Kitchener Court File No. CV-21-00000095-0000

ONTARIO
SUPERIOR COURT OF JUSTICE

BETWEEN:

THE ATTORNEY GENERAL OF ONTARIO

Applicant

and

TRINITY BIBLE CHAPEL, JACOB REAUME, WILL SCHUURMAN, DEAN WNADERS, RANDY FREY, HARVEY FREY, AND DANIEL GORDON

Respondents

AFFIDAVIT OF DR. DAVID McKEOWN
(Affirmed on July 5, 2021)

I, **DAVID MCKEOWN,** of the City of [redacted], in the Province of Ontario, **AFFIRM:**

I. Professional Background

1. I am the Associate Chief Medical Officer of Health ("**ACMOH**") with the Ontario Ministry of Health. I have held that position since early 2020 and previously held that position from 2016 to 2017. I am a licensed physician in Ontario and have practiced medicine for 35 years. I have a medical degree from McGill University and a Master's degree in Community Health and Epidemiology from the University of Toronto. I am a certified specialist in Canada and the United States in the areas of public health and preventative medicine. Prior to being appointed ACMOH in 2016, I was the Medical Officer of Health for the City of Toronto for 12 years. Prior to the COVID-19 pandemic, I led local public health responses to the H1N1 pandemic, a major outbreak of Legionnaire's Disease, and the first outbreak of West Nile Virus in Canada.

2. Pursuant to section 81.1 of *Health Protection and Promotion Act*, my responsibilities as ACMOH include acting in the capacity of the Chief Medical Officer of Health when he is unavailable and performing such functions and duties as the Chief Medical Officer of Health may specify in writing. During the COVID-19 pandemic, my responsibilities have included monitoring the spread of COVID-19 in Ontario and advising on the Ontario Government's policy response to the pandemic.

3. As such, I have personal knowledge of the contents of this affidavit. Where in this affidavit I have indicated I have received information from others, I have identified the source of the information and I believe the information to be true.

II. Ontario's Policy Response to the COVID-19 Pandemic

(i) Legislative Background

4. On March 17, 2020, the Premier of Ontario declared an emergency pursuant to section 7.0.1 of the *Emergency Management and Civil Protection Act* ("***EMCPA***"). An "emergency" is defined under section 1 of *EMCPA* as a "situation or an impending situation that constitutes a danger of major proportions that could result in serious harm to persons or substantial damage to property and that is caused by the forces of nature, a disease or other health risk, an accident or an act whether intentional or otherwise."

5. The emergency was declared pursuant to O. Reg. 50/20, which was promulgated under *EMCPA*. That regulation stated that "the outbreak of a communicable disease namely COVID-19 coronavirus disease constitutes a danger of major proportions that could result in serious harm to persons" and that "an emergency is hereby declared pursuant to section 7.0.1 of the Act in the whole of the Province of Ontario." Under *EMCPA*, during a declared emergency, the Lieutenant

Governor in Council may make certain orders that it believes are necessary to address the emergency, subject to the conditions set out in *EMCPA*.

6. On March 24, 2020, O. Reg. 82/20 was promulgated pursuant to the emergency powers under *EMCPA*. Pursuant to that regulation, all non-essential businesses were ordered to close and limits were placed on the operations of other businesses and organizations. Since March 24, 2020, O. Reg. 82/20 has been amended regularly as the pandemic has evolved. In addition, several other orders have been made under *EMCPA* to address the COVID-19 pandemic.

7. Under *EMCPA*, declarations of emergency (and the powers associated with them) are intended to be time limited. In order to ensure the Lieutenant Governor in Council continued to have the power to address the ongoing effects of the pandemic after the emergency declaration terminated, the Legislature enacted the *Reopening Ontario (A Flexible Response to COVID-19) Act, 2020* ("***ROA***"), which was proclaimed into force on July 24, 2020. The *ROA* terminated the provincial emergency and continued a number of orders made under *EMCPA* that were designed to address the COVID-19 pandemic, including O. Reg. 82/20. Since the *ROA* was passed, the Province has amended several orders that were continued under the *ROA* and taken a variety of other public health measures to address the ongoing pandemic.

8. On April 27, 2020, Ontario released its *Framework for Reopening our Province*, which established criteria that Ontario's Chief Medical Officer of Health and other health experts would use to advise the government on the loosening of emergency measures, as well as guiding principles for the safe, gradual reopening of businesses, services and public spaces. The plan contemplated a stage-by-stage approach to reopening the economy.

9. At that time, areas of the province were subject to different restrictions as they moved through three stages of reopening:

- **Stage 1:** Select businesses that were ordered to close or restrict operations would be permitted to reopen with modified operations. Some outdoor spaces, such as parks, would reopen to allow for a greater number of individuals to attend some events (O. Regs. 82/20; O. Reg. 52/20; and O. Reg. 104/20).
- **Stage 2:** More businesses would be permitted to reopen based on risk assessments, more outdoor spaces would reopen, and some larger public gatherings would be permitted (O. Reg. 263/20).
- **Stage 3:** Opening of all workplaces and further relaxing of restrictions on public gatherings (O. Reg. 364/20).

(ii) The Keeping Ontario Safe and Open Framework

10. On November 3, 2020, Ontario released its *Keeping Ontario Safe and Open Framework* ("*Framework*"), which established a modified tiered approach to combatting the pandemic. The *Framework* was intended to allow the province to scale up and scale back public health restrictions on a regional basis in response to surges and waves of COVID-19. It provided a more tailored approach that allowed measures and restrictions to be increased or decreased as required by local epidemiological data.

11. The *Framework* created five zones of public health protection measures, each with varying levels of public health protection measures. The five zones were (1) Green-Prevent; (2) Yellow-Protect; (3) Orange-Restrict; (4) Red-Control; and (5) Grey-Lockdown. Attached as **Exhibit "A"** is a press release dated November 3, 2020, entitled "Ontario Releases COVID-19 Response Framework to Help Keep the Province Safe."

12. The regulations that originally implemented the three stages were amended as follows to implement the various zones:

Zone	**Applicable Regulation**
Green-Prevent	O. Reg. 364/20
Yellow-Protect	O. Reg. 364/20
Orange-Restrict	O. Reg. 364/20
Red-Control	O. Reg. 263/20
Grey-Lockdown	O. Reg. 82/20

Each of the above-noted regulations has been amended multiple times since the *Framework* was first implemented to respond as needed to the changing COVID-19 situation.

13. Pursuant to O. Reg. 363/20, the Ontario can designate which geographic areas in the province are subject to which level of public health protection measures. The *Framework* provided that several public health indicators would inform any adjustment or tightening of health measures, including weekly incidence of COVID-19, the test positivity rate, the effective reproduction number (Rt), evidence of recent outbreaks, and the level of community transmission.

14. More generally, Ontario's approach to the pandemic has been informed by public health data and by public health professionals. Ontario's priorities when developing the *Framework* included limiting the transmission of COVID-19, avoiding closures while reducing the risk of transmission, keeping schools and childcare open and safe, maintaining health care and public health system capacity, protecting vulnerable populations, and providing additional support to those disproportionately affected by the pandemic.

15. In November and December 2020, Ontario moved various regions into different levels in the *Framework*, depending on the state of the pandemic in those regions. For example:

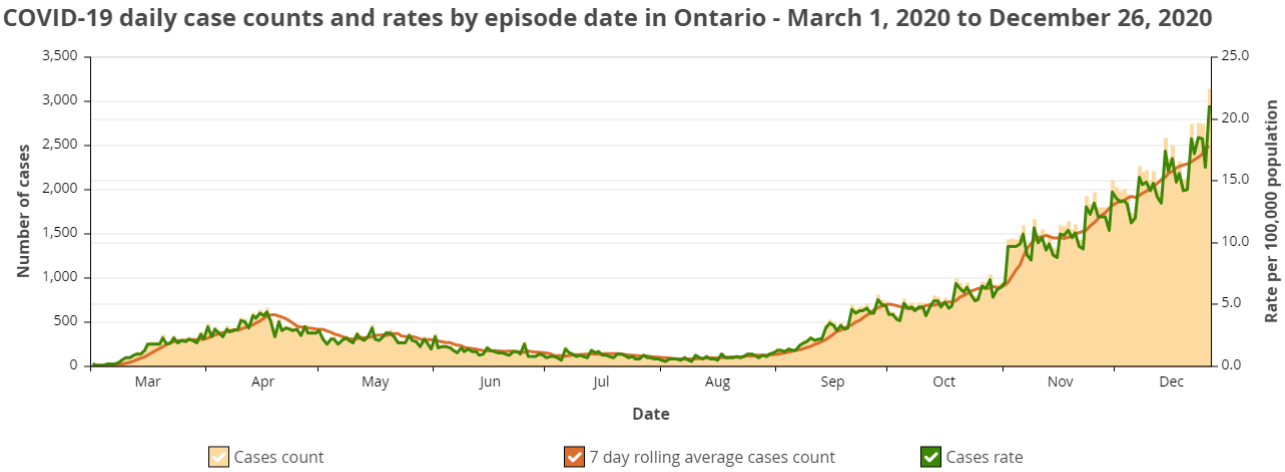
- On November 7, 2020, Peel Region was moved into Red-Control, the second-highest level in the framework. At the request of the local medical officer of health, Toronto remained in a modified Stage 2 under the previous framework.

Attached as **Exhibit "B"** is a press release dated November 6, 2020, entitled "Ontario Moves Public Health Unit Regions into COVID-19 Response Framework to Keep Ontario Safe and Open."

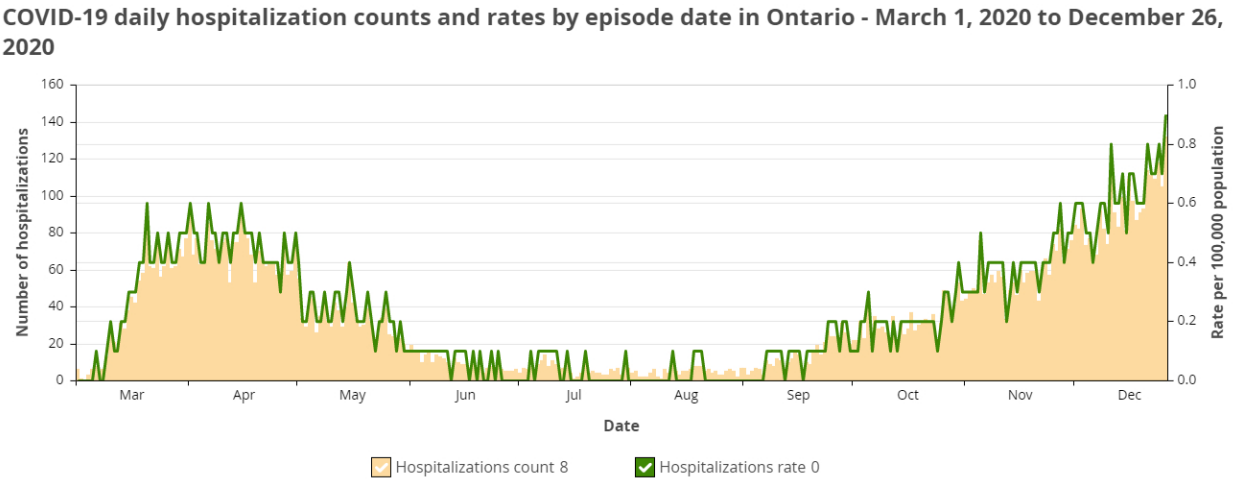
- On November 14, 2020, Toronto, Hamilton, Halton Region, and York Region moved into Red-Control. Attached as **Exhibit "C"** is a press release dated November 13, 2020, entitled "Ontario Updating COVID-19 Response Framework to Help Stop the Spread of COVID-19."
- On November 23, 2020, the City of Toronto and the Region of Peel were moved into Grey-Lockdown, which was at that time the highest level in the framework. Attached as **Exhibit "D"** is a press release dated November 20, 2020, entitled "Ontario Taking Further Action to Stop the Spread of COVID-19."
- On November 30, 2020, Windsor-Essex County Health Unit was moved into Red-Control. Attached as **Exhibit "E"** is a press release dated November 27, 2020, entitled "Ontario Moving Regions to New Levels in COVID-19 Response Framework."
- On December 14, 2020, Windsor-Essex County Health Unit and York Region Health Unit were moved into Grey-Lockdown. Attached as **Exhibit "F"** is a press release dated December 11, 2020, entitled "Ontario Moving Regions to New Levels with Stronger Public Health Measures."

(iii) The Second Provincial State of Emergency

16. In December 2020, there was a significant increase in COVID-19 cases and hospitalizations in Ontario. The graph below from Public Health Ontario ("**PHO**") shows daily COVID-19 cases in Ontario from March 1, 2020 to December 26, 2020:



17. Below is a graph from PHO that shows the number of daily COVID-19 hospitalizations in Ontario from March 1, 2020 to December 26, 2020:



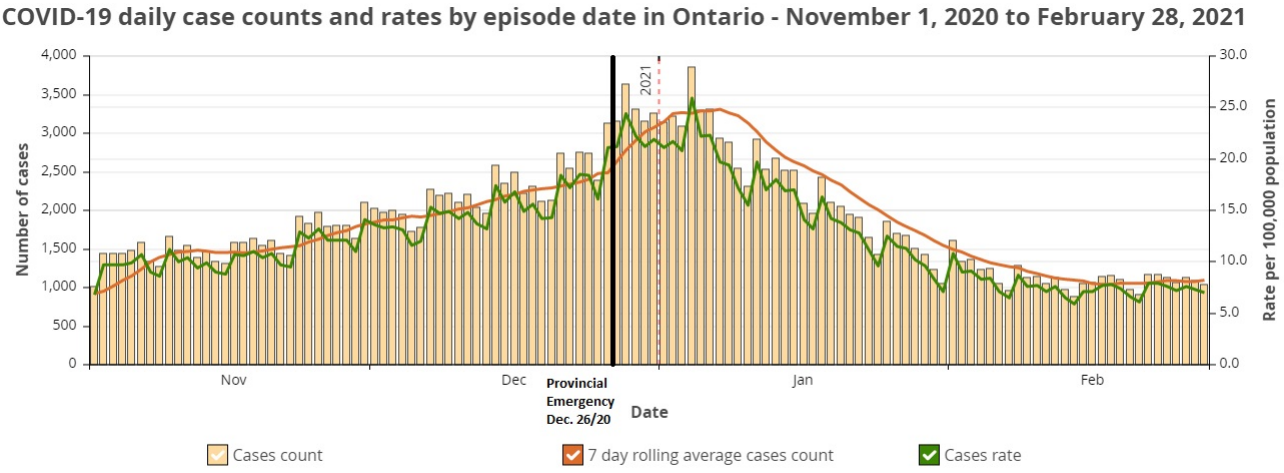
18. On December 21, 2020, the worsening COVID-19 situation led the government to pause the *Framework* and implement a Provincewide Shutdown effective December 26, 2020. Attached as **Exhibit "G"** is a press release dated December 21, 2020, entitled "Ontario Announces Provincewide Shutdown to Stop Spread of COVID-19 and Save Lives."

19. On January 12, 2021, the Premier of Ontario declared a second province-wide state of emergency pursuant to O. Reg. 7/21, which was promulgated under section 7.0.1 of *EMCPA*. The

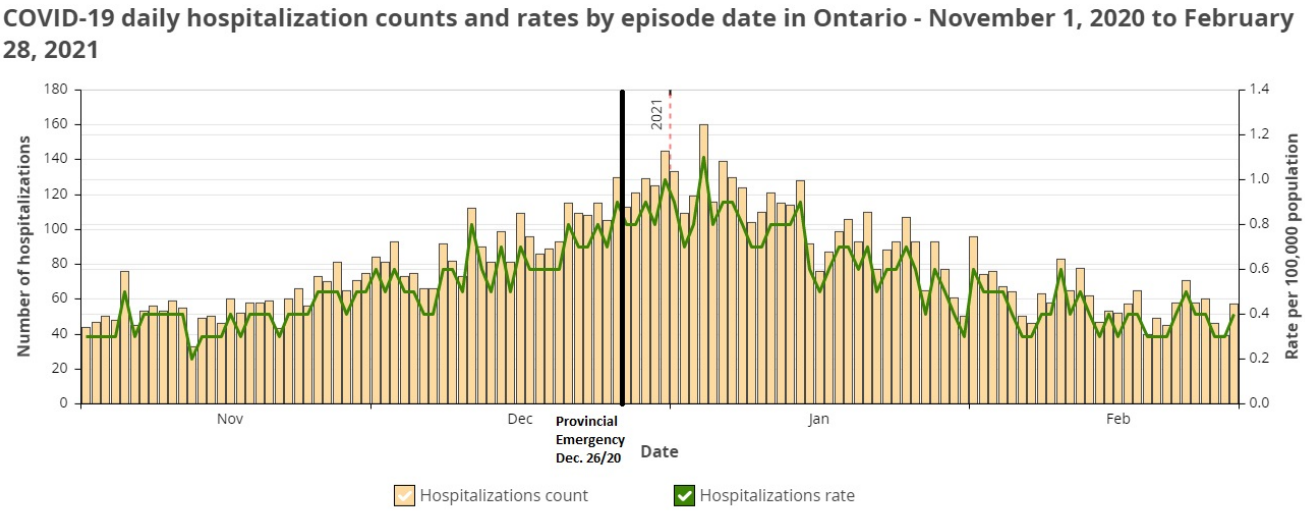
declaration of a state of emergency followed significant increases in the number of COVID-19 cases, hospitalizations and ICU patients in Ontario. Attached as **Exhibit "H"** is a press release dated January 12, 2021, entitled "Ontario Declares Second Provincial Emergency to Address COVID-19 Crisis and Save Lives."

20. During the state of emergency, the *Framework* was temporarily suspended and more stringent measures were put in place province-wide. Among other measures, the Province issued a stay-at-home order requiring everyone to remain at home, with exceptions for certain permitted purposes or activities, such as going to the grocery store or pharmacy, accessing health care services, or performing work that cannot be done remotely. In addition, schools moved to teacher-led remote learning until January 11, 2021 in Northern Ontario, January 25, 2021 in most of Southern Ontario, and February 10, 2021 in the most-affected regions such as Toronto.

21. Shortly after the province implemented the second state of emergency, COVID-19 cases in Ontario began to level off and then steadily decline. According to data from PHO, on December 26, 2021, the rolling 7-day average of new COVID-19 cases in Ontario was 2,488. By February 9, 2021, that number had declined to 1,210. Below is graph from PHO showing the number of new COVID-19 cases in Ontario from November 1, 2020 to February 28, 2021:



22. There was a similar decline in the number of hospitalizations. Below is a graph from PHO showing daily hospitalizations from November 1, 2020 to February 28, 2021:



23. At that time, very few Ontarians had received any COVID-19 vaccinations, as Ontario's vaccine rollout was hampered by a lack of a stable and reliable supply of vaccines from the federal government. According to data from PHO, throughout the entire second state of emergency, less than 2% of the Ontario population had received even a first dose of the vaccine and less than 1% were fully vaccinated.

