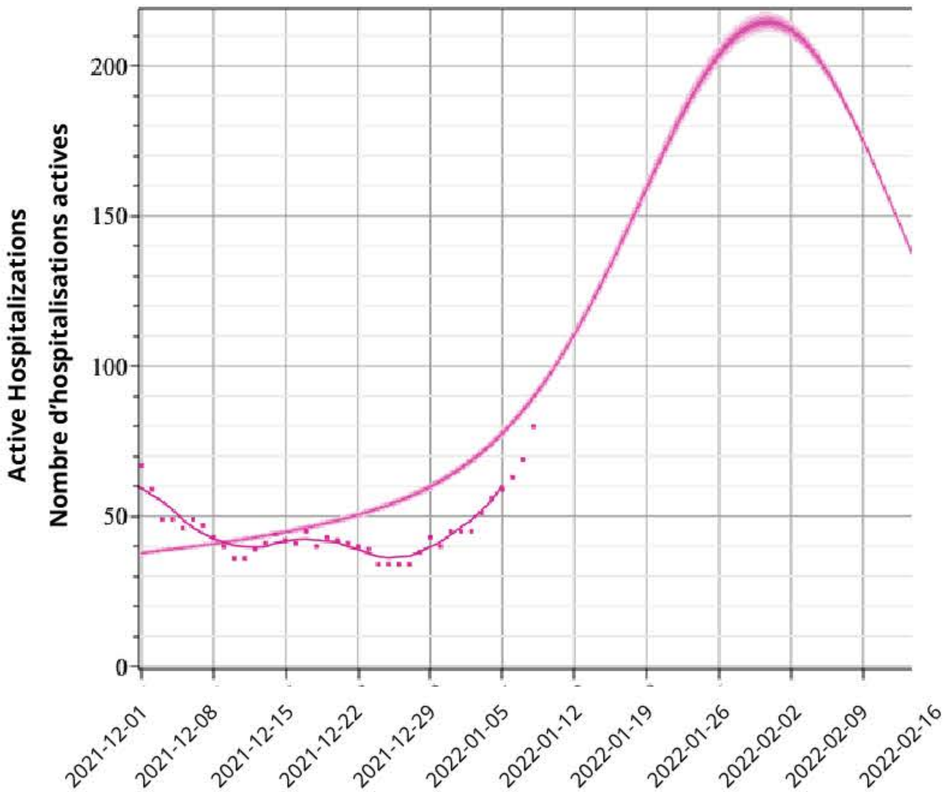
Trois doses: 26,5%

Prenez bien soin de vous.

Votre équipe des cadres supérieurs

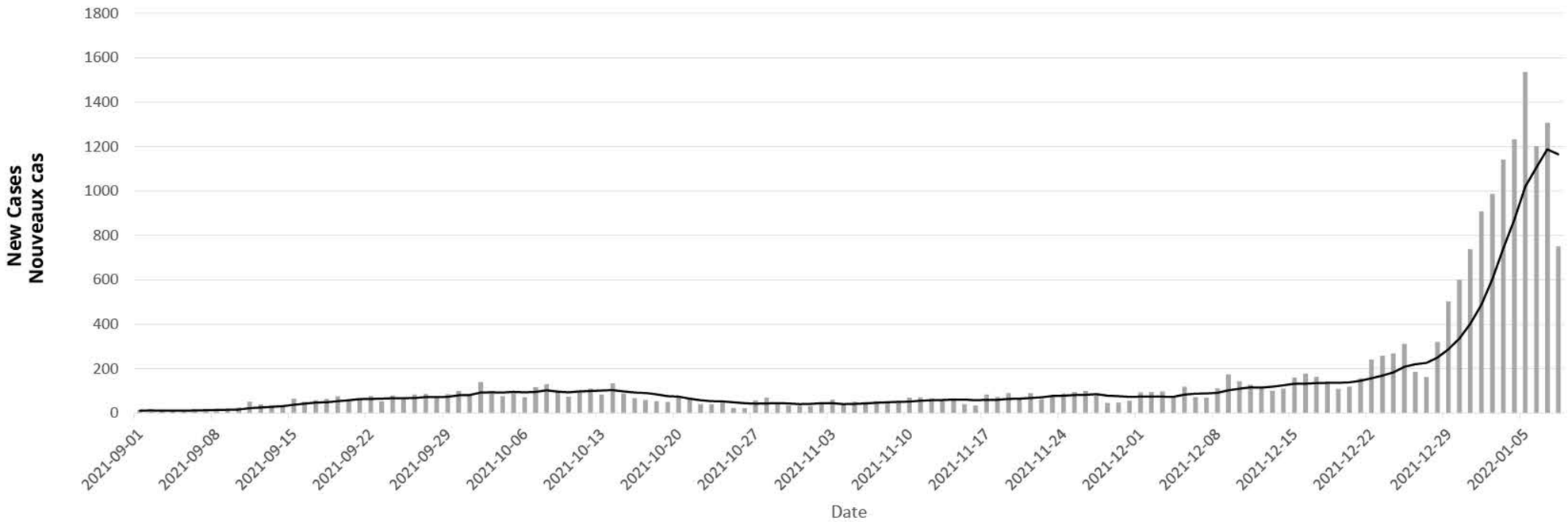
Forecast under current situation
Prévisions selon la situation actuelle





Jointly developed by Department of Health and Sanjeev Seahra (UNB Math and Stats; and AARMS)
Élaborée conjointement par le ministère de la Santé et Sanjeev Seahra (Département de mathématiques et statistiques de l'UNB, AARMS)