24. Following a significant decline in COVID-19 cases, the second provincial state of emergency ended on February 9, 2021. At that time, the Province began to gradually transition regions throughout the province from the emergency shutdown measures to revised measures under the *Framework*, as the public health situation in those regions permitted.

25. At the same time, Ontario introduced an "emergency brake" system to allow for immediate action if a public health unit experienced rapid acceleration in COVID-19 transmissions or if its health care system risked being overwhelmed. If that occurred, the Chief Medical Officer of Health, in consultation with the local Medical Officer of Health, could recommend immediately

moving a region into Grey-Lockdown to interrupt transmission. Attached as **Exhibit "I"** is a press release dated February 8, 2021, entitled "Ontario Extending Stay-at-Home Order across Most of the Province to Save Lives."

26. In February and March 2021, Ontario moved various regions into and out of various levels of public health protections, depending on the state of the pandemic in those regions. For example:

- On February 16, 2021, twenty-seven public health regions transitioned out of the shutdown into the revised *Framework.* Four public health regions – City of Toronto, Peel Region, York Region, and North Bay Parry Sound District Health Units – remained in the shutdown in light of the continuing severity of the COVID-19 situation in those regions. Attached as **Exhibit "J"** is a press release dated February 12, 2021, entitled "Ontario Returning 27 Public Health Regions to Strengthened COVID-19 Response Framework."
- On February 22, 2021, York Region returned to the *Framework,* but COVID-19 rates remained too high in the other three regions to justify a similar return to the *Framework.* As well, variants of concern ("VOCs") were starting to spread in the community, particularly in North Bay. Attached as **Exhibit "K"** is a press release dated February 19, 2021, entitled "Stay-at-Home Order Extended in Toronto and Peel Public Health Regions Along with North Bay-Parry Sound"
- On March 1, 2021, Ontario activated the "emergency brake" and returned Thunder Bay District and Simcoe-Muskoka District Health Units to Grey-Lockdown in order to immediately interrupt transmission and contain community spread of VOCs in those regions. Attached as **Exhibit "L"** is a press release dated

February 26, 2021, entitled “Ontario Activates Emergency Brake in Thunder Bay District Health Unit and Simcoe-Muskoka District Health Unit.”

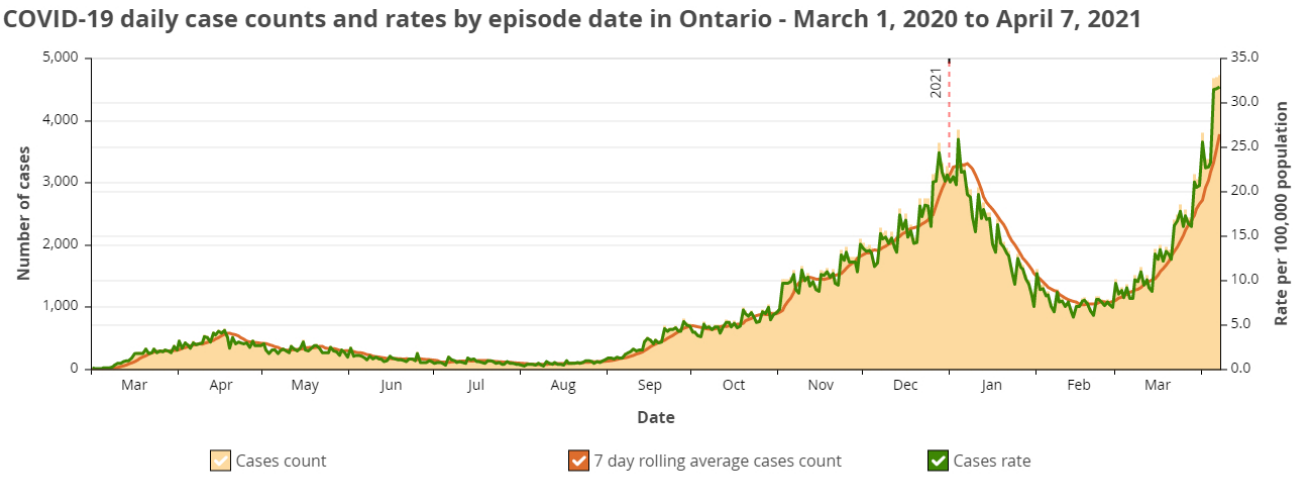
- On March 8, 2021, there was evidence of some improvement in the COVID-19 situation, which permitted the return of Toronto, Peel, and North Bay Parry Sound to the *Framework*. North Bay Parry Sound District Health Unit returned at the Red-Control level. Toronto and Peel, despite making progress, still had higher case rates and returned at the Grey-Lockdown level. Attached as **Exhibit “M”** is a press release dated March 5, 2021, entitled “Toronto, Peel and North Bay-Parry Sound Public Health Regions Returning to Strengthened COVID-19 Response Framework.”
- On March 12, 2021, Ontario again activated the “emergency brake” and moved Sudbury District Health Unit to Grey-Lockdown due to a rapid rise in the case rate in that area. Attached as **Exhibit “N”** is a press release dated March 11, 2021, entitled “Ontario Activates Emergency Brake in Sudbury Public Health Region.”

(iv) The Third Provincial State of Emergency

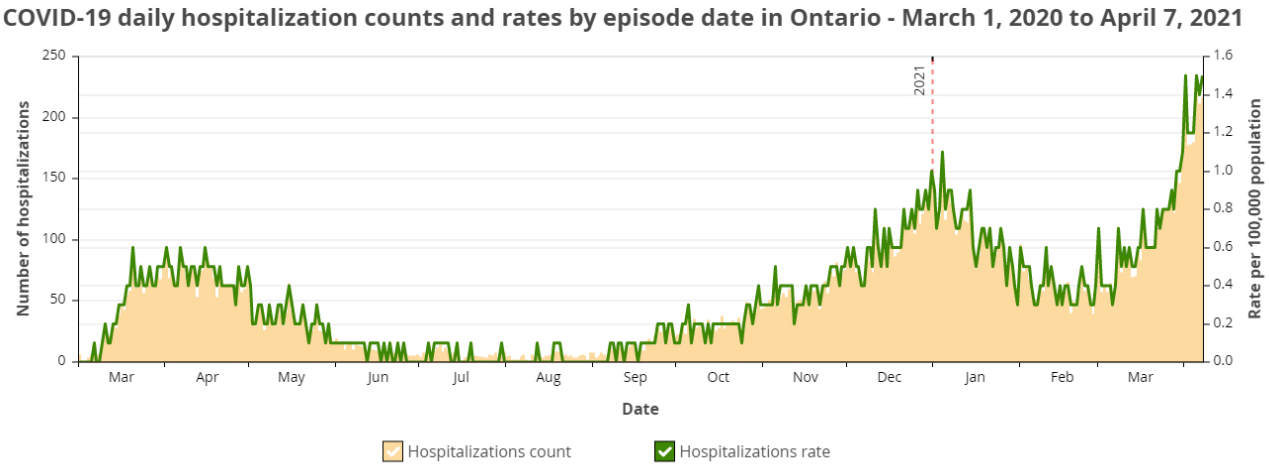
27. In March and April 2021, COVID-19 cases and hospitalizations in Ontario increased rapidly. On March 1, 2021, the average number of new COVID-19 cases reported each day based on a 7-day rolling average was 1,113. By April 1, 2021, the 7-day rolling average of new cases per day had increased to 3,327. By April 12, 2021, that number reached 4,484. By mid-April 2021, there were more patients hospitalized in Ontario as a result of COVID-19 than at any time since the start of the pandemic. Attached as **Exhibit “O”** is an Update on COVID-19 Projections dated April 1, 2021, from the Ontario COVID-19 Science Advisory Table, a group of health

professionals that evaluates and reports on emerging evidence relevant to the COVID-19 pandemic.

28. Below is a graph from PHO of daily COVID-19 cases from March 1, 2020 to April 7, 2021, which shows a significant increase in cases in March and April 2021:



29. The number of hospitalizations followed a similar trend. Below is a graph from PHO that shows daily COVID-19 hospitalizations in Ontario from March 1, 2020 to April 7, 2021:



30. On April 1, 2021, the alarming surge in case numbers and COVID-19 hospitalizations across the province led Ontario, in consultation with the Chief Medical Officer of Health and other

health experts, to implement a provincewide "emergency brake," effective April 3, 2021. Provincial case rates had increased by 7.7% to 101.1 cases per 100,000 people, COVID-19 related ICU admissions had exceeded the peak of the second wave, and hospitals in regional hotspots were beginning to further ramp down scheduled surgeries. Attached as **Exhibit "P"** is a press release dated April 1, 2021, entitled "Ontario Implements Provincewide Emergency Brake."

31. All 34 public health units were moved into the Shutdown Zone. The public health measures applicable in the Shutdown Zone included prohibiting indoor organized public events and social gatherings and limiting the capacity for outdoor organized public events or social gatherings to a 5-person maximum, except for gatherings with members of the same household or of one household and one other person from another household who lives alone. Capacity at weddings, funerals, and religious services, rites or ceremonies was limited to 15% occupancy per room indoors and to the number of individuals who could maintain 2-metre physical distancing outdoors. Ontarians were asked to limit trips outside the home, except for necessities.

32. On April 7, 2021, the Premier of Ontario declared a third province-wide state of emergency pursuant to O. Reg. 264/21, which was promulgated under section 7.0.1 of *EMCPA*. This state of emergency was implemented following rapid increases in COVID-19 cases, hospitalizations, and ICU occupancy in Ontario. For example, the number of COVID-19 hospitalizations in the province increased by 28.2% between the period of March 28 and April 5, 2021. In addition, between March 28 and April 5, 2021, the number of COVID-19 patients in ICUs increased by 25%. There was also an increase in the number of cases that were identified as VOCs, as discussed above. Attached as **Exhibit "Q"** is a press release dated April 7, 2021, entitled "Ontario Enacts Provincial Emergency and Stay-at-Home Order."

33. During this state of emergency, the entire province was in the Shutdown Zone and subject to the health protection measures set out in in O. Reg. 82/20, as well as additional measures, such as a stay-at-home order promulgated under *EMCPA*.

34. The health protection measures that applied during the third state of emergency included:

- the province-wide stay-at-home order, requiring everyone to remain at home except for essential purposes, such as going to the grocery store, accessing health care services, engaging in outdoor exercise, or conducting work that cannot be done remotely;
- limiting the majority of non-essential retailers to curbside pick-up and delivery only;
- restricting access to shopping malls to limited specified purposes;
- restricting discount and big box stores in-person retail sales to essential items;
- imposing more restrictive capacity limits for business or facilities that remain open to the public; and
- limiting restaurants and bars to providing take-out, delivery and drive-through service only.

35. On April 12, 2021, the Province moved elementary and secondary schools to remote learning following the April Break to limit community transmission, take pressure off hospitals, and allow more time to rollout further COVID-19 vaccinations. Attached as **Exhibit "R"** is a press release dated April 12, 2021, entitled "Ontario Moves Schools to Remote Learning Following Spring Break."

36. By April 16, 2021, COVID-19 cases, hospitalizations and ICU occupancy were at their highest levels since March 2020. Attached as **Exhibit "S"** is a graph from the Ontario COVID-19

website showing the number of patients hospitalized and in ICUs in Ontario with COVID-19 from April 2, 2020 to July 5, 2021. Attached as **Exhibit "T"** is an Update on COVID-19 Projections dated April 16, 2021, from the Ontario COVID-19 Science Table.

37. The number of hospitalized patients in an ICU due to COVID-19 also increased significantly. The increase in ICU patients was particularly concerning because it not only threatened the ability of the healthcare system to deal with COVID-19 patients, it also compromised the ability of the healthcare system to care for regular (i.e. non-COVID-19) patients. Attached as **Exhibit "U"** is a table showing the number of COVID-19 cases in ICU and ICU occupancy in Ontario as of April 18, 2021.

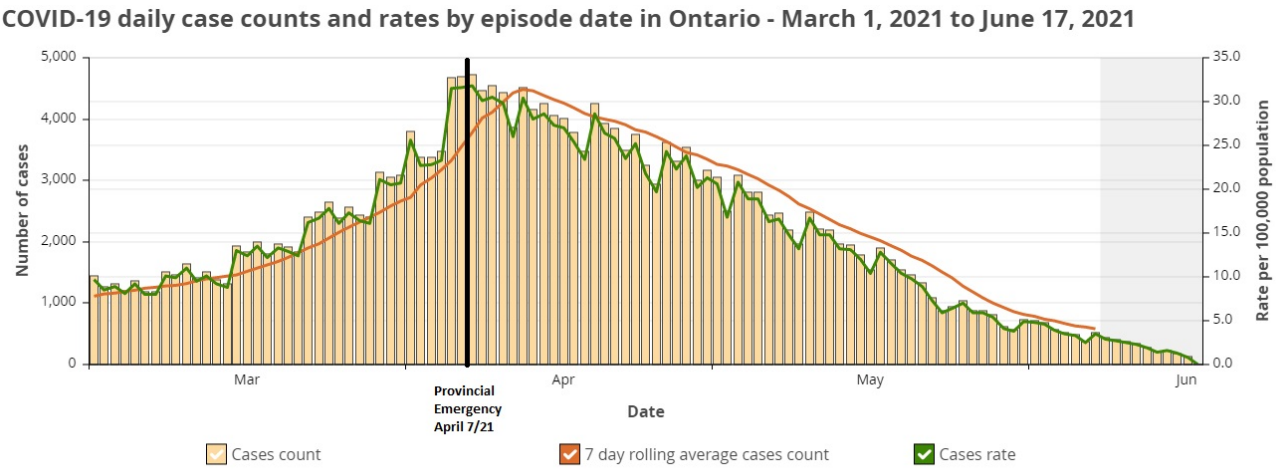
38. Beginning on April 16, 2021, the Province started to implement additional health protection measures, including the following:

- Indoor or outdoor gatherings (other than religious, wedding or funeral services) were only permitted with members of the same household or one other person from outside that household who lives alone or who is a caregiver for any member of the household.
- Indoor or outdoor religious, wedding and funeral services were limited to a maximum of 10 people. Drive-in religious, wedding and funeral services were permitted without any capacity limits.
- Retail stores where in-store shopping was permitted (e.g. supermarkets, grocery stores, convenience stores, indoor farmers' markets, other stores that primarily sell food and pharmacies) were required to operate at no greater than 25% capacity.
- Outdoor recreational amenities, such as golf courses, basketball courts, and soccer fields, were required to close.

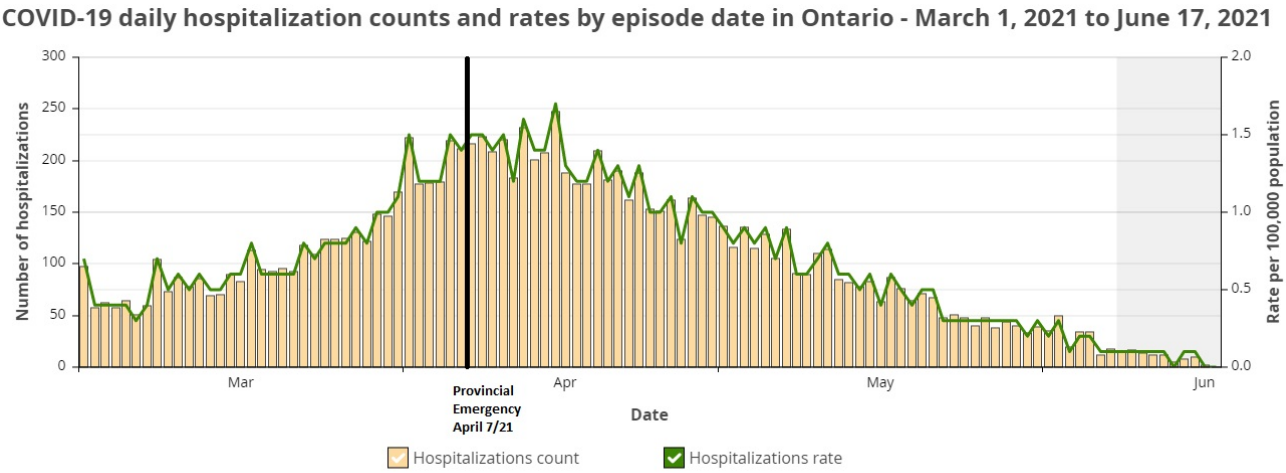
39. In addition, the government restricted travel into Ontario from neighbouring provinces, except for essential purposes, such as work, health care services, transportation of goods, or exercising Aboriginal or treaty rights.

(v) The Reopening Ontario Roadmap

40. Shortly after the Province declared a state of emergency on April 7, 2021, COVID-19 cases in Ontario began to decline. The 7-day rolling average number of daily new cases peaked on April 12, 2021, at 4,484, after which it began to steadily decline. Below is a graph from PHO showing daily new COVID-19 cases in Ontario from March 1, 2021 to June 17, 2021:



41. At the same time, there was a steady decline in the number of hospitalizations. Below is a graph from PHO that shows the number of daily new hospitalizations from COVID-19 from March 1, 2021 to June 17, 2021:



42. The decline in cases and hospitalizations was occurring at a time when the percentage of the Ontario population that had received a COVID-19 vaccine was still relatively low. According to data from PHO, when the Province implemented the third state of emergency on April 7, 2021, less than 3% of the Ontario population was fully vaccinated and only 17% of the population had received a first dose of vaccine.

43. By May 20, 2021, the number of COVID-19 cases had fallen significantly, with the 7-day rolling average of daily new cases dropping to 1,768, down from a high of 4,484 cases on April 12, 2021. Due to the declining number of cases and improvements in other key public health measures, such as hospitalization and ICU capacity, the Ontario government announced a three-step plan to safely reopen the province and end the province-wide stay-at-home order (the "*Roadmap*"). Attached as **Exhibit "V"** is a press release dated May 20, 2021 entitled "Ontario Releases Three-Step Roadmap to Safely Reopen the Province."

44. The *Roadmap* outlines three steps to easing public health measures, which were guided by the following principles:

- **Step 1:** An initial focus on resuming outdoor activities with smaller crowds where the risk of transmission was lower and some retail was permitted with restrictions.

This step included allowing outdoor gatherings of up to ten people, outdoor dining with up to four people per table, and non-essential retail at 15% capacity. Religious services, rites and ceremonies were permitted indoors at 15% capacity and outdoors with the only capacity limit being that participants had to be able to physically distance at least 2 metres. Drive-in religious services, rites and ceremonies were permitted without any capacity limits.

- **Step 2:** Further expanding outdoor activities and resuming limited indoor services with small numbers of people where face coverings are worn, including outdoor gatherings of up to 25 people, outdoor sports and leagues, personal care services where face coverings can be worn and with capacity limits. Religious services, rites and ceremonies are permitted indoors at 25% capacity and outdoors with the only capacity limit being that participants must be able to physically distance at least 2 metres. Drive-in religious services, rites and ceremonies are permitted without any capacity limits.
- **Step 3:** Expanding access to indoor settings, with restrictions, including allowing larger numbers of people in gatherings indoors where face coverings can't always be worn. This will include indoor sports and recreational fitness, indoor dining, museums, art galleries and libraries, and casinos and bingo halls, with some capacity limits. Religious services, rites and ceremonies will be permitted indoors at a capacity which will allow physical distancing .

45. The Reopening Roadmap states that the decision of when to proceed to the next step will be informed by several public health and health system indicators. One of those indicators is the

level of vaccinations in Ontario. The Reopening Roadmap provides that Ontario will not proceed to the next step of reopening until the following vaccinations thresholds have been met:

- **Step 1:** 60% of adults vaccinated with one dose.
- **Step 2:** 70% of adults vaccinated with one dose and 20% vaccinated with two doses.
- **Step 3:** 70% to 80% of adults vaccinated with one dose and 25% vaccinated with two doses.

46. While vaccination rates are a key public health measure that informs Ontario's decision to proceed through the steps of the Reopening Roadmap, they are not the only measure. Other important considerations include the number of hospitalizations, ICU occupancy and the weekly case incidence rates. It should be noted that the protective effects of the vaccine (for both the first and the second dose) take several weeks to develop. It should also be noted that, while the approved COVID-19 vaccines have been shown to be effective in preventing symptomatic illness, the evidence is less clear on the degree to which vaccines prevent asymptomatic transmission. A single dose of vaccine does not provide complete protection against symptomatic illness. Attached as **Exhibit "W"** is a publication from PHO dated April 15, 2021, entitled "Considerations for Public Health Measures for Individuals with Partial Vaccination for SARS-CoV-2."

47. On May 22, 2021, based on the provincewide vaccination rates and improvements in key public health indicators, Ontario lifted the temporary prohibition on some outdoor amenities, including golf courses, soccer fields, tennis and basketball courts, and skate parks. Those outdoor activities were permitted, provided physical distancing could be maintained. No outdoor sports or recreational classes were permitted at that time. Outdoor limits for social gatherings and organized public events were expanded to five people, including with members of different households. All

other public health and workplace safety measures under the provincewide emergency brake remained in effect.

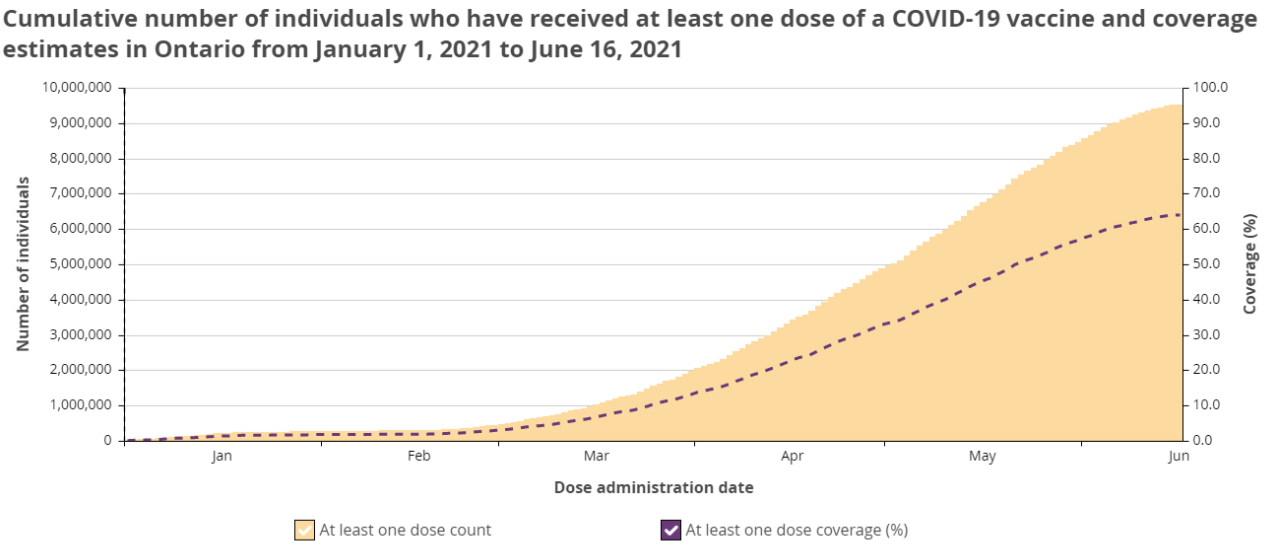
48. On June 2, 2021, based on the provincewide vaccination rates and improvements in key public health indicators, the province-wide stay-at-home order was lifted. All other public health measures existing at that time remained in place, including the restrictions imposed by the third state of emergency order. Attached as **Exhibit "X"** is a press release dated June 1, 2021, entitled "Ontario Maintains COVID-19 Restrictions as Stay-at-Home Order is Set to Expire."

49. On June 9, 2021, based on province-wide vaccination rates and improvements in other key public health indicators, Ontario ended the third state of emergency. On June 11, 2021, the province moved into Step 1 of the *Roadmap*. At that time, the number of cases and hospitalizations were steadily decreasing and over 72% of Ontario adults had received a first dose of a COVID-19 vaccine. There were still 494 patients in Ontario ICUs due to COVID-19, but that number was down from a high of over 800 patients in ICUs in April 2020. Attached as **Exhibit "Y"** is an Update on COVID-19 Projections dated May 20, 2021, from the Ontario COVID-19 Science Table.

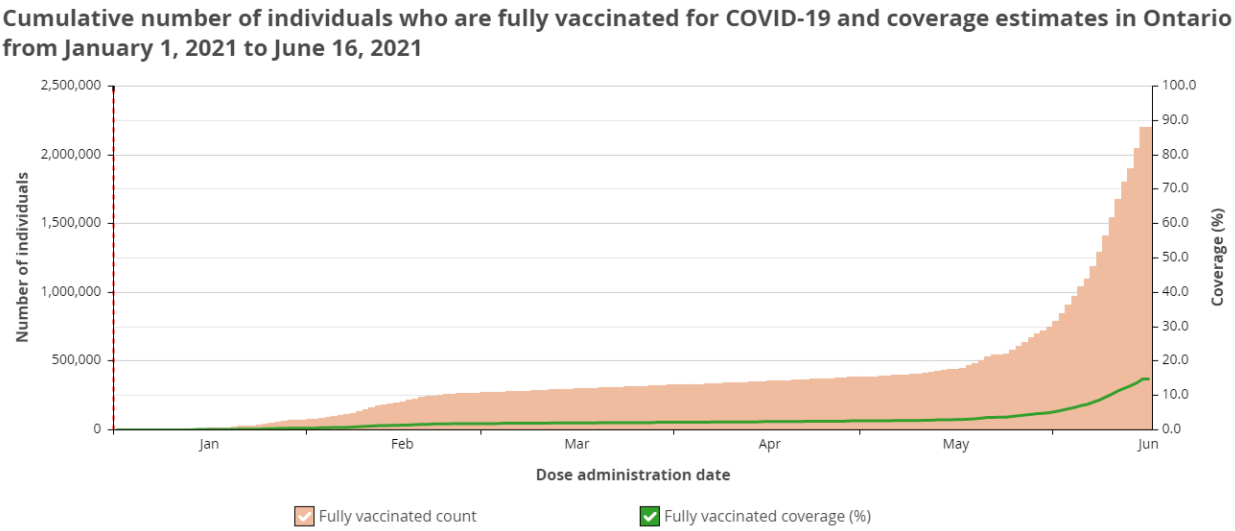
50. Due to high rates of COVID-19 transmission locally, including a rise in the number of cases involving the Delta variant, the Medical Officer of Health for the Porcupine Public Health Unit issued a series of instructions requiring businesses and organizations in the Porcupine Health Unit region to implement enhanced public health measures, beyond those required at Steps 1 and 2 of the Roadmap. The regulations that apply at each Step of the Roadmap state that a person responsible for a business or organization must operate that business or organization in compliance with instructions of public health officials, which includes instructions issued by local Medical

Officers of Health. Attached as **Exhibit "Z"** are the instructions issued by the Porcupine Medical Officer of Health.

51. On June 30, 2021, after having reached the vaccination target of 70% of adults with one dose and 20% of adults with two doses for at least two weeks and with other key public health measures, including hospitalizations, ICU occupancy, and weekly case incidence rates, improving, Ontario moved to Step 2 of the Reopening Roadmap. Below is a graph from PHO showing the number of individuals and rate of first dose vaccinations from January 1, 2021 to June 16, 2021:



52. Below is a graph from PHO showing the number of individuals and rate of second dose vaccinations from January 1, 2021 to June 16, 2021. As noted below, second dose vaccinations did not begin to significantly increase until approximately mid-June 2021. Prior to June 2021, only approximately 3% of Ontarians had received a second dose and most of those individuals were in nursing or long-term care facilities.



53. Step 2 focuses on the resumption of more outdoor activities and limited indoor services with small numbers of people where face coverings are worn, with other restrictions in place. The public health measures applicable at Step 2 include:

- Outdoor social gatherings are permitted up to 25 people;
- Indoor social gatherings are permitted with up to 5 people;
- Indoor religious services, rites or ceremonies are permitted with up to 25% capacity of each particular room. Outdoor religious services, rites or ceremonies continue to be permitted with the only capacity limit being that participants must be able to physically distance at least 2 metres. Drive-in religious services, rites and ceremonies continue to be permitted without any capacity limits;
- Personal care services where face coverings can be worn are permitted at 25% capacity;
- Outdoor sport facilities with spectators are permitted at 25% capacity;
- Outdoor fairs, rural exhibitions and festivals are permitted at 25% capacity;
- Outdoor concert venues, theatres and cinemas are permitted at 25% capacity;

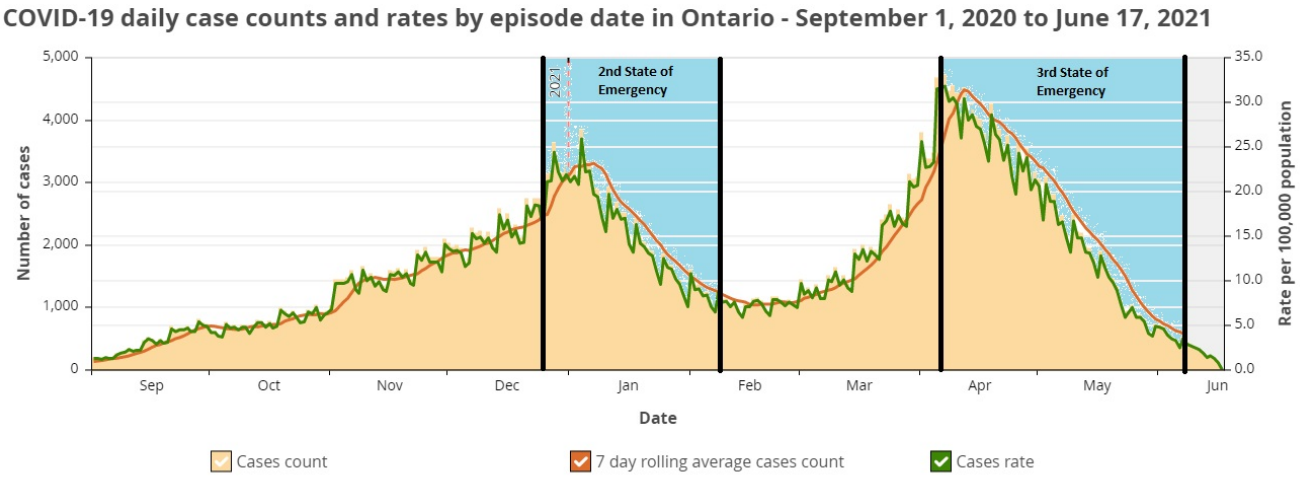
- Essential and other select retail is permitted up to 50% capacity while non-essential retail is permitted up to 25% capacity.

54. On June 29, 2021, the Medical Officer of Health for the Region of Waterloo, Dr. Hsiu-Li Wang, issued instructions, effective June 30, 2021, requiring the Region of Waterloo to maintain Step 1-level restrictions after entering Step 2 with the rest of the province on June 30, 2021. Dr. Wang stated that these measures were necessary due to the high prevalence of the Delta variant in the Region. It is anticipated that these measures will be necessary until approximately mid-July 2021. Attached as **Exhibit "AA"** are the instructions issued by the Waterloo Medical Officer of Health.

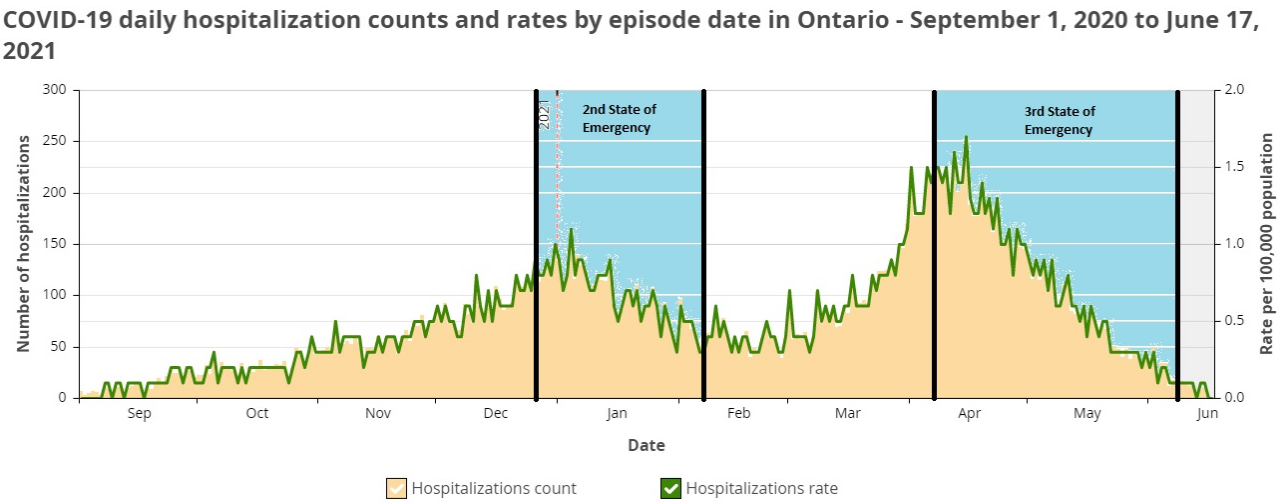
III. The Impact of Ontario's Public Health Measures

55. The public health measures implemented by Ontario had a significant impact on decreasing the transmission of COVID-19 across the province and reducing the strain on the healthcare system. Among other things, the implementation of public health measures during the second and third states of emergency were shortly followed by a substantial decrease in the number of COVID-19 cases and hospitalizations.

56. Both the second and third states of emergency were implemented at times when the number of daily COVID-19 cases was increasing rapidly. Shortly after Ontario implemented each state of emergency, the number of new daily cases started to level off and then steadily decline. This is illustrated in the graph below with data from PHO showing the number of daily new cases from September 1, 2021 to June 17, 2021:



57. The number of daily new hospitalizations followed a similar trend. This is illustrated in the graph below with data from PHO showing the number of daily new hospitalizations from September 1, 2021 to June 17, 2021:



58. In their update to the public on May 20, 2021, the Ontario COVID-19 Science Table stated that "control of the pandemic is improving due to current public health measures." Among other things, the Science Table noted that the percentage of individuals testing positive for COVID-19 decreased following the implementation of the province-wide lockdowns and provincial emergency brake.

59. In short, many key public health indicators showed signs of significant improvement following the implementation of Ontario's strictest public health measures. While there are many factors that contribute to the transmission of COVID-19, this data suggests that Ontario's public health measures decreased the spread of COVID-19 across the province, reduced the overall strain on the healthcare system, and likely saved lives.

IV. Public Health Considerations That Informed Ontario's COVID-19 Policy Response

60. As noted above, as Associate Chief Medical Officer of Health, my responsibilities include monitoring the spread of COVID-19 and advising the Ontario government on its policy response to the pandemic. In that role, I continuously review and assess information related to COVID-19, including published peer-reviewed literature, "scientific grey literature" (i.e. literature published outside of traditional peer-reviewed publishing channels), and publications from PHO. That information informs the advice that I provide, along with others in the office of the Chief Medical Officer of Health, to the Ontario government. I review information and provide advice related to COVID-19 as part of the ordinary exercise of my knowledge, training and experience as Associate Chief Medical Officer of Health.

61. Below are some of the public health considerations that inform Ontario's policy response to the pandemic. These considerations are not exhaustive and no single factor is determinative. It should also be noted that the state of the pandemic is constantly changing and Ontario's policy response must adapt to those changing circumstances. When determining which health protection measures should be implemented to mitigate the spread of the virus, Ontario attempted to use the best information available at the time about the transmissibility of COVID-19, which was also subject to change as research about the virus is being updated regularly.

(i) Methods of COVID-19 Transmission

62. The primary method of transmission of COVID-19 is through direct contact with respiratory droplets from an infected person, which have the potential to be propelled various distances when that person coughs, sneezes, sings, shouts or talks. Transmission occurs predominantly through close contact (2 metres or less) with an infected individual, but transmission over longer distances (more than 2 metres) is possible, although less common. Attached as **Exhibit "BB"** is a document dated December 1, 2020, from PHO entitled "COVID-19 Routes of Transmission," which summarizes some of the evidence related to COVID-19 transmission.

63. Transmission is more likely when people are in close physical proximity with an infected person over a prolonged period of time. The risk of transmission is especially high in settings with poor ventilation or where there is recirculation of unfiltered air, which may allow droplets (or, in some cases, smaller particles known as "aerosols") to travel further distances. For example, there is evidence of high rates of transmission in household settings, where individuals are in close proximity in enclosed areas and physical distancing is not feasible. There is also evidence that indoor settings have a higher risk of transmission relative to outdoor settings, although there remains a risk of transmission when people gather outdoors.

64. Because COVID-19 is spread primarily through close contact with an infected individual, large gatherings, whether indoors or outdoors, present a risk of COVID-19 transmission. The larger the gathering, the greater the likelihood that there will be individuals in that gathering who have COVID-19 and will transmit the virus to others. If individuals in a gathering become infected, they will often transmit the virus to other members of their households. As a result, gatherings of

people from different households present an especially high risk of widespread transmission throughout the population.

65. Certain behaviours may increase the risk of COVID-19 transmission. For example, activities such as singing, shouting, or loud talking can result in more forceful exhalation of droplets (or, in some cases, aerosols), which increases the likelihood of transmitting the virus to others in close proximity and may also increase the distance that droplets or aerosols travel. Attached as **Exhibit "CC"** is a document dated May 21, 2021, from PHO entitled "COVID-19 Transmission Through Large Respiratory Droplets and Aerosols."

66. COVID-19 can be transmitted by people who are pre-symptomatic (i.e. have not yet developed symptoms) or asymptomatic (i.e. never developed symptoms). Some studies have shown that transmission can occur as early as six days before the onset of symptoms, or possibly earlier. As a result, screening for symptoms is insufficient to prevent the spread of COVID-19 when individuals gather in groups, particularly when the level of COVID-19 in the general population is high. Attached as **Exhibit "DD"** is a document dated May 22, 2020, from PHO entitled "Asymptomatic Infection and Asymptomatic Transmission."