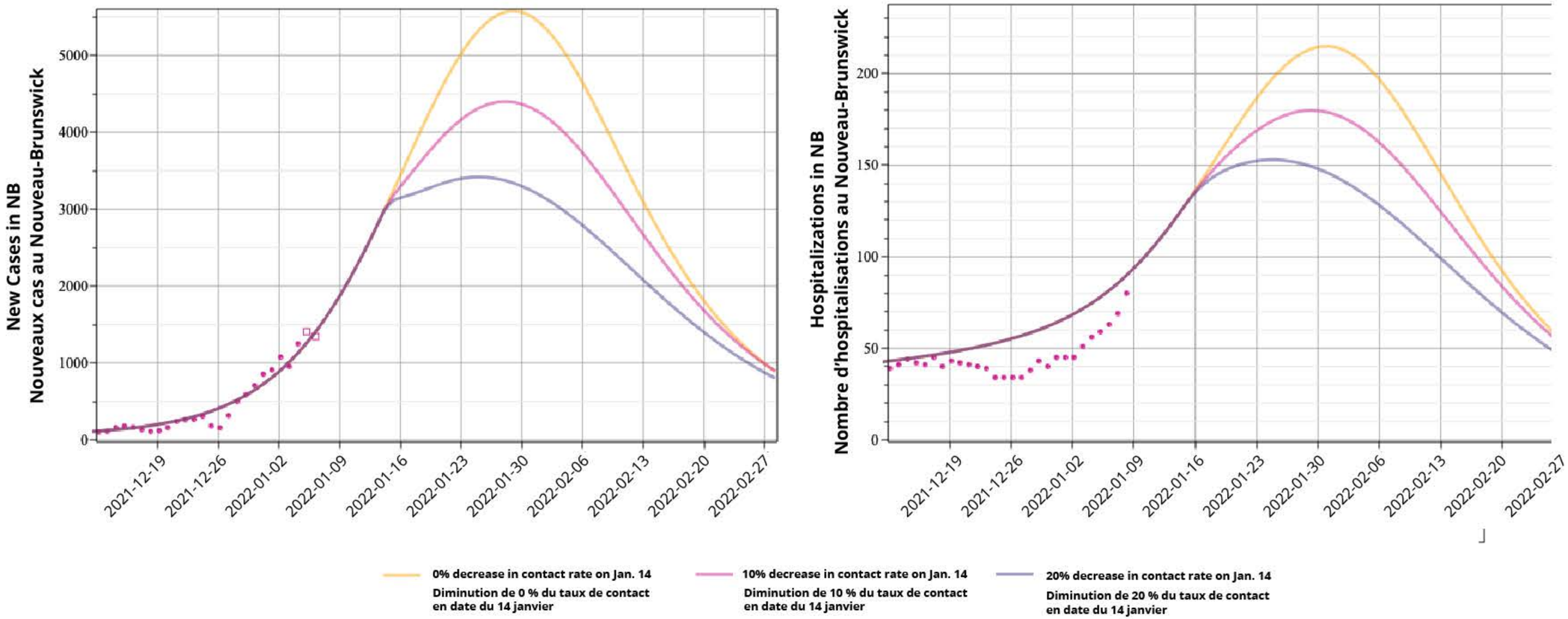
Daily New Cases
Nouveaux cas par jour



Cases (with POCT)
Nombre de cas (comprenant les personnes qui ont eu un résultat positif à un test de dépistage rapide au point de service)

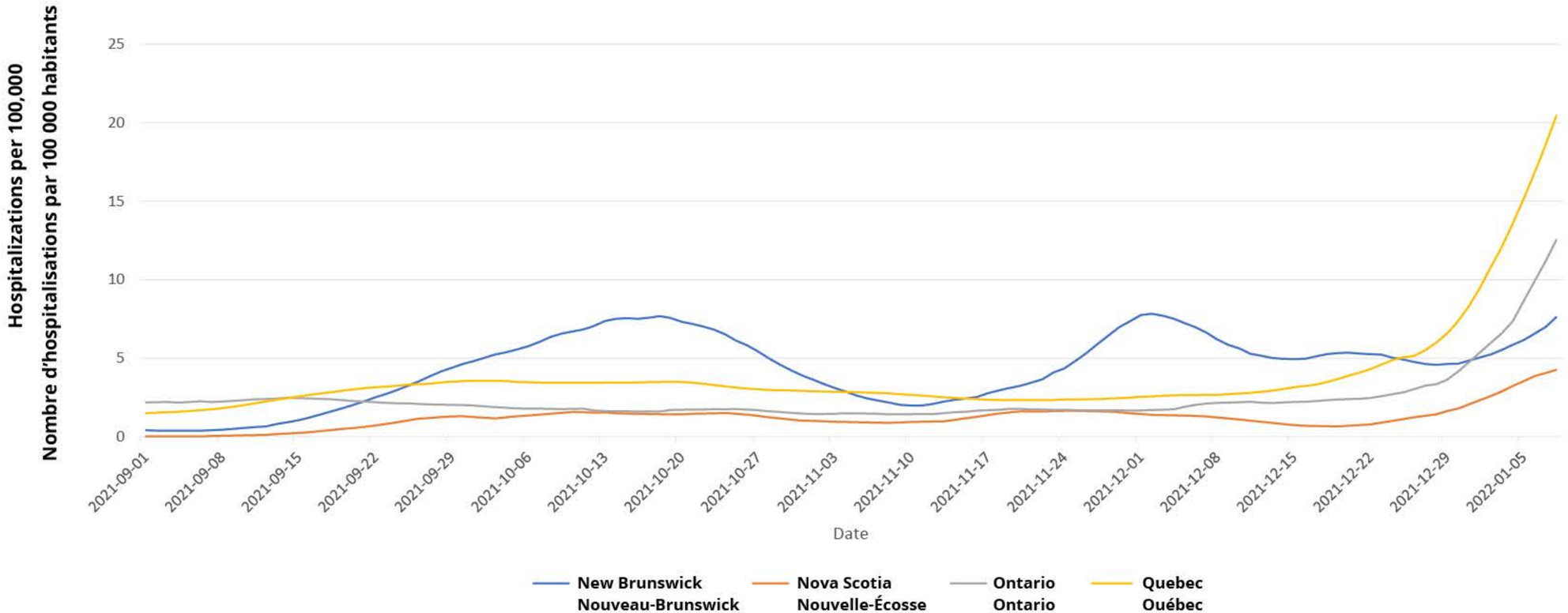
7-Day
7 jours

Projections should contact rates decrease
Prévisions si les taux de contact diminuent



Jointly developed by Department of Health and Sanjeev Seahra (UNB Math and Stats; and AARMS)
Élaborée conjointement par le ministère de la Santé et Sanjeev Seahra (Département de mathématiques et statistiques de l'UNB, AARMS)

Hospitalizations per 100,000
Nombre d'hospitalisations par 100 000 habitants



From:	Fetter, Tom (DH/MS)
To:	Liston, Heidi (DH/MS); Boudreau, René (ELG/EGL); Levesque, Eric J. (DH/MS); Elliott, Jennifer (DH/MS); Burkhardt, Tracey (DH/MS)
Cc:	Dell, Dave (DH/MS)
Subject:	January 12 2022 CDM TC notes
Date:	January 12, 2022 3:08:08 PM
Attachments:	January 12 2022 CDM TC notes.docx

Key discussion points:

Epidemiological Update

- Tracking hospitalization rates nationally – well past the peak now that Canada had seen in May 2021. The consensus is that Omicron is less severe on a personal level, yet the flood of cases is flooding hospitals. ICU cases are still lower than at the previous peak, but this is a lag inidicator and may change.
- Critical to get granular information on characteristics of hospitalized and ICU admitted patients, to help target recommendations for therapies.