(ii) Masks and Physical Distancing

67. There are several measures that can help reduce, but not eliminate, the risk of COVID-19 transmission. One of those measures is mask wearing. Masks have two potential functions. First, they can be used as personal protective equipment ("PPE") to protect the wearer from being exposed to droplets expelled by others who have been infected with COVID-19. Second, they can be used as "source control" to protect others from the wearer by reducing the degree to which a person who is infected with COVID-19 expels droplets.

68. There is evidence that the use of non-medical masks can be an effective form of source control when worn by persons shedding the virus (i.e. it protects others from a mask wearer with COVID-19). A literature review conducted by PHO found that "[m]andatory public mask policies have been associated with a decrease in new COVID-19 cases compared to regions without such policies." Attached as **Exhibit "EE"** is a document dated September 14, 2020, from PHO entitled "Wearing Masks in Public and COVID-19."

69. However, the same review by PHO found that the use of masks to protect the wearer (i.e. as PPE) is "unlikely to be effective in non-healthcare settings." As a result, if one or more infected individuals within a gathering do not wear a mask (or do not wear a mask consistently), the fact that others within the gathering are wearing masks is unlikely to provide sufficient protection against transmission. The efficacy of mask mandates is, therefore, highly dependent on the degree to which participants strictly and uniformly adhere to those mandates, especially in large gatherings or settings with poor ventilation.

70. There is an extremely high degree of variability in the efficacy of non-medical masks in public settings, depending on the materials used and whether the mask is the appropriate fit for the wearer. For example, one review of 42 studies on the effectiveness of non-medical masks in reducing COVID-19 transmission found that the filtration efficiency of non-medical masks (with variable designs and fabrics) ranged from less than 10% to more than 95%. Attached as **Exhibit "FF"** is a document dated February 2, 2021 from PHO entitled "Review of 'Rapid review on the characteristics of effective non-medical face masks in reducing the risk of SARS-CoV-2 transmission.'"

71. Guidance from the World Health Organization ("**WHO**") states that masks should be used as "part of a comprehensive package of prevention and control measures" to limit the spread

of COVID-19. However, that guidance also notes that "the use of a mask alone, even when correctly used…is insufficient to provide an adequate level of protection for an uninfected individual or prevent onward transmission from an infected individual (source control)." Attached as **Exhibit "GG"** is document dated December 1, 2020, from the WHO entitled "Mask use in the context of COVID-19."

72. Another measure that can help reduce, but not eliminate, the risk of COVID-19 transmission is physical distancing. As noted above, respiratory droplets from an infected person have the potential to be propelled various distances when that person coughs, sneezes, sings, shouts or talks. While transmission is most likely to occur through close contact of 2 metres or less, there is evidence that transmission over longer distances can occur, especially in areas with poor ventilation. Behaviours such as singing or loud talking have been shown to increase the distance that droplets can spread. Some studies have suggested that droplets can travel as much as 4 to 8 metres under favourable conditions (see **Exhibit "BB"**).

73. Similar to masks, physical distancing is one part of a comprehensive package of public health measures that can help reduce the transmission of COVID-19 but is insufficient on its own to prevent transmission of COVID-19. Furthermore, the efficacy of physical distancing depends on the degree to which individuals strictly adhere to physical distancing requirements of at least 2 metres. In practice, there will be some circumstances where physical distancing will be unlikely or impractical, such as within households.

(iii) Community Prevalence and Burden on the Healthcare System

74. The risk of COVID-19 transmission in any setting or gathering is related to the baseline level of COVID-19 in the community. The higher the number of COVID-19 cases in the population, the more likely it is that people who participate in a gathering will have COVID-19

and pass it on to others. While some types of gatherings may pose a relatively low risk of transmission when the level of COVID-19 in the population is low, those same gatherings may pose a higher risk of transmission when the level of COVID-19 in the population is high.

75. Ontario's policy response to COVID-19 was also informed by the burdens that the pandemic placed on the healthcare system. Several times during the pandemic, the spread of COVID-19 caused hospitalizations and ICU occupancy to increase significantly. This placed a substantial burden on the healthcare system, as Ontario has limited capacity to treat seriously ill patients who require hospitalization or intensive care. The increase in ICU patients was particularly concerning because it not only threatened the ability of the healthcare system to deal with COVID-19 patients, it also compromised the ability of the healthcare system to care for regular (i.e. non-COVID-19) patients. The diversion of healthcare resources to serve seriously ill patients with COVID-19 also creates a backlog of surgical and other medical treatments for other medical problems.

76. When the burdens on the healthcare system are high, even small increases in transmission within the population can have a significant negative impact on the healthcare system and potentially impact patient care. For example, in April 2021, ICU occupancy in some regions in Ontario was over 86%. At that time, there was a risk that ICU capacity would be stretched beyond its limits, even with small increases in the number of critically ill patients. Within that context, activities that pose a relatively low risk of transmission could significantly increase the burden on an already strained healthcare system.

(iv) Variants of Concern

77. The risk of COVID-19 transmission also depends on the degree of transmissibility of the virus, which has evolved over time as new variants have emerged. Several VOCs have been

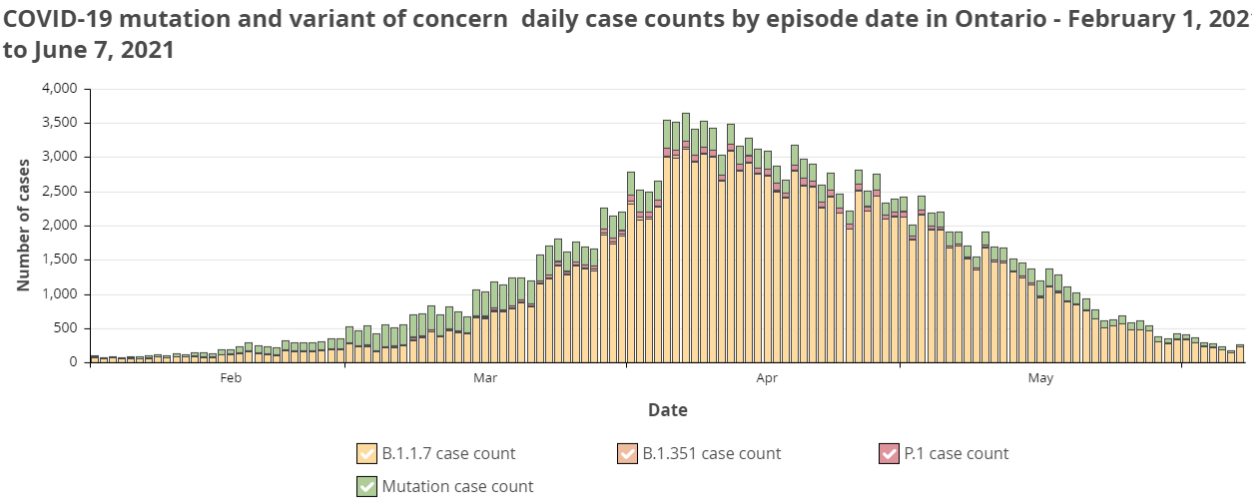
identified that are associated with factors such as increased transmissibility, detrimental change in COVID-19 epidemiology, increased virulence or change in clinical disease presentation, and decreased effectiveness of public health and social measures.

78. There are four VOCs that are particularly concerning in Ontario, namely:

- the B.1.1.7 (Alpha) variant, which was first detected in the United Kingdom;
- the B.1.351 (Beta) variant, which was first detected in South Africa;
- the P.1 (Gamma) variant, which was first detected in Brazil; and
- the B.1.617 (Delta) variant, which was first detected in India.

79. All four of these VOCs are associated with increased transmissibility of COVID-19. The Alpha, Beta and Gamma variants are each estimated to be at least 50% more transmissible than the original COVID-19 virus. Information about the Delta variant is still evolving, but evidence suggests that it is considerably more transmissible than non-variant strains of COVID-19. All four VOCs have been detected in Ontario. Attached as **Exhibit "HH"** is a publication by PHO entitled "Comparing SARS-CoV-2 Variants of Concern (VOCs) as of May 31, 2021." Attached as **Exhibit "II"** is a publication by PHO dated June 16, 2021, entitled "COVID-19 B.1.617 Variant of Concern – What We Know So Far."

80. In February and March 2021, the proportion of cases involving VOCs increased substantially. By April 2021, the Alpha variant had become the dominant strain in Ontario and over 70% of reported cases in the province tested positive for one of the VOCs. Attached as **Exhibit "JJ"** is a graph summarizing the percentage of COVID-19 associated with a VOC from March 31, 2021, to April 13, 2021. Below is a graph from PHO showing the progression of COVID-19 cases with a VOC from February 1, 2021 to June 7, 2021 (excluding the Delta variant):



81. In May and June 2021, there was an increase in the number of cases in Ontario testing positive for the Delta variant. As of June 22, 2021, 975 cases of the Delta variant had been confirmed in Ontario. Attached as **Exhibit "KK"** is the daily epidemiological summary from PHO dated July 3, 2021, which contains data regarding VOCs, including the Delta variant, from January 15, 2020 to July 3, 2021.

V. The Risks of COVID-19 Transmission at Religious Gatherings

82. In light of the factors described above, religious services and gatherings pose a significant risk for the spread of COVID-19. They typically involve large gatherings of people from different households who spend prolonged periods of time (often more than an hour) in the same physical space. That is precisely the scenario that has been shown to be associated with a high risk COVID-19 transmission. That risk is especially high if physical distancing is not strictly observed, if the services are held indoors or in poorly ventilated areas, or if masks are not worn (or not worn consistently or correctly).

83. Religious services are often associated with behaviours that can increase the spread of COVID-19. For example, many religious services involve singing, chanting or praying out loud,

which can increase the spread of droplets that transmit the virus. Religious services are also typically gatherings of families and friends in the same community who know each other well and will be tempted to greet or socialize with each other in violation of physical distancing requirements. While places of worship may take measures to promote physical distancing, in practice good intentions are often outweighed by human nature.

84. The risk of transmission at a religious gathering is not confined to those who attend those gatherings. If someone is infected with COVID-19 at a religious service, it is very likely that he or she will transmit the virus to other members of his or her household who, in turn, may transmit COVID-19 to others in the community.

85. The risk of transmission at religious gatherings increases significantly when the prevalence of COVID-19 in the community is high. The higher the number of COVID-19 cases in the general population, the more likely it is that people who participate in a religious gathering will have COVID-19 and pass it on to others. In addition, when COVID-19 cases in the general population are high, there is a greater burden on the healthcare system. When that occurs, even small amounts of transmission at religious gatherings can have a significant impact on the overall spread of the virus across the province, resulting in an even greater strain on the healthcare system and potentially impacting patient care.

86. Masks and physical distancing can help reduce the risk of COVID-19 transmission but are insufficient to stop the spread of the virus, particularly when the prevalence of COVID-19 in the population is high. As noted above, masks can be highly variable in their effectiveness in non-healthcare settings and their effectiveness decreases if they are ill-fitting or worn inconsistently. In addition, physical distancing of at least 2 metres decreases the likelihood of COVID-19 transmission, but there is evidence that droplets (or in some cases aerosols) can travel farther

distances under some conditions, although transmission at distances of more than 2 metres is less common. Similarly, holding gatherings outdoors can reduce the risk of transmission of the virus, but outdoor transmission can still occur, especially in large gatherings with inconsistent adherence to mask or physical distancing requirements.

VI. The Public Health Measures for Religious Gatherings

87. In order to limit the spread of COVID-19, Ontario implemented several public health restrictions for religious gatherings over the various phases of the pandemic. The objective of those restrictions was to reduce transmission by limiting the number of people who would gather together in close contact and to require participants to take certain precautions, such as mask wearing and physical distancing. The limits that applied to religious gatherings were part of a broader set of measures that applied to a wide variety of businesses, organizations and events throughout the province.

88. The public health measures Ontario has imposed at each stage of the pandemic have been informed by several key indicators, such as weekly incidence of COVID-19, the test positivity rate, the effective reproduction number (Rt), and evidence of recent outbreaks. Where feasible, public health measures have been tailored to the circumstances in each region of the province. During some phases of the pandemic, however, the rapid spread of COVID-19 or the need to discourage travel between different areas of the province required Ontario to implement restrictions that applied across the entire province.

89. I understand that the applicants in these proceedings are challenging the restrictions that applied to religious services in three different public health units ("**PHUs**"): the Niagara PHU, the Southwestern PHU, and the Region of Waterloo PHU. I have summarized below the restrictions that applied to religious gatherings in those PHUs from September 2020 to June 2021.

90. The table below summarizes the capacity limits that applied to religious services, rites or ceremonies in the Niagara PHU:

Capacity Limits for Religious Services, Rite or Ceremonies in the Niagara PHU

Date	**Outdoor Services**	**Indoor Services**	**Drive-in Services**
July 22, 2020 to December 25, 2020	100 people.	30% of room capacity.	Drive-in services permitted without any capacity limit.
December 26, 2020 to February 28, 2021	10 people.	10 people.	Drive-in services permitted without any capacity limit.
March 1, 2021 to March 28 , 2021	100 people.	30% of room capacity.	Drive-in services permitted without any capacity limit.
March 29, 2021 to April 2, 2021	No capacity limit, provided participants follow masking and physical distancing health guidance.	30% of room capacity.	Drive-in services permitted without any capacity limit.
April 3, 2021 to April 18, 2021	No capacity limit, provided participants follow masking and physical distancing health guidance.	15% of room capacity.	Drive-in services permitted without any capacity limit.
April 19, 2021 to June 10, 2021	10 people.	10 people.	Drive-in services permitted without any capacity limit.
June 11, 2021 to June 29, 2021	No capacity limit, provided participants follow masking and physical distancing health guidance.	15% of room capacity.	Drive-in services permitted without any capacity limit.
June 30, 2021	No capacity limit, provided participants follow masking and physical distancing health guidance.	25% of room capacity.	Drive-in services permitted without any capacity limit.

91. The table below summarizes the capacity limits that applied to religious services, rites or ceremonies in the Southwestern PHU:

Capacity Limits for Religious Services, Rite or Ceremonies in the Southwestern PHU

Date	Outdoor Services	Indoor Services	Drive-in Services
July 13, 2020 to December 25, 2020	100 people.	30% of room capacity.	Drive-in services permitted without any capacity limit.
December 26, 2020 to February 15, 2021	10 people.	10 people.	Drive-in services permitted without any capacity limit.
February 16, 2021 to March 28, 2021	100 people.	30% of room capacity.	Drive-in services permitted without any capacity limit.
March 29, 2021 to April 2, 2021	No capacity limit, provided participants follow masking and physical distancing health guidance.	30% of room capacity.	Drive-in services permitted without any capacity limit.
April 3, 2021 to April 18, 2021	No capacity limit, provided participants follow masking and physical distancing health guidance.	15% of room capacity.	Drive-in services permitted without any capacity limit.
April 19, 2021 to June 10, 2021	10 people.	10 people.	Drive-in services permitted without any capacity limit.
June 11, 2021 to June 29, 2021	No capacity limit, provided participants follow masking and physical distancing health guidance.	15% of room capacity.	Drive-in services permitted without any capacity limit.

Date	Outdoor Services	Indoor Services	Drive-in Services
June 30, 2021	No capacity limit, provided participants follow masking and physical distancing health guidance.	25% of room capacity.	Drive-in services permitted without any capacity limit.

92. The table below summarizes the capacity limits that applied to religious services, rites or ceremonies in the Waterloo PHU:

Capacity Limits for Religious Services, Rite or Ceremonies in the Waterloo PHU

Date	Outdoor services	Indoor services	Drive-in services
July 17, 2020 to December 25, 2020	100 people.	30% of room capacity.	Drive-in services permitted without any capacity limit.
December 26, 2020 to February 15, 2021	10 people.	10 people.	Drive-in services permitted without any capacity limit.
February 16, 2021 to March 28 2021	100 people.	30% of room capacity.	Drive-in services permitted without any capacity limit.
March 29, 2021 to April 2, 2021	No capacity limit, provided participants follow masking and physical distancing health guidance.	30% of room capacity.	Drive-in services permitted without any capacity limit.
April 3, 2021 to April 18, 2021	No capacity limit, provided participants follow masking and physical distancing health guidance.	15% of room capacity.	Drive-in services permitted without any capacity limit.
April 19, 2021 to June 10, 2021	10 people.	10 people.	Drive-in services permitted without any capacity limit.

Date	Outdoor services	Indoor services	Drive-in services
June 11, 2021 to June 29, 2021	No capacity limit, provided participants follow masking and physical distancing health guidance.	15% of room capacity.	Drive-in services permitted without any capacity limit.
June 30, 2021	No capacity limit, provided participants follow masking and physical distancing health guidance.	15% of room capacity (pursuant to the instructions discussed at para. 54).	Drive-in services permitted without any capacity limit.

93. The time periods with the lowest (or strictest) capacity limits corresponded to the time periods when the rate of COVID-19 transmission in the Ontario population and the burden on the Ontario healthcare system were at their highest levels. This is consistent with the principles discussed above regarding COVID-19 transmission, including that there are higher risks of COVID-19 transmission in a religious gathering when the baseline number of COVID-19 cases in the general population is higher.

94. Throughout most of the pandemic, the capacity limits for outdoor religious gatherings were higher (or less strict) than the capacity limits for indoor religious gatherings. This is consistent with the evidence that the risk of COVID-19 transmission is generally higher indoors compared to outdoors. However, during some periods when the rate of COVID-19 transmission and the burden on the healthcare system were at their highest, capacity limits for both indoor and outdoor religious gatherings were the same. During those periods, the rate of transmission was so high that outdoor gatherings that would otherwise have posed a relatively small risk of transmission could still have had a significant impact on the overall spread of the virus across the province. The higher the number of COVID-19 cases in the population, the more likely it is that people who participate in a religious gathering will have COVID-19 and pass it on to others. While each individual gathering

may result in a relatively small risk of additional cases, the cumulative impact of many such gatherings could result in a significant increase in transmission across the province.

95. In addition, during the highest risk periods, Ontario's ICUs were approaching full capacity and there was a serious concern that, if the number of new cases and hospitalizations continued to rise, it could overburden the healthcare system and significantly jeopardize patient care. During those time periods of highest risk, it was extremely important to control the spread of COVID-19 at both indoor and outdoor gatherings.

96. It should be noted that the public health measures imposed on indoor and outdoor religious gatherings, even during the highest risk periods, were almost always less strict than the public health measures imposed on other types of gatherings. For example, during the third state of emergency, indoor or outdoor gatherings (other than religious gatherings) were only permitted with members of the same household or one other person from outside that household who lives alone or who is a caregiver for any member of the household. At the same time, religious gatherings were permitted with up to 10 people, which could include members of different households. To take another example, when Ontario moved into Step 1 of the Roadmap, outdoor social gatherings or organized public events (other than religious services) were subject to a capacity limit of 10 people, but outdoor religious services had no capacity limit, provided the participants complied with public health and physical distancing guidelines.