Therapeutics

- Anticipate regulatory decision re Pfizer antiviral early next week, and have arranged with Pfizer to have initial shipments on or before that date, to be ready to distribute. Initial distribution will be per capita, and Health Canada is working on interim considerations document to help guide PT utilization especially in early days when supply is so limited. Expect this document to be complete late this week, coterminous or before the approval of the Pfizer drug.

Rapid Testing

- Very high global demand is restricting availability. Feds have ordered more, and will provide updates at the end of each week to PTs about when deliveries will be available the following week. This will likely continue at least through January.

Key issues and challenges

- All PTs expressed significant concern and challenges re HHR, in particular with so many staff being absent or needing to self-isolate. Various approaches being taken to increase the # of people who can support vaccination programs, etc. Significant concern re the impact on acute care, due to such staffing shortages.
- All PTs also expressed concern re the availability of rapid tests, and gratitude for Feds' efforts to secure more – Alberta has been making additional private purchases.
- Quebec discussed their recent initiative to penalize voluntarily non-vaccinated people, and their intention to hire more health care workers in a variety of settings.

From:	Fetter, Tom (DH/MS)
To:	Shephard, Dorothy Hon. (DH/MS); Liston, Heidi (DH/MS); Boudreau, René (DH/MS); Elliott, Jennifer (DH/MS); Burkhardt, Tracey (DH/MS); Levesque, Eric J. (DH/MS)
Cc:	Sully, Jason (DH/MS); Dell, Dave (DH/MS)
Subject:	HMM Jan 13 2022 TC notes
Date:	January 13, 2022 2:46:09 PM
Attachments:	HMM Jan 13 2022 TC notes.docx

Key discussion points:

Epi update

- Nationally, cases growing at a fierce rate, and lag indicators (hospitalizations, ICU admissions) growing at a somewhat expected lower rate … but still expected to climb further. Have surpassed peak cases and peak hospitalizations nationally by substantial amount, and expect this to grow.
- Vacc and booster programs going well. Note that full vaxx and boosters provide significant protection against severe illness, though less protection against infection/transmission.

Response measures

- Vacc is the most crucial tool – and boosters. While booster % is growing well, only about 27% nationally eligible have so far got this 3rd dose, so must continue the focus.
- While we've not yet increased booster availability to teens, NACI has been asked to consider this. Feds noted the value of their vacc mandates for Federal populations, and while "respecting" PT autonomy in such things, observed that if PT populations matched Fed populations in vacc rate, there'd be significantly fewer hospitalizations and deaths.
- Reiterated Fed purchase orders for rapid tests, and each Friday will confirm with PT officials the deliveries to be expected by provinces in the following week. Similar discussions will occur regarding Paxlovid, the Pfizer antiviral which is expected to be approved in coming days. Prepositioning with Pfizer, PHAC, PSPP and Health Canada to have PTs well advised and prepared about when to expect to receive initial and subsequent shipments of the therapeutic. PHAC developing interim considerations for use – which will soon be supplemented by similar work by CADTH and the Quebec agency doing similar work.

Round Table

- Ministers discussed very similar struggles re increasing cases, availability and use of rapid tests, changes to PCR testing protocols, and efforts to address HHR challenges.
- Noted increasing ICU and hospitalization numbers, lagging the case counts – and the fact that case counts by PCR are essentially sampling of what's actually occurring within the general population.
- While NB is today announcing increased PH measures, most other PTs have either (as PQ and ON) already tightened these, or are essentially staying put for now. Many described school returning in-person next week, and the need this places on availability of rapid tests.
- In general, vacc and booster programs progressing well, despite the continued presence of 10% or so staunch vac resisters. PEI minister noted the effectiveness of describing the negative consequences (ICU, hospital admissions, deaths) disproportionately experienced by the unvacced.

Modelling Omicron spread in Canada - update

Dr Nick Ogden

January 18, 2021

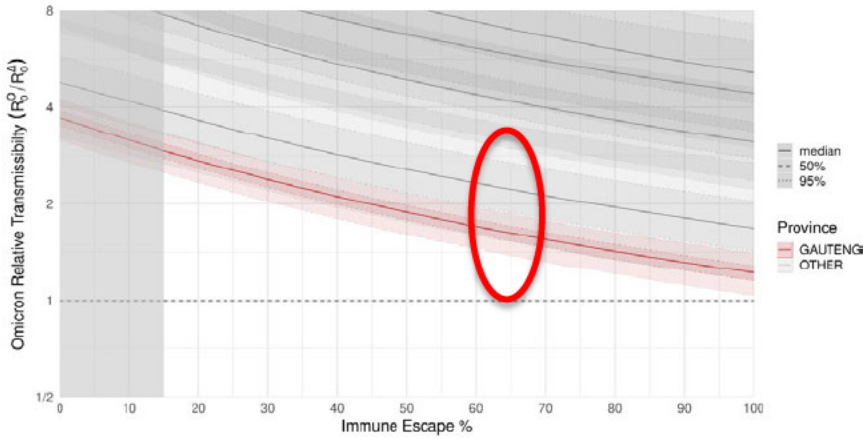
Presentation and modelling objectives

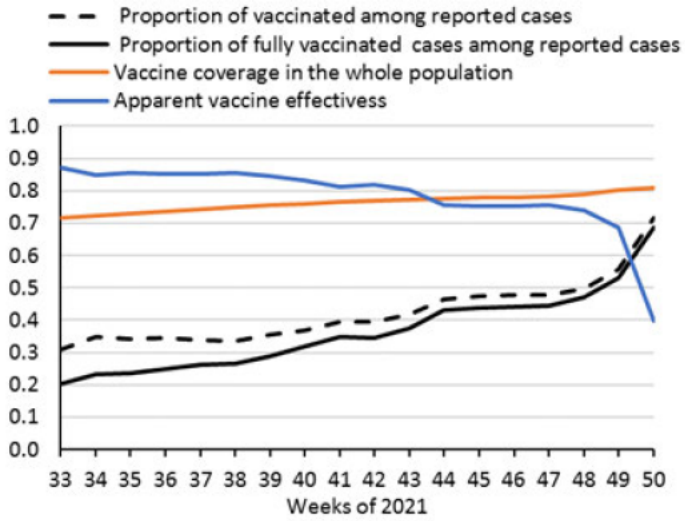
- Update on knowns and unknowns about Omicron transmission
- Forecasting the Omicron-driven wave
- Scenarios for the epidemic without and with attempts to control:
  - SEIR model is used to compare hospital admissions in surveillance data against scenarios for different levels of Omicron severity
  - Agent-based model explored