97. There are several reasons why Ontario imposed slightly different measures for religious gatherings. Among other things, the higher capacity limits allowed a small number of people who may not be in the same household to produce and disseminate virtual religious services to a wider community. A capacity limit of 10 people permits a few members of the public (such as readers, cantors, etc.) to assist officiants in conducting the larger online or drive-in services that remained

permitted. Ontario recognizes that religious communities are often a source of support, comfort and guidance for the communities they serve. Religious leaders can provide pastoral and spiritual support during public health emergencies and other health challenges. The public health measures for religious gatherings attempted to allow religious services to continue so that members of religious communities could access the benefits of those services, but with strict capacity limits that mitigate the spread of COVID-19.

VII. Public Health Measures in Other Settings

98. I understand that some of the applicants in these proceedings are arguing that the public health measures that applied to religious gatherings at various stages of the pandemic were not necessary or justified. In support of that argument, I understand that the applicants note that some public health measures that applied to non-religious gatherings or settings, such as essential retail stores, were (in their view) not as strict as the public health measures placed on religious gatherings at certain points during the pandemic.

99. It should be noted that the various restrictions imposed by the Province to reduce the spread of COVID-19 at different times, in different regions of the province, and in different sectors are based on the unique circumstances of each region and sector and the changing nature of the COVID-19 pandemic. Comparing the restrictions that apply in one circumstance to those that apply in another is not a useful or appropriate exercise without taking into account the full context of each circumstance. Every health protection measure implemented by the Province was assessed on its own merits and the factors that apply in determining whether a measure is appropriate in one circumstance may not apply, or may not apply to the same degree, in another.

100. It is important to keep those principles in mind when assessing the public health measures that applied to religious gatherings at various stages of the pandemic. As noted above, religious

gatherings are associated with a combination of risk factors, which may not apply, or may not apply to the same degree, in other settings.

101. Having said that, there are several reasons why Ontario imposed different public health measures on essential retail businesses compared to religious gatherings. Ontario imposed different limits on those retail businesses not because religious worship is any less essential than retail activities, but because religious gatherings typically have characteristics that make them more likely to spread COVID-19 than transient encounters in a retail setting.

102. The behaviour of persons in religious spaces is different than the behaviour of persons in retail spaces. First, people spend, on average, more time at religious gatherings compared to retail settings. It is not uncommon for a person to "run in" to retail stores to quickly purchase a number of small items. In contrast, religious gatherings are often an extended length and typically run for more than an hour, and sometimes for two hours or more. In addition, large groups of people tend to arrive and depart religious services at the same time, which increases crowding, in contrast to retail stores where people typically arrive and depart at many different times.

103. Second, the nature of human interaction in a retail setting tends to be different than human interaction at religious gatherings. Interactions with people outside of a person's household in a retail store are usually brief (e.g. passing someone in a store aisle). In contrast, at religious gatherings, there is often prolonged exposure to the same people sitting together, which presents a greater danger for the spread of the virus, especially if social distancing rules are not followed, the indoor space is not well ventilated, or where face coverings are not worn correctly. Another example is that, in a religious space, people often pray out loud or sing (which is not a concern in retail settings), which increases the risk of transmission.

104. Third, unlike in religious gatherings, there is typically no sense of community in retail settings, such that groups of people would want to greet each other in violation of physical distancing rules. While well-intentioned people at religious gatherings may attempt to physically distance from family and friends, good intentions are often outweighed by human nature. The conflict between the desire to warmly greet friends and family and diligently following physical distancing rules is less of a concern in retail stores.

AFFIRMED by video conference by David McKeown of the City of [redacted], before me at the City of Toronto on the 5th day of July, 2021, in accordance with O. Reg. 431/20, Administer the Oath or Declaration Remotely.

Ryan Cookson

A Commissioner etc.

DAVID MCKEOWN

This is **Exhibit "A"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

NEWS RELEASE

Ontario Releases COVID-19 Response Framework to Help Keep the Province Safe and Open

Government Provides Additional Details on $300 Million to Support Eligible Businesses

November 3, 2020
Office of the Premier

TORONTO — In consultation with the Chief Medical Officer of Health and other health experts, the Ontario government has developed the *Keeping Ontario Safe and Open Framework*. It ensures that public health measures are targeted, incremental and responsive to help limit the spread of COVID-19, while keeping schools and businesses open, maintaining health system capacity and protecting vulnerable people, including those in long-term care.

Details were provided today by Premier Doug Ford, Christine Elliott, Deputy Premier and Minister of Health, Rod Phillips, Minister of Finance, Peter Bethlenfalvy, President of the Treasury Board, and Dr. David Williams, Chief Medical Officer of Health.

"It's clear COVID-19 will be with us for a while, which is why we are putting in place a framework that will protect the health and safety of individuals and families, while avoiding broader closures across the province," said Premier Ford. "This framework, developed in consultation with our health experts, will serve as an early warning system allowing us to scale up and scale back public health restrictions on a regional or community basis in response to surges and waves of COVID-19. By introducing public health measures sooner, we can keep this deadly virus at bay, bend the curve and reclaim a little more of our normal lives."

The framework takes a gradual approach that includes introducing preventative measures earlier to help avoid broader closures and allow for additional public health and workplace safety measures to be introduced or removed incrementally. It categorizes public health unit regions into five levels: Green-Prevent, Yellow-Protect, Orange-Restrict, Red-Control, and Lockdown being a measure of last and urgent resort. Each level outlines the types of public health and workplace safety measures for businesses and organizations. These include targeted measures for specific sectors, institutions and other settings.

"The health and wellbeing of Ontarians is our number one priority. This framework, informed by public health experts, data and the experiences of other jurisdictions, is focused on introducing less invasive measures earlier to stop the spread of COVID-19," said Minister Elliott. "We are committed to being transparent with Ontarians, businesses and local communities as we work together to keep Ontarians safe, while keeping our economy open."

"This framework is critical to ensuring that public health measures are able to help slow the spread of the virus, while also supporting mental health and other social determinants of health," said Dr. Williams. "The framework operates like a dimmer switch, enabling measures and restrictions to be increased and give individuals and families the information they need to adjust their activities and interactions based on local epidemiological data."

As the province continues to expand access to real-time data, enhancements are also being made to Ontario.ca/coronavirus, Ontario's one-stop shop for information on COVID-19. Information about the spread of the virus, and public health and health system capacity will now be available on the website. This includes local cases by public health unit regions, the total number of cases, resolved cases, deaths, and tests completed and how many are positive. The province will continue to add data sets as they become available, such as sources of outbreaks as a subset of overall cases. This information will better help businesses, organizations and local communities access key information to prepare in advance for any changes in their region.

"You deserve to have access to the same information that we have, and that's why our government is enhancing online data and data visualization," said Minister Bethlenfalvy. "Greater transparency means that the people of Ontario have reliable access to the information they need to protect their health, and for businesses to reopen and operate safely. This is another way we're using technology and pursuing innovation to put the people at the centre of government and move Ontario onwards."

To provide the utmost transparency, each public health unit will be classified according to current framework indicators. Proposed classifications based on data for the week of October 26, 2020 can be found below. These will be confirmed by the province on Friday, November 6, 2020 and become effective on Saturday, November 7, 2020 at 12:01 a.m. Final decisions on moving public health unit regions into the framework will be made by the government based on updated data and in consultation with the Chief Medical Officer of Health, local medical officers of health and other health experts, and will be reviewed weekly.

Going forward, the government will continually assess the impact of public health measures applied to public health unit regions for 28 days, or two COVID-19 incubation periods.

Supporting Businesses Affected by COVID-19 Public Health Measures

The Ontario government is making $300 million available to businesses required to close or significantly restrict services in areas subject to modified Stage 2 public health restrictions (Ottawa, Peel, Toronto, and York Region) or, going forward, in areas categorized as Control or Lockdown.

Rebates will cover the period of time that businesses are required to temporarily close or significantly restrict services as a result of being located in areas subject to the targeted modified Stage 2 public health restrictions or, going forward, in areas categorized as Control or Lockdown.

Beginning November 16, 2020, eligible businesses will be able to apply for temporary property tax and energy cost rebates directly to the province through a single, online application portal. Many businesses should expect to receive their rebate payments within a few weeks of finalizing and submitting their completed application. Eligible businesses include restaurants, bars, gyms and cinemas.

"On Thursday, I'll introduce Ontario's 2020 Budget, the next phase of Ontario's Action Plan," said Minister Phillips. "It is a plan that will have three pillars. As we announced yesterday, the first is protect. The second pillar is support, because we know COVID-19 has brought severe challenges and economic difficulties to families and employers. Supporting businesses affected by necessary public health restrictions in regions experiencing a greater risk from COVID-19 is one way we are helping employers manage during these difficult times."

Through Ontario's Property Tax and Energy Cost Rebates program, the government is building on its efforts to ensure eligible businesses receive the financial help they need as a result of targeted provincial public health restrictions.

Public Health Unit Region Classifications

As of November 7, 2020, the province will transition public health unit regions to the new framework. The following proposed classifications for public health unit regions are based on data for the week of October 26, 2020. Updated data will be used for final review by the Chief Medical Officer of Health and approval by Cabinet on Friday, November 6, 2020.

Lockdown:

- No public health unit regions

Red-Control:

- No public health unit regions

Orange-Restrict:

- Eastern Ontario Health Unit;
- Ottawa Public Health;
- Peel Public Health;
- Toronto Public Health (may be delayed in entering Orange-Restrict level until November 14, 2020); and
- York Region Public Health.

Yellow-Protect:

- Brant County Health Unit;
- City of Hamilton Public Health Services;
- Durham Region Health Department; and
- Halton Region Public Health.

Green-Prevent:

- Algoma Public Health;
- Chatham-Kent Public Health;
- Grey Bruce Health Unit;
- Kingston, Frontenac and Lennox & Addington Public Health;
- Haliburton, Kawartha, Pine Ridge District Health Unit;
- Haldimand-Norfolk Health Unit;
- Hastings Prince Edward Public Health;
- Huron Perth Public Health;
- Lambton Public Health;
- Leeds, Grenville & Lanark District Health Unit;
- Middlesex-London Health Unit;
- Niagara Region Public Health;
- North Bay Parry Sound District;
- Northwestern Health Unit;
- Peterborough Public Health;
- Porcupine Health Unit;
- Public Health Sudbury & Districts;
- Region of Waterloo Public Health and Emergency Services;
- Renfrew County and District Health Unit;
- Simcoe Muskoka District Health Unit;
- Southwestern Public Health;
- Thunder Bay District Health Unit;
- Timiskaming Health Unit;
- Wellington-Dufferin-Guelph Public Health; and
- Windsor-Essex County Health Unit.

Quick Facts

- The Ontario government has developed a $2.8 billion COVID-19 fall preparedness plan, *Keeping Ontarians Safe: Preparing for Future Waves of COVID-19*, to ensure the province's health care, long-term care and education systems are prepared for the immediate challenges of the fall, including a second wave of COVID-19 and the flu season.
- If you are concerned you were exposed to COVID-19 or have symptoms, take the online COVID-19 self assessment.
- Get tested if you have symptoms compatible with COVID-19, or if you have been advised of exposure by your local public health unit or through the COVID Alert app. Visit Ontario.ca/covidtest to find the nearest testing location.
- Types of businesses that are eligible for support include restaurants and bars, bingo halls, gaming establishments, casinos, conference centres and convention centres, gyms, facilities for indoor sports and recreational fitness activities, community centres and multi-purpose facilities, museums, performing arts and cinemas and personal care services (with exception of oxygen bars) that were required to close or are subject to significant restrictions under modified Stage 2.
- Businesses that are not eligible are those that were already required to close prior to the introduction of modified Stage 2 public health restrictions, those that were not required to close or restrict services due to modified Stage 2 public health restrictions, and those who do not pay property taxes or energy costs.

Additional Resources

- Ontario Moving Additional Region to Modified Stage 2
- Ontario Implementing Additional Public Health Measures in Toronto, Ottawa and Peel Region
- Property Tax and Energy Cost Rebates
- Visit Ontario's website to learn more about how the province continues to protect the people of Ontario from COVID-19.

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This is **Exhibit "B"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

NEWS RELEASE

Ontario Moves Public Health Unit Regions into COVID-19 Response Framework to Keep Ontario Safe and Open

New approach introduces preventative measures earlier to limit transmission of COVID-19 and avoid broader closures

November 06, 2020
Health

TORONTO — In consultation with the Chief Medical Officer of Health, local medical officers of health, and other health experts, the province intends to move Ontario's public health unit regions to the *Keeping Ontario Safe and Open Framework*. The framework categorizes public health regions into five levels: Green-Prevent, Yellow-Protect, Orange-Restrict, Red-Control, and Lockdown being a measure of last and urgent resort.

"The framework lays out a proactive and graduated response to be applied based on the local situation in each region," said Dr. David Williams, Chief Medical Officer of Health. "By working with the medical officers of health and local authorities on the realities and situations of COVID-19, we want to continue to help protect people's health and wellbeing. We are adapting the public health measures to be as targeted and efficient as possible to stop the spread of the virus, while managing any outbreaks as quickly as possible."

At the request of the local medical officer of health, and with the support of Ontario's Chief Medical Officer of Health, Toronto Public Health would remain in a modified Stage 2 until November 14, 2020.

As of Saturday, November 7, 2020 at 12:01 a.m., public health unit regions would be moved to the following levels:

Lockdown:

- No public health unit regions.

Red-Control:

- Peel Regional Health Unit.

Orange-Restrict:

- Ottawa Public Health; and
- York Region Public Health.

Yellow-Protect:

- Brant County Health Unit;
- City of Hamilton Public Health Services;
- Durham Region Health Department;
- Eastern Ontario Health Unit;
- Haldimand-Norfolk Health Unit;
- Halton Region Public Health;
- Niagara Region Public Health;
- Region of Waterloo Public Health and Emergency Services;
- Simcoe Muskoka District Health Unit; and
- Wellington-Dufferin-Guelph Public Health.

Green-Prevent:

- Algoma Public Health;
- Chatham-Kent Public Health;
- Grey Bruce Health Unit;

- Kingston, Frontenac and Lennox & Addington Public Health;
- Haliburton, Kawartha, Pine Ridge District Health Unit;
- Hastings Prince Edward Public Health;
- Huron Perth Public Health;
- Lambton Public Health;
- Leeds, Grenville & Lanark District Health Unit;
- Middlesex-London Health Unit;
- North Bay Parry Sound District;
- Northwestern Health Unit;
- Peterborough Public Health;
- Porcupine Health Unit;
- Public Health Sudbury & Districts;
- Renfrew County and District Health Unit;
- Southwestern Public Health;
- Thunder Bay District Health Unit;
- Timiskaming Health Unit; and
- Windsor-Essex County Health Unit.

Public health measures required for each level can be found in the *Keeping Ontario Safe and Open Framework*.

For long-term care homes, visitor restrictions remain in effect for the following public health unit regions: Ottawa, Peel, Toronto, and York Region.

"COVID-19 will be with us for awhile, which is why we have put in place a framework that introduces more public health measures sooner to limit transmission of COVID-19 in our communities while avoiding broader closures," said Christine Elliott, Deputy Premier and Minister of Health. "We are committed to being transparent with Ontarians, businesses and local communities as we work together to keep Ontarians safe, while keeping our economy open."

The *Keeping Ontario Safe and Open Framework* takes a comprehensive, whole of government approach by introducing preventative measures earlier to help avoid broader closures and allow for additional public health and workplace safety measures to be introduced or removed gradually. It ensures that public health measures are targeted, incremental and responsive to help limit the spread of COVID-19, while keeping schools and businesses open, maintaining health system capacity and protecting vulnerable people, including those in long-term care.

Trends in public health data will be reviewed weekly. At the same time, the government will continually assess the impact of public health measures for 28 days, or two COVID-19 incubation periods to determine if public health units should stay where they are or be moved into a different level.

The Ontario government is making $300 million available to businesses required to close or significantly restrict services in areas subject to modified Stage 2 public health restrictions, or, going forward, in areas categorized as Control or Lockdown. As a result, businesses in these areas will be able to apply for temporary property tax and energy cost rebates directly to the province through a single, online application portal.

As the province continues to expand access to real-time data, enhancements are also being made to Ontario.ca/coronavirus, Ontario's one-stop shop for information on COVID-19. Information about the spread of the virus, and public health and health system capacity will now be available on the website. This includes local cases by public health unit regions, the total number of cases, resolved cases, deaths, and tests completed and how many are positive. This information will better help businesses, organizations and local communities access key information to prepare in advance for any changes in their region.

Quick Facts

- The framework categorizes public health unit regions into five levels: Green–Prevent, Yellow–Protect, Orange–Restrict, Red–Control, and Lockdown. Each level outlines the types of public health and workplace safety measures for businesses and organizations. These include targeted measures for specific sectors, institutions and other settings.
- Municipalities and local medical officers of health may have additional restrictions or targeted requirements in their region, on top of the public health measures required at their specific level.
- The Ontario government has developed a $2.8 billion COVID-19 fall preparedness plan, *Keeping Ontarians Safe: Preparing for Future Waves of COVID-19*, to ensure the province's health care, long-term care and education systems are prepared for the immediate challenges of the fall, including a second wave of COVID-19 and the flu season.

- On November 5, 2020, the Ontario government released the 2020 Budget, *Ontario's Action Plan: Protect, Support, Recover*, which outlines how the province is protecting people during the COVID-19 pandemic by investing $15.2 billion in health care.
- If you are concerned you were exposed to COVID-19 or have symptoms, take the online COVID-19 self assessment.
- Get tested if you have symptoms compatible with COVID-19, or if you have been advised of exposure by your local public health unit or through the COVID Alert app. Visit Ontario.ca/covidtest to find the nearest testing location.
- To stay safe, you can download the COVID Alert App free from the Apple and Google Play app stores.

Additional Resources

- Ontario Releases COVID-19 Response Framework to Help Keep the Province Safe and Open
- Property Tax and Energy Cost Rebates
- Visit Ontario's website to learn more about how the province continues to protect the people of Ontario from COVID-19.

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This is **Exhibit "C"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

NEWS RELEASE

Ontario Updating COVID-19 Response Framework to Help Stop the Spread of COVID-19

Modelling Shows New Thresholds Needed to Bend the Curve and Keep People Safe

November 13, 2020
Office of the Premier

TORONTO — In consultation with the Chief Medical Officer of Health and the Public Health Measures Table, the Ontario government is taking immediate action to respond to the rapid increase in COVID-19 cases and is updating the *Keeping Ontario Safe and Open Framework*, by lowering the thresholds for each level in the framework. These necessary updates will help limit the spread of COVID-19 while keeping schools open, maintaining health system capacity, protecting the province's most vulnerable, and avoiding broader lockdowns.

Details were provided today by Premier Doug Ford, Christine Elliott, Deputy Premier and Minister of Health, and Dr. David Williams, Chief Medical Officer of Health.

"Our number one priority right now is getting the numbers down and keeping people safe. That's why, on the recommendation of the Chief Medical Officer of Health, we're updating the framework with new thresholds so we can slow the spread of this virus," said Premier Ford. "These adjustments are necessary to respond to the latest evidence we're seeing and we are prepared to make further adjustments as the health experts continue to review the current public health restrictions. We must do whatever it takes to stop our hospitals from being overwhelmed and protect our most vulnerable."

The latest modelling shows that if the number of new cases continues to grow at its current rate, the province could register up to 6,500 new cases per day by mid-December. Within the next two weeks the province will likely exceed its intensive care threshold of 150 beds, under any potential scenario.

The framework changes are in response to the current data and trends, and will lower the threshold for each of the five levels for: weekly incidence rates, positivity rate, effective reproductive number (Rt), outbreak trends and the level of community transmission. Based on these new thresholds, the following public health unit regions would be moved to the following levels in the framework:

- Red-Control:
  - Hamilton Public Health Services
  - Halton Region Public Health
  - Toronto Public Health
  - York Region Public Health

- Orange-Restrict:
  - Brant County Health Unit
  - Durham Region Health Department
  - Eastern Ontario Health Unit
  - Niagara Region Public Health
  - Wellington-Dufferin-Guelph Public Health
  - Region of Waterloo Public Health

- Yellow-Protect:
  - Huron Perth Public Health
  - Middlesex-London Health Unit
  - Public Health Sudbury & Districts
  - Southwestern Public Health
  - Windsor-Essex County Health Unit

Please visit Ontario.ca/COVID19 for the full list of public health region classifications that will come into effect as of Monday, November 16, 2020 at 12:01 a.m. Toronto Public Health will move into the framework on Saturday, November 14, 2020 at 12:01 a.m.

For long-term care homes, visitor restrictions will apply to public health regions within the Orange-Restrict and Red-Control levels in the framework. This will go into effect on Monday, November 16, 2020 at 12:01 a.m.

"Over the last week we have seen an alarming shift in the trends of key public health indicators in regions across the province," said Minister Elliott. "The COVID-19 pandemic continues to evolve, and our government's response must evolve with it. These updates to the COVID-19 Framework will ensure that the necessary targeted measures are in place in hotspots to help stop the spread of the virus and keep our schools and businesses open. Protecting the health and well-being of Ontarians remains our top priority."

The framework takes a gradual approach that includes introducing preventative measures earlier to help avoid broader closures and allow for additional public health and workplace safety measures to be introduced or removed incrementally. It categorizes public health unit regions into five levels: Green-Prevent, Yellow-Protect, Orange-Restrict, Red-Control, and Lockdown being a measure of last and urgent resort.

Ontario's COVID-19 Response Framework has been designed to:

- Be responsive and flexible to latest data;
- Introduce preventative measures earlier to help limit the spread of COVID-19, while keeping schools open, supporting mental health, protecting our most vulnerable, and keeping businesses open where possible;
- Recognize that every community is different and provide the flexibility to allocate resources where they are needed most; and
- Support the ability for local officials to tailor restrictions in their communities based on regional circumstances. The framework serves as a baseline that municipalities and local medical officers of health can build on by imposing additional restrictions or targeted requirements in their region, on top of the public health and workplace safety measures required at their specific level.

"The latest modelling shows a concerning situation in our province. Worldwide we are seeing COVID-19 cases continue to rise, and Ontario is no exception," said Dr. Williams. "It remains critical that everyone continue to strictly follow public health advice to protect yourself and your community. We bent the curve during the first wave and, although it will be challenging, we can do so again through the collective actions of all Ontarians."

Assignments to the current levels would last for a minimum of 28 days or two-incubation periods, at which time the status of these public health unit regions will be reassessed on a weekly basis. However, movement to a more restrictive zone will be considered sooner if there are rapidly worsening trends.

Since the beginning of the outbreak, Ontarians have been playing their part to help bend the curve and stop the spread of the virus. Today more than ever, it is critical for everyone to follow public health advice and strictly comply to the restrictions applied in their regions, especially when connecting with others. The following recommendations apply to all public health unit regions in the province:

- Avoid social gatherings and limit close contacts to your household or the people you live with;
- Adhere to the restrictions in your region on public and private gatherings;
- Maintain two metres of physical distancing from everyone else;
- Wear a face covering indoors and wear one outdoors if physical distancing may not be maintained or if wearing one is required;
- Wash your hands thoroughly and regularly;
- Stay home if you have COVID-19 symptoms, even if they are mild;
- Cover your cough;
- Get tested if you have symptoms compatible with COVID-19, or if you've been advised of exposure by your local public health unit or through the COVID Alert mobile app;
- Individuals and families from higher transmission regions should avoid travel to lower transmission regions, except for essential reasons; and
- Download the COVID Alert mobile app.

In addition, as the province continues to expand access to real-time data, enhancements have been made to Ontario.ca/coronavirus, Ontario's one-stop shop for information on COVID-19. Beginning today, users will now be able to view new, active, resolved, deceased, and total cases, by public health unit, on a map. In addition, the website will now provide Ontarians with an effective reproduction number, as well as enhanced long-term care data. The government will

continue to update the dashboard with relevant data to ensure as much transparency as possible. This information will better help businesses, organizations and local communities access key information to prepare in advance for any changes in their region.

Quick Facts

- Find out what level and which regional public measures are in place for your area.
- The Ontario government has developed a $2.8 billion COVID-19 fall preparedness plan, *Keeping Ontarians Safe: Preparing for Future Waves of COVID-19*, to ensure the province's health care, long-term care and education systems are prepared for the immediate challenges of the fall, including a second wave of COVID-19 and the flu season.
- The Ontario government is making $300 million available to businesses required to close or significantly restrict services in areas subject to modified Stage 2 (Red–Control level) public health restrictions, or, going forward, in Lockdown. As a result, businesses in these areas will be able to apply for temporary property tax and energy cost rebates directly to the province through a single, online application portal.
- If you are concerned you were exposed to COVID-19 or have symptoms, take the online COVID-19 self assessment.
- Get tested if you have symptoms compatible with COVID-19, or if you have been advised of exposure by your local public health unit or through the COVID Alert app. Visit Ontario.ca/covidtest to find the nearest testing location.
- To stay safe, you can download the COVID Alert App free from the Apple and Google Play app stores.

Additional Resources

- Ontario Releases COVID-19 Response Framework to Help Keep the Province Safe and Open
- Property Tax and Energy Cost Rebates
- Visit Ontario's website to learn more about how the province continues to protect the people of Ontario from COVID-19.

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This is **Exhibit "D"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

NEWS RELEASE

Ontario Taking Further Action to Stop the Spread of COVID-19

Province Also Doubling Financial Support for Businesses Affected by Additional Restrictions

November 20, 2020
Office of the Premier

TORONTO — In consultation with the Chief Medical Officer of Health, local medical officers of health, and other health experts, the province is moving certain public health unit regions to new levels in the *Keeping Ontario Safe and Open Framework*, which includes moving Toronto and Peel into Lockdown. These necessary measures are being taken to limit community transmission of COVID-19 in order to keep schools open, safeguard health system capacity, and protect the province's most vulnerable populations.

Details were provided today by Premier Doug Ford, Christine Elliott, Deputy Premier and Minister of Health, Rod Phillips, Minister of Finance, and Dr. David Williams, Chief Medical Officer of Health.

"With the numbers rising rapidly in certain regions, we have to make the tough, but necessary decisions now to protect our hospitals, long-term care and retirement homes, and every person in this province," said Premier Ford. "We cannot afford a province-wide lockdown, so we are taking preventative action today by moving Toronto and Peel into Lockdown level restrictions and other regions into higher levels of restrictions. We need to take decisive action to stop the spread of this deadly virus."

Over the past week, some regions under the Red-Control level have continued to see worsening trends in key indicators, despite having a range of public health measures and restrictions in place since early October. Based on the latest data, the government intends to move Peel Public Health and Toronto Public Health into Lockdown effective Monday, November 23, 2020 at 12:01 a.m. This action is being taken to help stop the spread of COVID-19, while prioritizing the continued opening of schools, child care centres and other key services to the fullest extent possible.

Measures under Lockdown include, but are not limited to:

- Schools, before and after school programs, and child care will remain open;
- Post-secondary schools open for virtual learning with some limited exceptions for training that can only be provided in-person, such as clinical training or training related to a trade;
- No indoor organized public events or social gatherings except with members of the same household. Individuals who live alone, including seniors, may consider having exclusive, close contact with another household;
- Outdoor organized public events or social gatherings limited to a maximum of 10 people;
- Wedding services, funeral services and religious services, rites or ceremonies where physical distancing can be maintained can have up to 10 people indoors or 10 people outdoors;
- Retail permitted to be open for curbside pick-up or delivery only, with certain exceptions such as for supermarkets, grocery stores, pharmacies, hardware stores, discount and big box retailers selling groceries, beer, wine and liquor stores, safety supply stores, and convenience stores, which will be allowed to operate at 50 per cent capacity;
- Restaurants, bars, and food and drink establishments will only be able to provide takeout, drive-through and delivery. Indoor and outdoor dining services are prohibited;
- Personal care services closed;
- Casinos, bingo halls and other gaming establishments closed; and
- Indoor sports and recreational facilities, including pools, closed with limited exceptions.

The Chief Medical Officer of Health and health experts will continue to provide advice to the government using criteria, including:

- Epidemiological indicators such as the number and rate of COVID-19 cases and test positivity;
- Health system capacity indicators including hospital and Intensive Care Unit capacity, access to ventilators and ongoing availability of personal protective equipment;

- Public health sector capacity, including the number of COVID-19 cases and contacts being reached by local public health officials within one day; and
- Ongoing testing of suspected COVID-19 cases, especially of vulnerable populations, to detect new outbreaks quickly.

"As public health indicators continue to worsen in regions across the province, particularly in hotspots like Peel and Toronto, it is clear that more needs to be done to limit community spread of COVID-19," said Minister Elliott. "As we have seen around the world, lockdowns are a difficult but necessary step to stop the spread, safeguard the key services we rely on and protect our health system capacity. With the recent positive news on the development of a vaccine, there is a real hope that we can defeat this deadly virus, but for now we all must continue to follow public health advice and strictly adhere to the restrictions in place."

Based on the latest data, the following public health unit regions will move from their current level in the framework to the following levels effective Monday, November 23, 2020 at 12:01 a.m.:

- Red-Control
  - Durham Region Health Department; and
  - Region of Waterloo Public Health and Emergency Services.

- Orange-Restrict
  - Huron Perth Public Health;
  - Simcoe Muskoka District Health Unit;
  - Southwestern Public Health; and
  - Windsor-Essex County Health Unit.

- Yellow-Protect
  - Chatham-Kent Public Health;
  - Eastern Ontario Health Unit;
  - Grey Bruce Health Unit;
  - Kingston, Frontenac and Lennox & Addington Public Health;
  - Peterborough Public Health; and
  - Thunder Bay District Health Unit.

Please visit Ontario.ca/covidresponse for the full list of public health region classifications.

Trends in public health data will continue to be reviewed weekly to determine if public health units should stay where they are or be moved into a higher level. Public health units will stay in their level for a minimum of 28 days, or two COVID-19 incubation periods, at which time, the government will assess the impact of public health measures to determine if the public health unit should stay where they are or be moved to a different level. The Ministry of Health will continue to communicate regularly with local medical officers of health on local context and conditions to help inform the classification of their public health unit region.

For long-term care homes, visitor restrictions apply to those homes in the public health units that are in the Orange-Restrict level or higher. To further protect the health and safety of those in long-term care homes, staff, essential caregivers and support workers who provide direct care to residents in those regions will be tested more frequently for COVID-19, moving from bi-weekly tests to weekly as of November 23, 2020. In addition, support workers who provide direct care and caregivers in those regions will be asked to provide proof of a negative COVID-19 test result in the past week and verbally attest that they have not subsequently tested positive.

For retirement homes, homes in public health regions that are in Red-Control or higher will be in high alert with visitor restrictions as outlined in the Retirement Homes COVID-19 Visitor Policy. Homes will continue to be notified of their alert status by the Retirement Homes Regulatory Authority.

"Advising regions to move into a lockdown is not a decision we take lightly, but it is one that is needed to ensure the safety of the people of Peel and Toronto," said Dr. Williams. "Now more than ever, it is critical that all Ontarians continue to follow public health advice to help stop the spread of the virus. Everyone has a role to play to protect each other. We are interdependent and nothing can be done without the commitment of each individual, family and community."

To further support public health regions, the province is making additional enforcement mechanisms available to local medical officers of health who have applied additional measures based on their local conditions and needs. The government is amending Ontario Regulation 950 under the *Provincial Offences Act*, allowing for a ticket to be issued for any contravention of a COVID-19 specific communicable disease class order issued by a medical officer of health. The government will also ask the Chief Justice of the Ontario Court of Justice to establish a set fine to be attached to any ticket issued for violating a section 22 order relating to COVID-19 made by a local medical officer of health.

"We are asking Ontarians to familiarize themselves with the restrictions in place, follow the rules and public health guidance, and support enforcement officers who are working to help prevent the further spread of COVID-19," said Solicitor General Sylvia Jones. "Our government will continue to work with law enforcement to ensure they have the tools they need to promote public safety and take the enforcement actions needed to prevent unsafe behaviour."

Additional Supports Available for Businesses Affected by COVID-19 Public Health Measures

The Ontario government is now providing $600 million in relief to support eligible businesses required to close or significantly restrict services due to enhanced public health measures, doubling its initial commitment of $300 million made in the 2020 Budget, Ontario's Action Plan: Protect, Support Recover.

Businesses can apply online for temporary property tax and energy cost rebate grants from the province, via an easy-to-use one-window portal. The rebates will cover the length of time that a business is required to temporarily close or significantly restrict services as a result of being located in an area categorized as Red-Control or Lockdown, or previously categorized as modified Stage 2 public health restrictions. Most businesses can expect to receive their rebate payments within a few weeks of submitting a complete application. A detailed list of eligible businesses, as well as instructions for applying, can be found at Ontario.ca/covidsupport.

The federal and provincial governments have been working collaboratively together to deliver benefits and supports to individuals, families and businesses since the onset of COVID-19. Consistent with this, Ontario will work with the federal government to ensure these supports for businesses in COVID-19 hotspots are available in the most straightforward and seamless way possible by integrating these rebates with the federal Canada Emergency Rent Subsidy (CERS) program.

"We will double the funding we have made available to support employers and jobs affected by the necessary public health measures we are taking to protect people during the second wave," said Minister Phillips. "All of us know a small business owner struggling due to COVID-19. These necessary public health measures we have outlined today will create new challenges — but as we committed in Ontario's Action Plan: Protect, Support, Recover, we will continue to be there to protect jobs and support employers."

Quick Facts

- If you have questions about what will be open or impacts to your business or employment, call the Stop the Spread Business Information Line at 1-888-444-3659.
- Find out what level and which regional public measures are in place for your area.
- Municipalities and local medical officers of health may have additional restrictions or targeted requirements in their region, on top of the public health measures required at their specific level.
- The Ontario government has developed a $2.8 billion COVID-19 fall preparedness plan, Keeping Ontarians Safe: Preparing for Future Waves of COVID-19, to ensure the province's health care, long-term care and education systems are prepared for the immediate challenges of the fall, including a second wave of COVID-19 and the flu season.
- Get tested if you have symptoms compatible with COVID-19, or if you have been advised of exposure by your local public health unit or through the COVID Alert app. Visit Ontario.ca/covidtest to find the nearest testing location.
- To find the right supports, visit COVID-19: Support for People, which has information about the many available and free mental health services and supports.
- To stay safe you can download the COVID Alert App free from the Apple and Google Play app stores.

Additional Resources

- Ontario's Action Plan: Protect, Support, Recover
- Ontario Updating COVID-19 Response Framework to Help Stop the Spread of COVID-19
- Ontario's Action Plan: Responding to COVID-19
- Property Tax and Energy Cost Rebates
- Visit Ontario's website to learn more about how the province continues to protect the people of Ontario from COVID-19.

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This is **Exhibit "E"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

NEWS RELEASE

Ontario Moving Regions to New Levels in COVID-19 Response Framework

Framework Introduces Preventative Measures Earlier to Limit Transmission of COVID-19

November 27, 2020
Health

TORONTO — The Ontario government, in consultation with the Chief Medical Officer of Health, local medical officers of health, and other health experts, is moving five public health regions to new levels with stronger public health measures. These steps are being taken to stop the spread of COVID-19 in order to keep schools open, safeguard health system capacity, and protect the province's most vulnerable populations. The regional levels and specific public health measures are set out in the *Keeping Ontario Safe and Open Framework*.

"The health and safety of all Ontarians is and will always be our top priority, that's why we are following the advice of the Chief Medical Officer of Health and other health experts and making this adjustment today," said Christine Elliott, Deputy Premier and Minister of Health. "Over the last week we have seen a shift in the trends of key public health indicators in regions across the province, and by moving these five regions to a new level in the framework, we can ensure that the necessary targeted measures are in place to stop the spread of the virus and allow us to keep our schools and businesses open."

Based on the latest data, the following public health regions will move from their current level in the framework to the following levels effective Monday, November 30, 2020 at 12:01 a.m.:

- Red-Control
  - Windsor-Essex County Health Unit.
- Orange-Restrict
  - Haldimand-Norfolk Health Unit.
- Yellow-Protect
  - Hastings Prince Edward Public Health
  - Lambton Public Health; and
  - Northwestern Health Unit.

All other public health regions will remain at their current level. Please visit Ontario.ca/covidresponse for the full list of public health region classifications.

For long-term care homes, visitor restrictions apply to those homes in the public health unit regions that are in the Orange-Restrict level or higher. In addition, long-term care homes must implement recently enhanced testing requirements.

Trends in public health data will continue to be reviewed weekly to determine if public health units should stay where they are or be moved into a higher level. Public health units will stay in their level for a minimum of 28 days, or two COVID-19 incubation periods, at which time, the government will assess the impact of public health measures to determine if the public health unit should stay where they are or be moved to a different level. The Ministry of Health will continue to consult regularly with local medical officers of health on local context and conditions to help inform the classification of their public health unit region.

"As we continue in our fight against this second wave of COVID-19, the need to follow public health advice has never been greater," said Dr. David Williams, Chief Medical Officer of Health. "All Ontarians are urged to adhere to the organized public event and social gathering limits in their region and avoid any non-essential travel in order to reduce the risk of exposure and ensure the continued safety of the community."

All Ontarians should avoid close contact with anyone not living in the same household. People who live alone may have exclusive close contact with one additional household to prevent feelings of isolation and mitigate against negative mental health impacts.

The following recommendations apply to all public health unit regions in the province:

- Stay home if you have COVID-19 symptoms, even if they are mild;
- Maintain two metres of physical distancing from everyone else;
- Avoid social gatherings and limit close contacts to your household or the people you live with;
- Adhere to the restrictions in your region on public and private gatherings;
- Wear a face covering indoors and wear one outdoors if physical distancing may not be maintained or if wearing one is required;
- Wash your hands thoroughly and regularly;
- Cover your cough;
- Get tested if you have symptoms compatible with COVID-19, or if you've been advised of exposure by your local public health unit or through the COVID Alert mobile app;
- Individuals and families from higher transmission regions should avoid travel to lower transmission regions, except for essential reasons; and
- Download the COVID Alert mobile app.