Emerging knowledge of Omicron transmission – knowns and unknowns

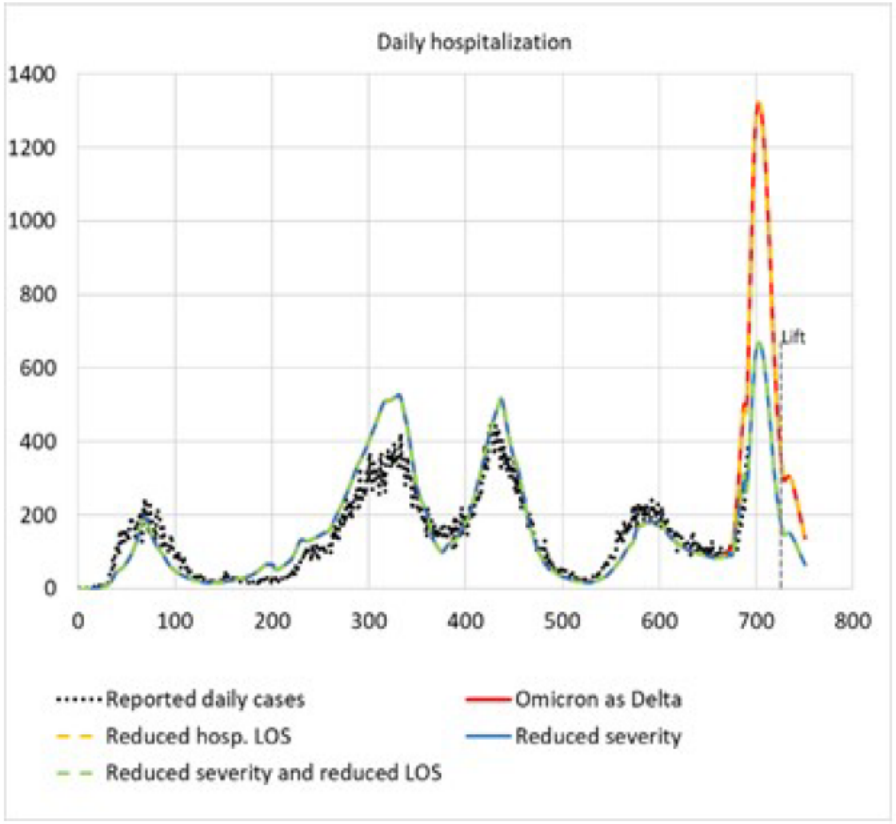
- Transmission:
  - More highly transmissible than Delta: 1.75-2.0x
  - Vaccine escape resulting in effectiveness of 2 dose mRNA being circa 35% against infection/mild illness and 70% against severe illness
  - Partially evades post infection immunity

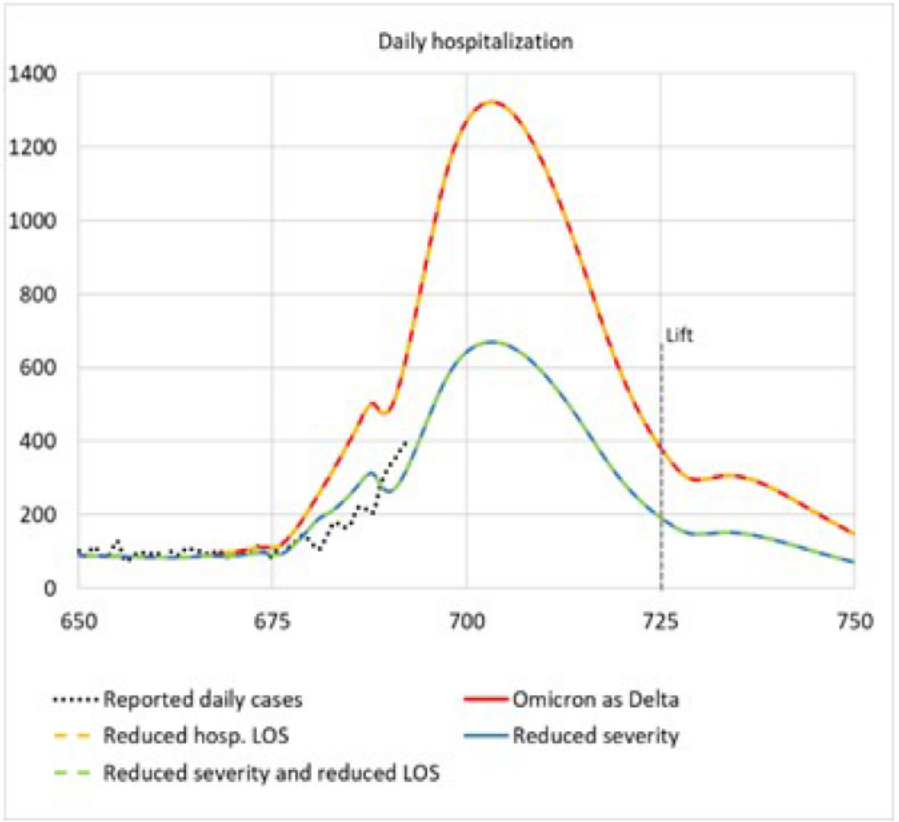
- Severity
  - Risk of hospitalisation is ~70% of that of wild type = ~60% lower than Delta
  - Risk of ICU maybe even less
  - Duration hospitalisation likely less (~50% less than Delta)





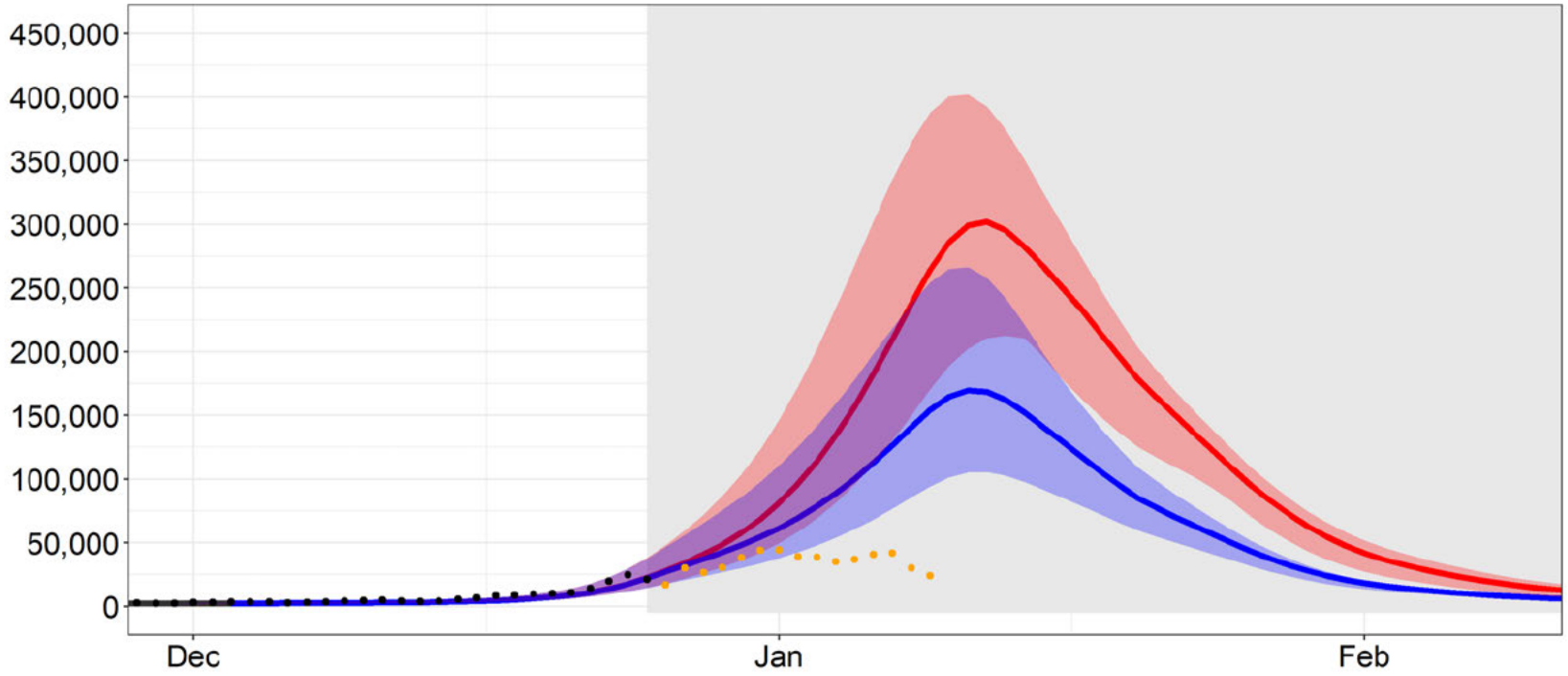
Scenarios in which Omicron has at lest 50% reduction in risk of hospitalisation fit observed data best





A rapid, large increase in incidence is forecast for Canada due to the spread of Omicron

Number of cases*



With measures in place up until end December 2021

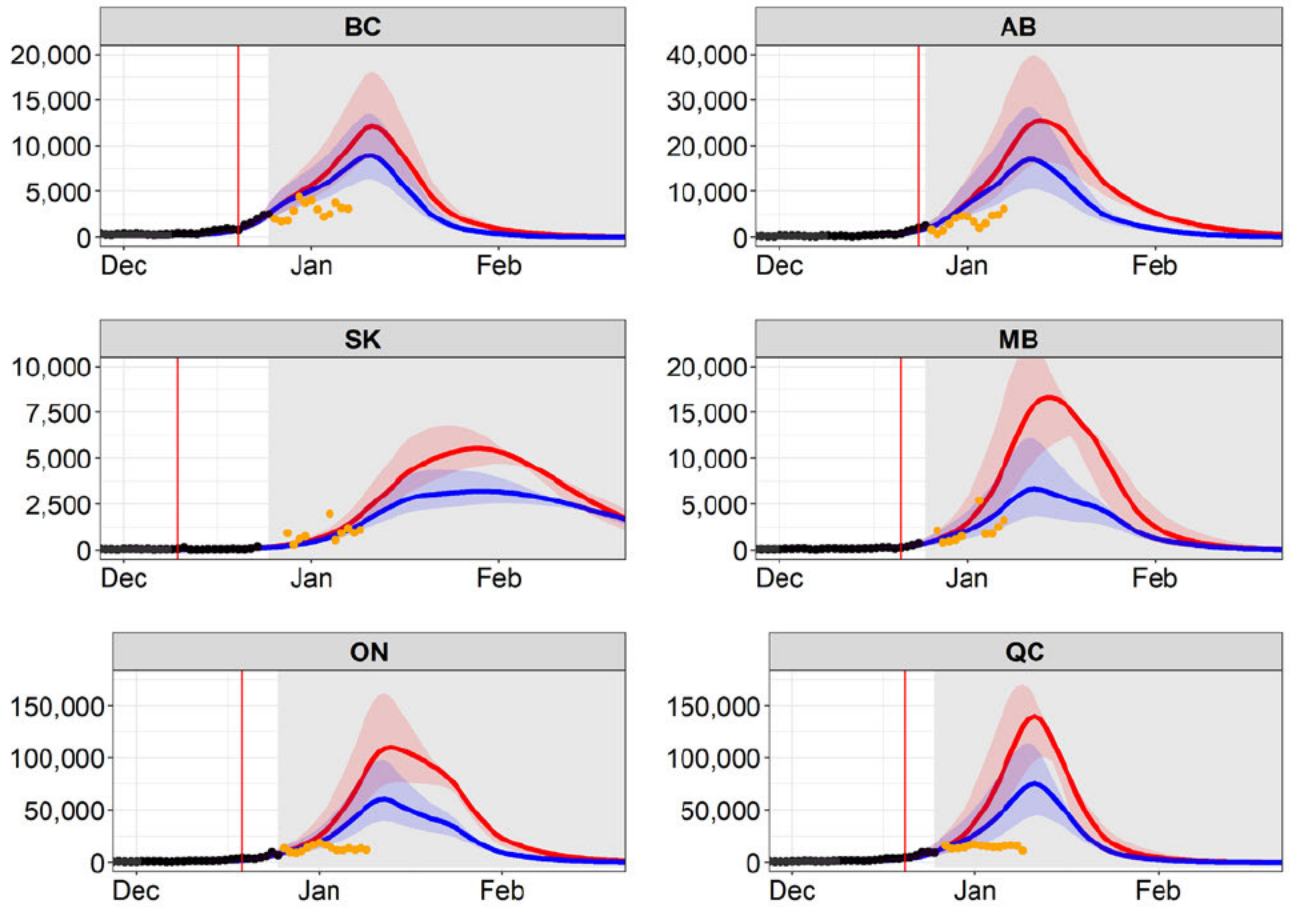
With measures introduced in January 2022

* The forecast number of cases will not be captured by surveillance due to limitations on testing during the period identified in grey. Surveillance data during this period are indicated by orange points