Quick Facts

- Find out what level and which regional public measures are in place for your area.
- No matter where you live in the province, the safest way to spend the holidays this year is by only celebrating in person with the people you live with and celebrating virtually with everyone else.
- Get tested if you have symptoms compatible with COVID-19, or if you have been advised of exposure by your local public health unit or through the COVID Alert app. Visit Ontario.ca/covidtest to find the nearest testing location.
- To find the right supports, visit COVID-19: Support for People, which has information about the many available and free mental health services and supports.
- The Ontario government is now providing $600 million in relief to support eligible businesses required to close or significantly restrict services due to enhanced public health measures, doubling its initial commitment of $300 million made in the 2020 Budget, Ontario's Action Plan: Protect, Support Recover.
- If you have questions about what will be open or impacts to your business or employment, call the Stop the Spread Business Information Line at 1-888-444-3659.
- To stay safe, you can download the COVID Alert App free from the Apple and Google Play app stores.

Additional Resources

- Celebrate the Holiday Season Safely
- Ontario Taking Further Action to Stop the Spread of COVID-19
- Ontario’s Action Plan: Protect, Support, Recover
- Property Tax and Energy Cost Rebates
- Visit Ontario’s website to learn more about how the province continues to protect the people of Ontario from COVID-19.

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This is **Exhibit "F"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

NEWS RELEASE

Ontario Moving Regions to New Levels with Stronger Public Health Measures

Action is being taken to stop the spread of COVID-19 and protect vulnerable people

December 11, 2020
Health

TORONTO — The Ontario government, in consultation with the Chief Medical Officer of Health, local medical officers of health, and other health experts, is moving seven public health regions to new levels with stronger public health measures, including Windsor-Essex County Health Unit and York Region Public Health moving into Grey-Lockdown. These steps are being taken to stop the spread of COVID-19 in order to keep schools open in the regions where in-class learning is permitted, safeguard health system capacity, and protect the province's most vulnerable populations. The regional levels and specific public health measures are set out in the *Keeping Ontario Safe and Open Framework*.

"Moving a region into Grey-Lockdown is not an easy decision, but it is one we needed to make in order to help stop the spread of the virus and safeguard the key services we rely on," said Christine Elliott, Deputy Premier and Minister of Health. "As we enter the holiday season and as the province prepares to receive its first shipment of COVID-19 vaccines, it remains crucial for all Ontarians to continue adhering to public health advice and workplace safety measures to reduce the spread of the virus and keep each other safe."

Based on the latest data, the following public health regions will move from their current level in the framework to the following levels effective Monday, December 14, 2020 at 12:01 a.m.:

- Grey-Lockdown
  - Windsor-Essex County Health Unit; and
  - York Region Public Health.

- Red-Control
  - Middlesex-London Health Unit;
  - Simcoe Muskoka District Health Unit; and
  - Wellington-Dufferin-Guelph Public Health.

- Orange-Restrict
  - Eastern Ontario Health Unit.

- Yellow-Protect
  - Leeds, Grenville and Lanark District Health Unit.

All other public health regions will remain at their current level. Please visit Ontario.ca/covidresponse for the full list of public health region classifications.

"Over the last week, public health indicators in the York and Windsor regions have continued to trend in the wrong direction and it is evident additional measures are needed to help limit the spread of the virus," said Dr. David Williams, Chief Medical Officer of Health. "By making this difficult but necessary decision we can help to ensure that hospitals in these regions can work to provide patients with the care they need when they need it, including the performing of scheduled surgeries and other important procedures."

For long-term care homes, visitor restrictions apply to those homes in the public health unit regions that are in the Orange-Restrict level or higher. In addition, long-term care homes must implement recently enhanced testing requirements.

Trends in public health data will continue to be reviewed weekly to determine if public health units should stay where they are or be moved into a different level. Public health units will stay in their level for a minimum of 28 days, or two COVID-19 incubation periods, at which time, the government will assess the impact of public health measures to determine if the public

health unit should stay where they are or be moved to a different level. The government and the Chief Medical Officer of Health will continue to consult regularly with local medical officers of health on local context and conditions to help inform the classification of their public health unit region.

As we approach the holiday season, the government is urging all Ontarians to continue to follow all required public health measures and public health advice. This includes the following:

- Stay home if you have COVID-19 symptoms, even if they are mild;
- Maintain two metres of physical distancing from anyone outside your household;
- Avoid social gatherings and limit close contacts to your household or the people you live with;
- Adhere to the restrictions in your region on public and private gatherings;
- Wear a face covering indoors and wear one outdoors if physical distancing may not be maintained or if wearing one is required;
- Wash your hands thoroughly and regularly;
- Cover your cough;
- Get tested if you have symptoms compatible with COVID-19, or if you've been advised of exposure by your local public health unit or through the COVID Alert mobile app;
- Individuals and families from higher transmission regions should avoid travel to lower transmission regions, except for essential reasons; and
- Download the COVID Alert mobile app.

No matter where you live in the province, the safest way to spend the holidays this year is by only celebrating in person with the people you live with and celebrating virtually with everyone else. People who live alone may have exclusive close contact with one additional household to help prevent feelings of isolation and mitigate against negative mental health impacts.

The Ontario government is now providing $600 million in property tax and energy cost rebates to support eligible businesses required to close or significantly restrict services due to enhanced public health measures, doubling its initial commitment of $300 million made in the 2020 Budget, Ontario's Action Plan: Protect, Support, Recover. To apply for this funding please visit Businesses: Get help with COVID-19 costs.

Quick Facts

- Find out what level and which regional public measures are in place for your area.
- Learn how to celebrate the holidays safely with the people you live with by visiting Ontario.ca/celebratesafely.
- Get tested if you have symptoms compatible with COVID-19, or if you have been advised of exposure by your local public health unit or through the COVID Alert app. Visit Ontario.ca/covidtest to find the nearest testing location.
- To find the right supports, visit COVID-19: Support for People, which has information about the many available and free mental health services and supports.
- If you have questions about what will be open or impacts to your business or employment, call the Stop the Spread Business Information Line at 1-888-444-3659.
- To stay safe, you can download the COVID Alert App free from the Apple and Google Play app stores.

Additional Resources

- Celebrate the Holiday Season Safely
- Ontario Moving Three Regions to New Levels in COVID-19 Response Framework
- Ontario's Action Plan: Protect, Support, Recover
- Property Tax and Energy Cost Rebates
- Visit Ontario's website to learn more about how the province continues to protect the people of Ontario from COVID-19.

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This is **Exhibit "G"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

NEWS RELEASE

Ontario Announces Provincewide Shutdown to Stop Spread of COVID-19 and Save Lives

Government Providing Grants of up to $20,000 to Small Businesses Impacted by New Public Health Measures

December 21, 2020
Office of the Premier

TORONTO — As COVID-19 cases continue to rise at an alarming rate, the Ontario government, in consultation with the Chief Medical Officer of Health and other health experts, is imposing a Provincewide Shutdown. Additional restrictions will be put into place and reinforce that Ontarians should stay at home as much as possible to minimize transmission of the virus and prevent hospitals from becoming overwhelmed. The Provincewide Shutdown will go into effect as of Saturday, December 26, 2020, at 12:01 a.m.

Details were provided today by Premier Doug Ford, Christine Elliott, Deputy Premier and Minister of Health, Stephen Lecce, Minister of Education, Dr. David Williams, Chief Medical Officer of Health, and Dr. Naveed Mohammad, President and CEO, William Osler Health System.

"The number of daily cases continue to rise putting our hospitals and long-term care homes at risk," said Premier Ford. "We need to stop the spread of this deadly virus. That's why, on the advice of Dr. Williams and other health experts, we are taking the difficult but necessary decision to shutdown the province and ask people to stay home. Nothing is more important right now than the health and safety of all Ontarians."

In response to these exceptional circumstances, the Provincewide Shutdown would put in place time-limited public health and workplace safety measures similar to those in other jurisdictions. It would help stop the trend of high COVID-19 transmission in communities, preserve health system capacity, safeguard vulnerable populations and those who care for them, and save lives. Measures include, but are not limited to:

- Restricting indoor organized public events and social gatherings, except with members of the same household (the people you live with). Individuals who live alone may consider having exclusive close contact with one other household.
- Prohibiting in-person shopping in most retail settings - curbside pickup and delivery can continue. Discount and big box retailers selling groceries will be limited to 25 per cent capacity for in-store shopping. Supermarkets, grocery stores and similar stores that primarily sell food, as well as pharmacies, will continue to operate at 50 per cent capacity for in-store shopping.
- Restricting indoor access to shopping malls - patrons may only go to a designated indoor pickup area (by appointment only), essential retail stores that are permitted to be open (e.g. pharmacy, grocery store), or, subject to physical distancing and face covering requirements, to the food court for takeout purchases. Shopping malls may also establish outdoor designated pickup areas.
- Prohibiting indoor and outdoor dining. Restaurants, bars and other food or drink establishments will be permitted to operate by take out, drive-through, and delivery only.

On the advice of the Chief Medical Officer of Health, all Ontarians are advised to stay home as much as possible with trips outside the home limited to necessities such as food, medication, medical appointments, or supporting vulnerable community members. Employers in all industries should make every effort to allow employees to work from home.

The current COVID-19 Response Framework will be paused when the Provincewide Shutdown comes into effect. The impacts of these time-limited measures will be evaluated throughout the 14 days in Northern Ontario and 28 days in Southern Ontario to determine if it is safe to lift any restrictions or if they need to be extended.The Chief Medical Officer of Health will assess and apply lessons learned thus far to the COVID-19 Response Framework to ensure appropriate and effective measures are in place to protect the health of Ontarians and enable economic recovery after the Provincewide Shutdown ends. This will include an assessment of how a revised approach for the safe reopening of retail may be operationalized, according to the latest available evidence.

"This was not an easy decision before the holidays, but we have reached a tipping point," said Minister Elliott. "We continue to see sharp increases in hospitalizations and occupancy in intensive care units is reaching concerning levels. Urgent action must be taken to prevent our health care system from becoming overwhelmed. By implementing a Provincewide Shutdown, we can work to stop the virus in its tracks, safeguard hospital capacity, and save lives."

The government is also providing $12.5 million to implement a High Priority Communities Strategy to contain the virus in high-risk communities. The strategy will take a tailored, community-based approach to fund community agencies in 15 priority communities in the York, Peel, Durham, Ottawa, and Toronto regions. The funding will also allow for the hiring of community ambassadors to make people aware of available services and assistance, for coordination of increased testing opportunities and for the arrangement of wraparound supports for those who are COVID-positive. Additional funding of $42 million will also be available to establish isolation centres.

The province will work with our local municipal partners to establish new isolation centres to help those who may need to isolate following testing.

"We continue to see the number of cases in the province grow and the trends in public health indicators worsen. Additional measures are needed provincewide in order to interrupt this concerning growth," said Dr. Williams. "We must work together to enable everyone to follow these new and time-limited restrictions and protect our health system and our communities."

The government is working to limit the transmission of COVID-19 in workplaces by supporting essential businesses in doing whatever is necessary to keep workers safe. The Ministry of Labour, Training and Skills Development is leading a multi-ministry COVID-19 Safety Team. The team will partner with local authorities to carry out additional enforcement blitzes in sectors where they are needed most.

New School Protocols

While transmission in schools remains low, all publicly funded and private elementary and secondary schools are to move to teacher-led remote learning when students return from the winter break on January 4, 2021. This action is being taken in support of the Government's broader efforts to limit the spread of COVID-19.

Schools located in the following Public Health Unit regions can resume in-person instruction on January 11, 2021 for both elementary and secondary students:

- The District of Algoma Health Unit
- North Bay Parry Sound District Health Unit
- Northwestern Health Unit
- Porcupine Health Unit
- Sudbury and District Health Unit
- Thunder Bay District Health Unit
- Timiskaming Health Unit

For schools in all other Public Health Unit regions, elementary school students are planned to be able to return to in-person learning on January 11, 2021, and secondary school students will continue learning remotely until January 25, 2021, at which point they may resume in-person learning. During this period, child care centres, authorized recreational and skill building programs and home-based child care services will remain open. From January 4-8, 2021, when elementary students move to remote learning, before and after school programs will be closed and emergency child care for health care and frontline workers will be provided. As part of the government's efforts to protect the most vulnerable, boards will be required to make provisions for continued in-person support for students with special education needs who cannot be accommodated through remote learning for whom remote learning is challenging.

"While our schools are not a source of rising community transmission, we can play an important part of the solution to save lives from COVID-19," said Minister Lecce. "During this period, students will pivot to teacher-led online learning, with child care provided for our frontline workers. We are taking proactive and preventative action to protect schools following the holiday break to ensure kids can continue in-class learning — something we believe is so important — for the remainder of the year."

The New Ontario Small Business Support Grant

The government recognizes that small businesses impacted by these necessary public health measures will require additional support so they can continue serving their communities and employing people in Ontario once the COVID-19 pandemic is over. That is why the government is announcing the new *Ontario Small Business Support Grant*, which will provide a minimum of $10,000 and up to $20,000 to eligible small business owners to help navigate this challenging period.

"Ontario's business owners have shown remarkable resolve and ingenuity throughout the pandemic. They know better than anyone what they need to come through this very difficult time, so they can continue to serve and employ people in their communities," said Rod Phillips, Minister of Finance. "The new *Ontario Small Business Support Grant* will provide significant financial support to eligible small business owners in addition to the other supports made available to our small business community."

Small businesses required to close or restrict services under the Provincewide Shutdown will be able to apply for this one-time grant. Each small business will be able to use the support in whatever way makes the most sense for their individual business. For example, some businesses will need support paying employee wages or rent, while others will need support maintaining their inventory.

Eligible small businesses include those that:

- Are required to close or significantly restrict services subject to the Provincewide Shutdown effective 12:01 a.m. on December 26, 2020;
- Have less than 100 employees at the enterprise level; and
- Have experienced a minimum of 20 per cent revenue decline in April 2020 compared to April 2019.

Starting at $10,000 for all eligible businesses, the grant will provide businesses with dollar for dollar funding to a maximum of $20,000 to help cover decreased revenue expected as a result of the Provincewide Shutdown. The business must demonstrate they experienced a revenue decline of at least 20 per cent when comparing monthly revenue in April 2019 and April 2020. This time period was selected because it reflects the impact of the public health measures in spring 2020, and as such provides a representation of the possible impact of these latest measures on small businesses.

Essential businesses that are allowed to remain open will not be eligible for this grant. More information about the *Ontario Small Business Support Grant* is available here. Further details, including how to apply, will be announced in January 2021.

Businesses that are impacted by the Provincewide Shutdown will also be eligible for the property tax and energy cost rebates. In November, the government launched a program to provide rebates to offset fixed costs such as property tax and energy bills for businesses that are required to shut down or significantly restrict services due to provincial public health measures. These rebates will continue to be available for businesses impacted by the Provincewide Shutdown and earlier restrictions. Business can apply for the rebates here.

Quick Facts

- Currently, hospitalizations for COVID-19 have increased by 74 per cent over the last four weeks and are more than 15 times higher than they were at the beginning of September. Intensive care unit (ICU) occupancy for COVID-19 has more than doubled over the last four weeks and is 20 times higher than at the beginning of September.
- Ontario currently has 915 COVID-19 patients requiring acute care, 265 patients in ICU, with 152 on a ventilator.
- Based on the latest modelling data, cases across the province are continuing to grow and the number of people requiring an intensive care bed is projected to rise well above 300 people within the next 10 days.
- Some jurisdictions around the world, including those in Canada have implemented similar time-limited measures to respond to a dramatic resurgence in cases. Based on their experiences, measures of four to six weeks are expected to interrupt transmission of COVID-19 in Ontario.
- Municipalities and local medical officers of health may have additional restrictions or targeted requirements in their region.
- Get tested if you have symptoms compatible with COVID-19, or if you have been advised of exposure by your local public health unit or through the COVID Alert App. Visit Ontario.ca/covidtest to find the nearest testing location.
- The Ontario Small Business Support Grant is part of the Province's more than $13.5 billion in support for people and jobs outlined in the 2020 Budget, Ontario's Action Plan: Protect, Support, Recover. It is also in addition to $4.8 billion to address critical areas to support a strong long-term recovery that helps workers, employers and communities get back on their feet, while building the foundation for recovery and growth.
- To find the right supports, visit COVID-19: Support for People, which has information about the many available and free mental health services and supports.
- To stay safe you can download the COVID Alert App free from the Apple and Google Play app stores.
- To date, as part of the province's COVID-19 immunization program, over 3,000 frontline health care workers have been vaccinated.
- Schools continue to be safe, and according to data reported by school boards, as of Friday, December 18: approximately 99.64 per cent of students in Ontario have not reported a case of COVID-19; approximately 92 per cent of schools across the province have had either no cases or one case reported within the last 14 days; and approximately 80 per cent of schools do not have an case of COVID-19.

Additional Resources

- Ontario Building On Supports for Employers During COVID-19
- Ontario Supporting High Priority Communities
- The Digital Main Street program helps main street businesses build their online presence and reach more customers.
- Property Tax and Energy Cost Rebates
- Visit Ontario's website to learn more about how the province continues to protect the people of Ontario from COVID-19.
- COVID-19: provincewide shutdown
- **If you have questions about what will be open or impacts to your business or employment, call the Stop the Spread Business Information Line at 1-888-444-3659.**

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This is **Exhibit "H"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

NEWS RELEASE

Ontario Declares Second Provincial Emergency to Address COVID-19 Crisis and Save Lives

Province Issues Stay-at-Home Order and Introduces Enhanced Enforcement Measures to Reduce Mobility

January 12, 2021
Office of the Premier

TORONTO — In response to a doubling in COVID-19 cases over the past two weeks, the real and looming threat of the collapse of the province's hospital system and alarming risks posed to long-term care homes as a result of high COVID-19 transmission rates, the Ontario government, in consultation with the Chief Medical Officer of Health and other health experts, is immediately declaring a second provincial emergency under s 7.0.1 (1) of the *Emergency Management and Civil Protection Act* (EMPCA).

Details were provided today by Premier Doug Ford, Christine Elliott, Deputy Premier and Minister of Health, Solicitor General Sylvia Jones, Dr. David Williams, Chief Medical Officer of Health, and Dr. Adalsteinn (Steini) Brown, Co-Chair of the Ontario COVID-19 Science Advisory Table.

"The latest modelling data shows that Ontario is in a crisis and, with the current trends, our hospital ICUs will be overwhelmed in a few short weeks with unthinkable consequences," said Premier Ford. "That's why we are taking urgent and decisive action, which includes declaring a provincial emergency and imposing a stay-at-home-order. We need people to only go out only for essential trips to pick up groceries or go to medical appointments. By doing the right thing and staying home, you can stay safe and save lives."

Effective Thursday, January 14, 2021at 12:01 a.m., the government is issuing a stay-at-home order requiring everyone to remain at home with exceptions for permitted purposes or activities, such as going to the grocery store or pharmacy, accessing health care services, for exercise or for work where the work cannot be done remotely. This order and other new and existing public health restrictions are aimed at limiting people's mobility and reducing the number of daily contacts with those outside an immediate household. In addition to limiting outings for these purposes, all businesses must ensure that any employee who can work from home, does work from home.