Data as of Jan 7, 2022; fit as of Dec 25th, 2021
Note: *Output from PHAC-McMaster model. Model considers impact of vaccination and increased transmissibility of VOCs (including Delta, and Omicron), refer to annex for detailed assumptions on modelling.*

An increase in incidence is forecast for all provinces

Number of cases*



With measures in place up until end December 2021

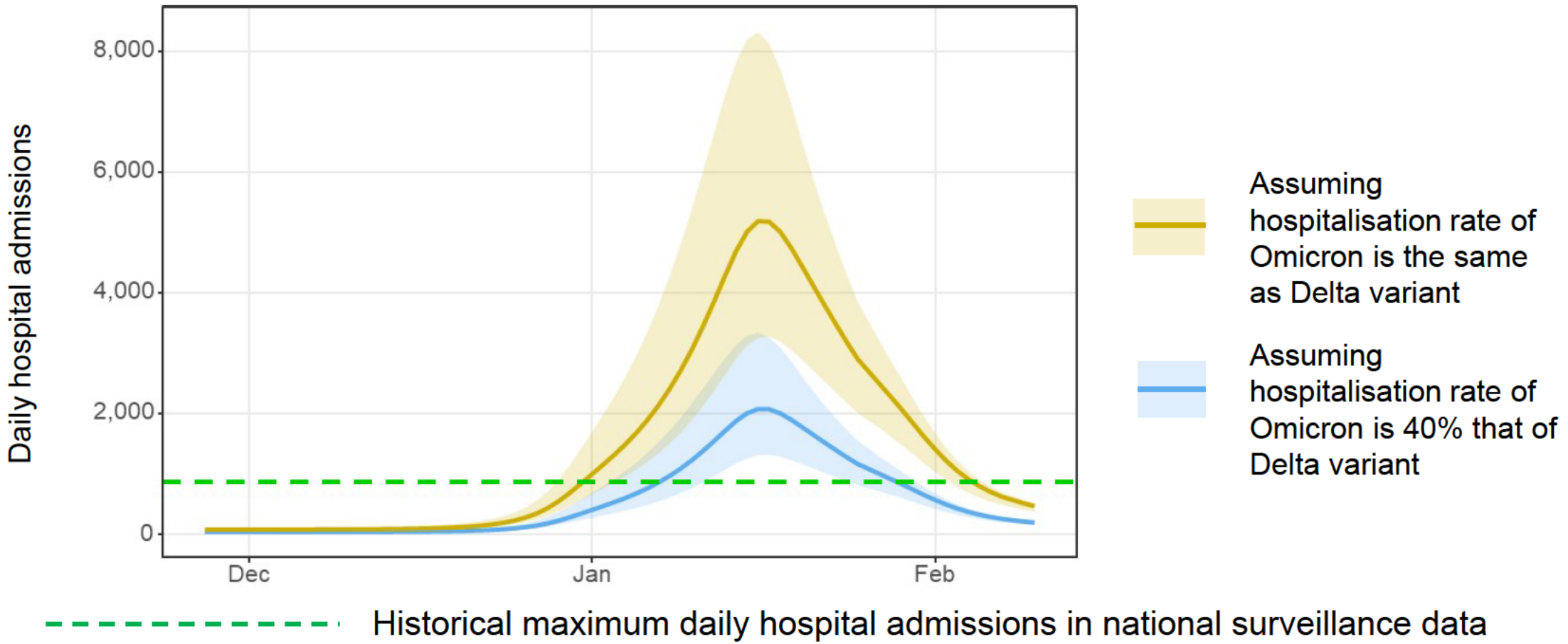
With measures introduced in January 2022

* The forecast number of cases will not be captured by surveillance due to limitations on testing during the period identified in grey. Surveillance data during this period are indicated by orange points

Data as of Jan 7, 2022; fit as of Dec 25th, 2021

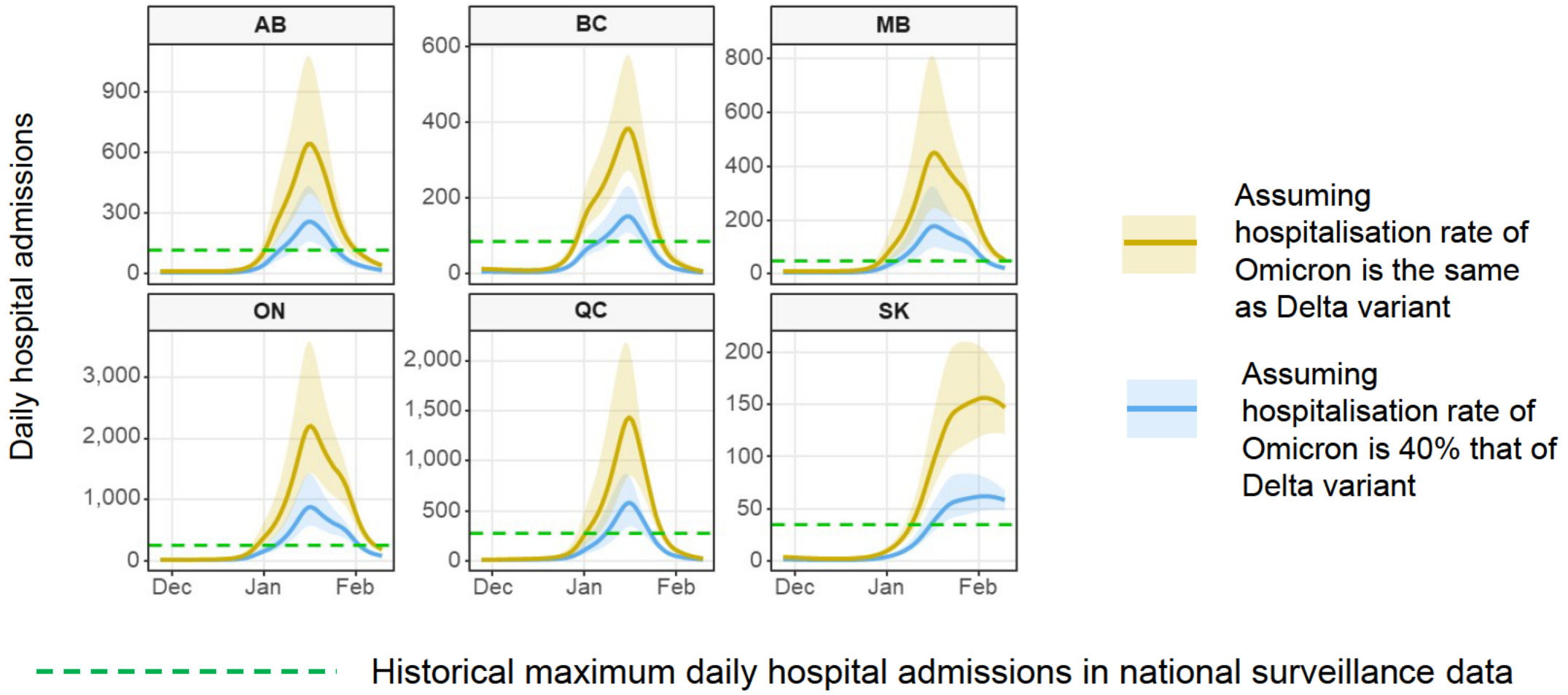
Note: *Output from PHAC-McMaster model. Model considers impact of booster vaccinations and increased transmissibility of VOCs (including Delta, and Omicron), refer to annex for detailed assumptions on modelling. Red vertical lines represent the timing of reimplementation/reinforcement of measures in each province.*

A large increase in daily hospital admissions is forecast for Canada due to the spread of Omicron



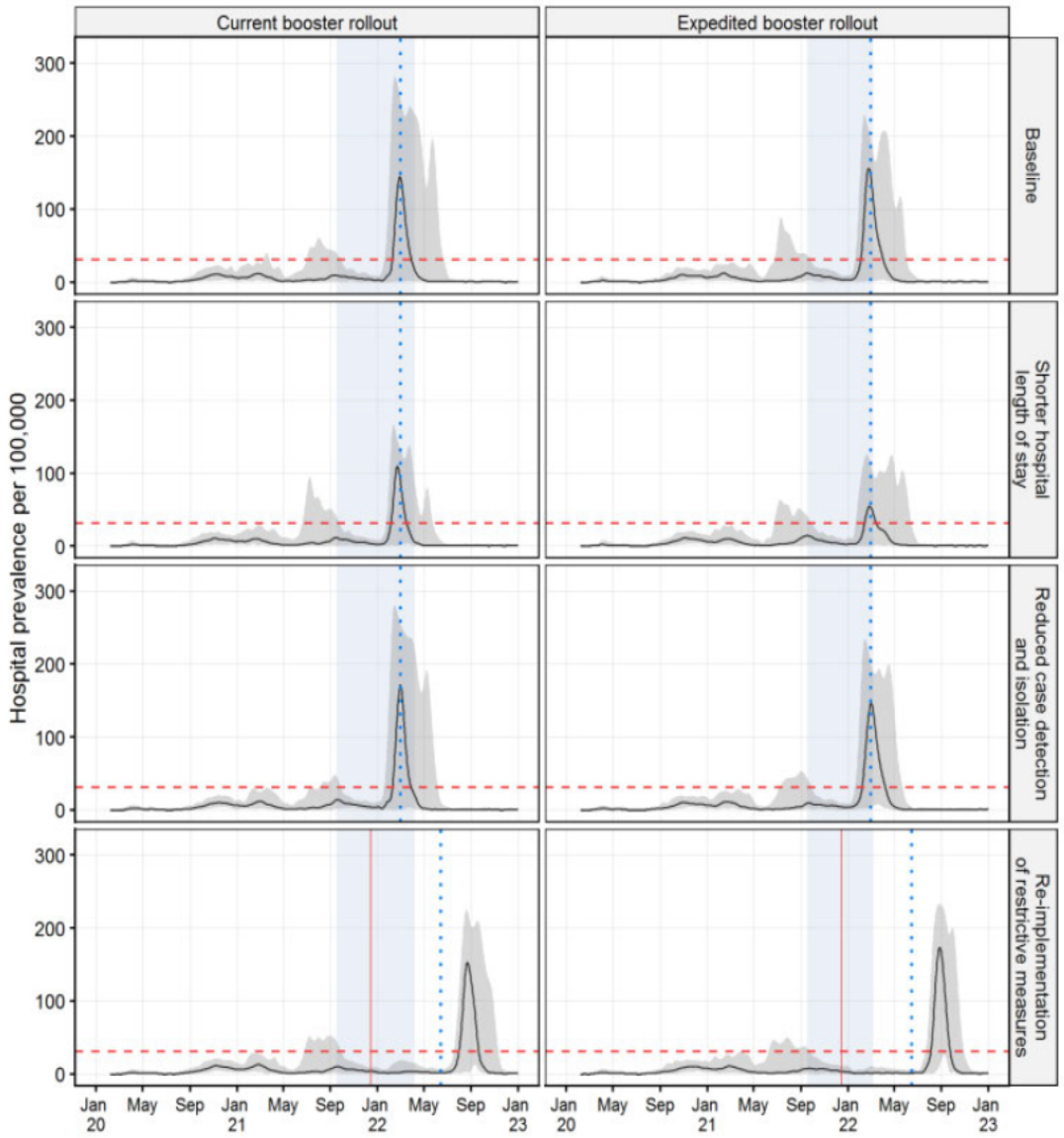
Note: *Forecast of hospitalisations is obtained from cases forecast by the PHAC-McMaster model. Ratio of hospitalised to non-hospitalised cases, and historic maximum number of daily admissions is obtained from surveillance data and may differ slightly from data from hospitals. Refer to annex for detailed assumptions on modelling.*

A large increase in daily hospital admissions is forecast for each province due to the spread of Omicron



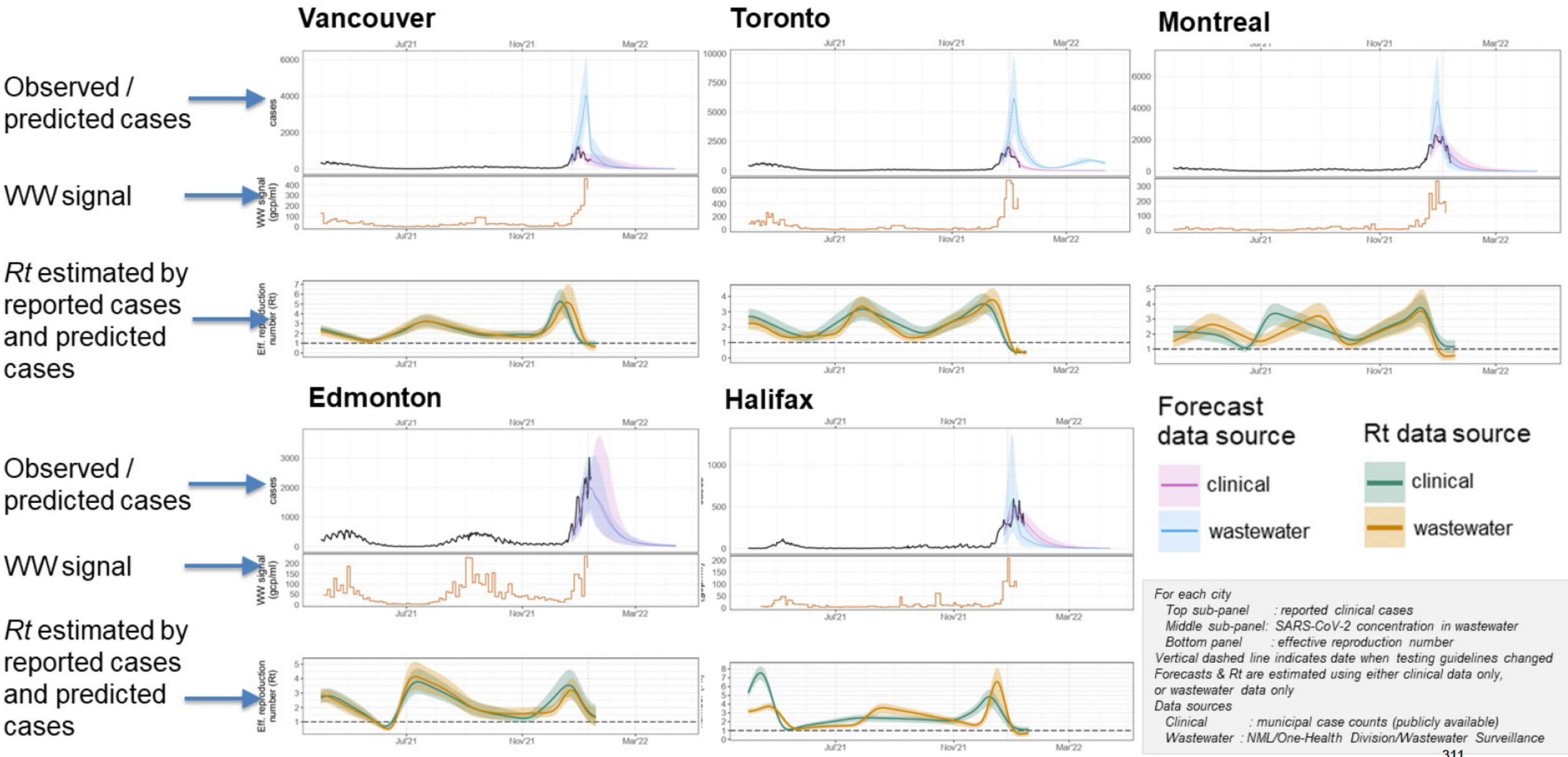
Note: *Forecast of hospitalisations is obtained from cases forecast by the PHAC-McMaster model. Ratio of hospitalised to non-hospitalised cases, and historic maximum number of daily admissions is obtained from surveillance data and may differ slightly from data from hospitals. Refer to annex for detailed assumptions on modelling.*

Agent-based model – exceeding hospital capacity is difficult to avoid



ABM section, PHAC Modelling Group Report 13th Jan 2021

Signals from wastewater surveillance suggest Omicron peak is past in many major cities



Conclusions

- The combination of increased transmissibility and immune escape of Omicron has produced a wave that is much larger than seen previously
- Despite lower virulence, the sheer number of cases means hospitalisations of the unvaccinated/unprotected may threaten healthcare
- Healthcare capacity will be stretched and expediting boosters is unlikely to help in the short term
- Overall, combining some restrictive closures with accelerated rollout of boosters is most likely the best to protect health care.
- Wastewater data suggest we are past peak in major cities – but that may be a combination of people acquiring infection and immunity, and effects of restrictions – release these cautiously
- We need more within-Canada data on severity:
  - Proportion of cases that are hospitalised – now very difficult to estimate with changes in testing
  - Proportion of "hospitalised cases" that are "of" Omicron, rather than "with" Omicron
  - Proportion of hospitalised cases that require ICU
  - Duration of stay for hospitalised cases/ICU cases

Longer-range forecasting model assumptions

- The forecast uses compartmental models reflecting the biology of COVID-19 and public health response developed by PHAC in collaboration with McMaster University. It projects the near future given recent incidence of COVID-19 and scenarios for public health measures, variants of concern and vaccination.
- The model assumes that the B.1.617.2 (Delta) VOC is 50% more transmissible compared to B.1.1.7 (Alpha). This value is used to estimate the rate at which VOCs replace existing strains. Ongoing virus evolution is not accounted for and at this stage effects of the omicron VOC is not included in the forecast.
- Delta is considered to have been introduced in mid-March at very low prevalence, with provincial variations. The proportion of cases due to VOCs are indirectly fitted when calibrating to data.
- The national forecast includes two scenarios for changes in the effective transmission rate. These include a scenario for expected change in cases if reduction of effective transmission rates by public health measures is weak (red – public health measures in place in December 2021) and strong (blue – public health measures introduced in January 2022). There are uncertainties with the amount of transmission which propagates forward in the forecasting scenarios.
- The forecast includes current vaccine roll-out, assumes that vaccinations are 60% effective against infection after one dose and 90% after the second dose for all variants except for Delta (against which effectiveness if 30% after one dose and 80% after the second dose). The vaccine projections assume 8% for first dose and 10% for second dose hesitancy of the eligible population (Ages 5+). Waning of immunity is not account for.
- A simplified approach to modelling the omicron variant in which it is assumed that i) combined transmissibility and immune escape effects result in transmissibility 3x that of delta; ii) omicron replaces delta at the rate seen in Gauteng, Republic of South Africa, Ontario, and the UK (0.3/day); and iii) 1% of omicron introduced in the last week of Nov for all PTs. Vaccine effectiveness (VE) is assumed to decrease 50% with respect to delta implying 15% and 40% for first and second dose respectively. It is assumed that booster doses increase VE against infection to 70%.
- Hospital admissions forecasts are obtained assuming the ratio of reported hospitalisations to cases in surveillance data from 1st July to 1st November 2021 represents the ratio for the Delta VOC, while those infected with Omicron have a chance of being hospitalised that is approximately 40% the chance of hospitalisation for a Delta case (https://www.imperial.ac.uk/media/imperial-college/medicine/mrc-gida/2021-12-22-COVID19-Report-50.pdf; https://www.pure.ed.ac.uk/ws/portalfiles/portal/245818096/Severity_of_Omicron_variant_of_concern_and_vaccine_effectiveness_against_symptomatic_disease.pdf; https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1044481/Technical-Briefing-31-Dec-2021-Omicron_severity_update.pdf; https://www.discovery.co.za/corporate/health-insights-omicron-outbreak-analysis.)