These new public health measures will help stop the spread of COVID-19 by reducing concerning levels of mobility as the province continues its vaccine rollout and ramps up to mass vaccination when the federal government is able to provide the necessary supply to do so.

Additional Public Health Restrictions

Since the implementation of the Provincewide Shutdown over two weeks ago, the latest modelling trends in key public health indicators have continued to worsen, forecasting an overwhelming of the health system unless drastic action is taken. Escalating case counts have led to increasing hospitalization rates and intensive care unit (ICU) occupancy which has resulted in cancellations of scheduled surgeries and procedures.

Provincial modelling shows growth in COVID-19 cases has accelerated, leading to increased hospitalization rates and ICU occupancy. ICU occupancy by COVID-19 patients is now over 400 beds and is projected to be as high as 1,000 beds by early February which has the potential to overwhelm Ontario's hospitals. The number of COVID-19-related deaths continues to rise and is expected to double from 50 to 100 deaths per day between now and the end of February. Notably, data shows that mobility and contacts between people have not decreased with the current restrictions. A new variant of COVID-19 emerged in November. If community transmission of this variant occurs, Ontario could experience much higher case counts, ICU occupancy and mortality.

In response to the alarming and exceptional circumstances at hand, and to further interrupt the deadly trend of transmission in Ontario communities, hospitals, and long-term care homes, the following additional public health measures will take effect January 13, 2021 at 12:01 a.m.:

- Outdoor organized public gatherings and social gatherings are further restricted to a limit of five people with limited exceptions. This is consistent with the rules during the lockdown during the first wave of COVID-19 in spring 2020 and will allow individuals and families to enjoy time outdoors safely.
- Individuals are required to wear a mask or face covering in the indoor areas of businesses or organizations that are open. Wearing a mask or face covering is now recommended outdoors when you can't physically distance more than two metres.
- All non-essential retail stores, including hardware stores, alcohol retailers, and those offering curbside pickup or delivery, must open no earlier than 7 a.m. and close no later than 8 p.m. The restricted hours of operation do not apply to stores that primarily sell food, pharmacies, gas stations, convenience stores, and restaurants for takeout or delivery.
- Non-essential construction is further restricted, including below-grade construction, exempting survey.

These measures will come into effect between Tuesday January 12, 2021 and Thursday, January 14, 2021, including the provincial declaration of emergency under the EMCPA, orders under that Act, and amendments to regulations under the *Reopening Ontario (A Flexible Response to COVID-19) Act, 2020*.

"Despite our best efforts, COVID-19 is continuing to spread in our communities, our hospitals, our long-term care homes, and our workplaces. We are continuing to see concerning trends across the province, including a tragic number of deaths," said Christine Elliott, Deputy Premier and Minister of Health. "We have made great strides in vaccinating tens of thousands of Ontarians, and we can't let these efforts go to waste. Urgent action is required to break this deadly trend of transmission, ensure people stay home, and save lives."

To help quickly identify and isolate cases of COVID-19 in workplaces and service providers permitted to remain open such as long-term care homes and schools, the province will provide up to 300,000 COVID-19 tests per week to support key sectors such as manufacturing, warehousing, supply chain and food processing, as well as additional tests for schools and long-term care homes. This volume of rapid tests would support antigen screening for up to 150,000 workers per week over the next 4-5 months in Ontario's most critical workplaces. The province is expecting to receive 12 million Panbio tests from the federal government over the next several months and continues to pursue opportunities to purchase additional rapid tests.

"The trends in key public health indicators are continuing to deteriorate, and further action is urgently required to save lives," said Dr. David Williams, Chief Medical Officer of Health. "By strictly adhering to all public health and workplace safety measures, we can reduce the transmission of COVID-19 and keep our loved ones and our communities safe. It will take the collective efforts of us all to defeat this virus."

The government knows that in order to keep Ontarians safe, it is important that they are not forced to leave their homes during the new state of emergency. Ontario is exploring all options available to put a temporary residential evictions moratorium in place, and will have more to say in the coming days.

The additional public health restrictions introduced expand on the existing measures put in place to keep Ontarians safe and healthy.

New Enforcement Measures

The province will provide authority to all provincial offences officers, including the Ontario Provincial Police, local police forces, bylaw officers, and provincial workplace inspectors to issue tickets to individuals who do not comply with the stay-at-home-order, or those not wearing a mask or face covering indoors in places open to the public, subject to limited exceptions, as well as retail operators and companies who do not enforce requirements under orders under the *Reopening Ontario (A Flexible Response to COVID-19) Act* (ROA) or EMPCA. Those who decide not to abide by orders will be subject to a set fine and/or prosecution under both the ROA and EMCPA as applicable.

In addition, all provincial offences officers will have the authority to temporarily close a premise and disperse individuals who are in contravention of gathering limits an order and will be able to disperse people who are gathering, regardless whether a premise has been closed or remains open such as a park.

"Strong, new measures will be enforced to stop the spread of COVID-19," said Solicitor General Sylvia Jones. "We are taking extraordinary action to provide law enforcement officers with the tools and support they need to protect the health and wellbeing of Ontarians."

Schools and Child Care Centres

Based on the advice of the Chief Medical Officer of Health, schools in the following public health units (PHUs) will not return to in-person instruction until February 10, 2021:

- Windsor-Essex

- Peel Region
- Toronto
- York
- Hamilton

By January 20, 2021, the Chief Medical Officer of Health will advise the Ministry of Education on which public health units (PHUs) will be permitted to resume in-person instruction, based on the most up-to-date data and modelling. Before- and after-school programs can be offered when in-person instruction resumes. Schools in northern PHUs will continue to remain open.

To continue to keep students, staff and communities safe, the following new health and safety measures will be put in place for in-person learning:

- Masking for Grade 1-3 and requirements for mask wearing outdoors;
- Enhanced screening protocols; and
- Expanded targeted testing.

The government will also implement new health and safety measures in Ontario child care settings, such as enhanced screening to align with school requirements, voluntary participation in targeted testing and additional infection prevention and control measures to align with schools. These enhancements are in addition to the existing health and safety measures already being implemented in child care settings across the province.

Child care centres for non-school aged children will remain open, and emergency child care for school-aged children will end in approved PHU regions on January 22, 2021 as these elementary schools return to in-person learning.During this extended period of online learning, in areas where in-person elementary learning is suspended, emergency child care will continue for eligible families in regions subject to school closures, as identified by the Chief Medical Officer of Health.

"At the heart of our continued efforts to protect against the spread of COVID-19 in our communities is a firm commitment to return kids to school safely," said Education Minister Stephen Lecce. "Protecting our students, staff and their families is our top priority, and these additional measures build on our comprehensive plan to reopen schools and keep young children in child care safe."

Workplace Safety

The Ministry of Labour, Training and Skills Development is taking additional steps to protect workers with the launch of the "Stay Safe All Day" campaign, focusing workplace inspections in areas of high transmission, including break rooms, and providing new educational materials to employers to

promote safe behaviour before, during and after work.

Evidence gathered from COVID-19 related workplace inspections to date shows the vast majority of employers and workers are following COVID-19 safety requirements when working. However, when in a break room, a vehicle or not on the clock, there is a tendency to forget about the importance of wearing masks, maintaining physical distance and hand hygiene.

As part of the "Stay Safe All Day" campaign, inspectors will use a data-driven approach to focus on workplaces with reported COVID-19 outbreaks, manufacturing businesses, warehouses, distribution centres, food processing operations, construction projects and publicly accessible workplaces deemed essential, such as grocery stores. The Ministry is also using a new data-sharing program, in conjunction with the Ministry of Long-Term Care and the Retirement Regulatory Authority, to focus onsite inspections of long-term-care homes and retirement homes.

"We know the majority of businesses are operating safely and responsibly to protect their workers and customers. But as COVID-19 cases continue to rise, we all need to step up and take additional measures to stop the spread," said Monte McNaughton, Minister of Labour, Training and Skills Development. "This includes increasing our inspections to look at everything workers do both while on the job and throughout the workday."

In the unfortunate event that an employee becomes infected with COVID-19, they may be entitled to federally funded paid sick leave of up to $500 a week for two weeks. Workers can also access Canada's Recovery Caregiver Benefit of up to $500 per week for up to 26 weeks if they are unable to work because they must care for their child under 12 years old or a family member who needs supervised care.

Over the summer, the government enacted a new regulatory amendment that put non-unionized employees on Infectious Disease Emergency Leave during the COVID-19 outbreak any time their hours of work are temporarily reduced by their employer due to COVID-19, ensuring businesses aren't forced to terminate employees after their ESA temporary layoff

periods have expired. As part of the Safe Restart Agreement, the federal government is funding a temporary income support program that allows workers to take up to 10 days of leave related to COVID-19, preventing the risk of further spread in the workplace and allowing workers to focus on their health.

Quick Facts

- The Government of Ontario declared its first provincial emergency in response to COVID-19 on March 17, 2020 which remained in effect until July 24, 2020 when the ROA came into force.
- An emergency declaration pursuant to s. 7.0.1 is terminated 14 days after being made and may be extended for up to a further 14 days by the Lieutenant Governor in Council. Thereafter, extensions require approval of the Legislature, which can extend the declared provincial emergency for additional periods of up to 28 days. Orders made during the declaration of emergency pursuant s. 7.0.2 (4) will automatically terminate after 14 days unless they are extended for additional periods of up to 14 days, while orders pursuant to s. 7.1 can be for a period of up to 90 days and renewed for additional periods of up to 90 days.
- The orders currently in force under the Reopening Ontario (A Flexible Response to COVID-19) Act, 2020 (ROA) remain in effect until January 20, 2021. Under the ROA, orders can be extended for up to 30 days at a time, and the government must continue to report on all order extensions to the Select Committee on Emergency Management Oversight.
- A full list of emergency orders under the EMPCA as well as orders under the ROA can be found on the e-Laws website and at Ontario.ca/alert.
- As of January 10, 2021, there have been 215,782 reported COVID-19 cases and 4,983 related deaths in Ontario.
- Ontario has implemented the largest immunization plan in its history and to date, a total of over 130,000 doses have been administered provincewide.
- Building on the efforts of the targeted testing in Phase 1, the Ministry of Education and the Ministry of Health will work together with Ontario Health, PHUs and school boards to expand access to COVID-19 testing.

Additional Resources

- Ontario Continues to Support Employers and Workers during COVID-19
- Enhancing Public Health and Workplace Safety Measures in the Provincewide Shutdown
- Visit Ontario's COVID-19 vaccine web page to view the latest provincial data and information on COVID-19 vaccines.
- Visit Ontario's website to learn more about how the province continues to protect the people of Ontario from COVID-19.
- If you have questions about what will be open or impacts to your business or employment, call the Stop the Spread Business Information Line at 1-888-444-3659.
- Get tested if you have symptoms compatible with COVID-19, or if you have been advised of exposure by your local public health unit or through the COVID Alert App. Visit Ontario.ca/covidtest to find the nearest testing location.
- To find the right supports, visit COVID-19: Support for People, which has information about the many available and free mental health services and supports.
- To stay safe, you can download the COVID Alert App free from the Apple and Google Play app stores.
- COVID-19: Reopening Schools
- COVID-19 school and child care screening
- Operational Guidance: COVID-19 Management in Schools document.

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This is **Exhibit "I"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

NEWS RELEASE

Ontario Extending Stay-at-Home Order across Most of the Province to Save Lives

Public Health Units to Gradually Return to the COVID-19 Response Framework

February 08, 2021
Office of the Premier

TORONTO — In consultation with the Chief Medical Officer of Health, the government is moving to a regional approach and maintaining the shutdown in the majority of the public health regions in Ontario, including the Stay-at-Home order and all existing public health and workplace safety measures. When it is safe to do so, the province will gradually transition each region from the shutdown measures to a revised and strengthened *COVID-19 Response Framework: Keeping Ontario Safe and Open* (the "Framework").

Details were provided today by Premier Doug Ford, Christine Elliott, Deputy Premier and Minister of Health, Solicitor General Sylvia Jones, and Dr. David Williams, Chief Medical Officer of Health.

"Our number one priority will always be protecting the health and safety of all individuals, families and workers across the province," said Premier Ford. "But we must also consider the severe impact COVID-19 is having on our businesses. That's why we have been listening to business owners, and we are strengthening and adjusting the Framework to allow more businesses to safely reopen and get people back to work."

To support the province's economic recovery, the government has updated the Framework to allow for a safer approach to retail. Limited in-person shopping in Grey-Lockdown zones will be permitted with public health and safety measures, such as limiting capacity to 25 per cent in most retail settings. In addition, public health and safety measures in retail settings will be strengthened for other levels of the Framework. Individuals will also be required to wear a face covering and maintain physical distance when indoors in a business, with limited exceptions.

Other measures include a requirement for individuals to wear a face covering when attending an organized public event or gathering (where permitted) if they are within two metres distance of another individual who is not part of their household (both indoor and outdoor). All other requirements for gatherings and organized public events would be maintained.

Based on the improving local trends of key indicators, including lower transmission of COVID-19, improving hospital capacity, and available public health capacity to conduct rapid case and contact management, the following three regions will be moving back to the Framework at the Green-Prevent level on Wednesday, February 10, 2021 at 12:01 a.m. and will no longer be subject to the Stay-at-Home order:

- Hastings Prince Edward Public Health;
- Kingston, Frontenac and Lennox & Addington Public Health; and
- Renfrew County and District Health Unit.

Due to the fact that public health trends are improving in some regions faster than others, the current Stay-at-Home order will be amended and individual orders making it applicable to each public health region will be made except for the three above. It is proposed that the Stay-at-Home order will continue to apply to 28 public health regions until Tuesday, February 16, 2021. For Toronto, Peel and York regions, it is proposed that the Stay-at-Home order will continue to apply until Monday, February 22, 2021. Final decisions will be subject to review of the trends in public health indicators at that time.

"While we have seen some progress in our fight against COVID-19, the situation in our hospitals remains precarious and the new variants pose a considerable threat to all of us," said Minister Elliott. "As we cautiously and gradually transition out of the provincewide shutdown, we have developed an emergency brake system giving us the flexibility to contain community spread quickly in a specific region, providing an extra layer of protection."

Recognizing the risk posed by new variants to the province's pandemic response, Ontario is introducing an "emergency brake" to allow for immediate action if a public health unit region experiences rapid acceleration in COVID-19 transmission or if its health care system risks becoming overwhelmed. If this occurs, the Chief Medical Officer of Health, in consultation with

the local medical officer of health, may advise immediately moving a region into Grey-Lockdown to interrupt transmission.

"While we are seeing our numbers trend in the right direction, our situation remains precarious as the variants of concern remain a serious risk," said Dr. Williams. "This is not a re-opening or a 'return to normal' and we must continue to limit close contact to our immediate households and stay at home except for essential reasons. By continuing to follow all public health and workplace safety measures, we can continue to reduce the number of new cases and the strain on our health system."

In addition, the provincial emergency declared under s 7.0.1 of the *Emergency Management and Civil Protection Act* (EMPCA) will be allowed to terminate at the end of February 9, 2021. While the provincewide Stay-at-Home order will cease to apply in some regions as of February 10, 2021, everyone is strongly advised to continue to stay at home, avoid social gatherings, minimize travel between areas with different rules, and limit close contacts to their household. Employers in all industries should continue to make every effort to allow employees to work from home.

Enforcement of residential evictions will remain paused in the public health unit regions where the provincial Stay-at-Home order remains in effect. This will ensure people are not forced to leave their homes. In regions where the Stay-at-Home order is lifted, the regular process for residential eviction enforcement will resume.

Orders currently in force under the EMCPA have been extended to February 23, 2021 and will be extended further if necessary. O.Reg.55/21 (Compliance Orders for Retirement Homes) is currently in effect until February 19, 2021.

"While the declaration of emergency will be ending, the risks posed by COVID-19 and the new variants remain serious concerns," said Solicitor General Jones. "That's why extending the stay-at-home orders for most of the province is necessary to protect our communities, our most vulnerable populations, and stop the spread of COVID-19. We continue to urge all Ontarians to follow public health guidelines and stay home, stay safe, and save lives."

The Chief Medical Officer of Health will continue to consult with public health and other experts, review data, and provide advice to the government on the appropriate and effective measures that are needed to protect the health of Ontarians. Municipalities and local medical officers of health may have additional restrictions or targeted requirements in their region.

Quick Facts

- Provincewide Shutdown measures went into effect on December 26, 2020 to stop the rapid spread of COVID-19 across the province.
- The government declared its second provincial emergency on January 12, 2021 and issued a Stay-at-Home order to reduce mobility and address hospital capacity concerns.
- Ontario has implemented a six-point plan to deal with the new variants which includes mandatory on-arrival testing of international travellers, enhanced screening and sequencing, maintaining public health measures to keep people safe, strengthening case and contact management to track the spread of new cases, enhanced protections for vulnerable populations, and leveraging the latest data to inform public health decisions.
- In January, Ontario's provincial offences officers visited 1,147 big-box stores and other essential retail businesses to ensure businesses are following the public health guidelines and properly protecting workers and customers from COVID-19. 112 tickets were issued to businesses and individuals during three inspection campaigns.
- To support the safe return of in-person learning, Ontario has introduced new measures to continue to protect students and staff against COVID-19 in the classroom.
- Once the shutdown is lifted, visitor restrictions for long-term care homes will once again apply to those homes in the public health regions that are in the Orange-Restrict level or higher. In addition, long-term care homes must implement enhanced testing requirements.
- A full list of emergency orders under the EMPCA as well as orders under the ROA can be found on the e-Laws website and at Ontario.ca/alert.

Additional Resources

- In-Person Shopping at Retail Stores Permitted with Public Health and Safety Requirements in Place
- Find out about the latest public health measures, advice and restrictions.
- To find the right supports, visit COVID-19: Support for People, which has information about the many available and free mental health services and supports.
- Get tested if you have COVID-19 symptoms, or if you have been advised of exposure by your local public health unit or through the COVID Alert App. Visit Ontario.ca/covidtest to find the nearest testing location.
- Visit Ontario's COVID-19 vaccine web page to view the latest provincial data and information on COVID-19 vaccines.
- Visit Ontario's website to learn more about how the province continues to protect the people of Ontario from COVID-19.

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This is **Exhibit "J"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

NEWS RELEASE

Ontario Returning 27 Public Health Regions to Strengthened COVID-19 Response Framework

Province Extending Shutdown and Stay-at-Home Order in Regions at Highest Risk

February 12, 2021
Health

TORONTO — In consultation with the Chief Medical Officer of Health, the Ontario government is transitioning twenty-seven public health regions out of the shutdown and into a revised and strengthened *COVID-19 Response Framework: Keeping Ontario Safe and Open* (the "Framework"). The four remaining public health regions, Toronto Public Health, Peel Public Health, York Region Public Health and North Bay Parry Sound District, will remain in the shutdown, and the Stay-at-Home order and all existing public health and workplace safety measures will continue to apply to these four public health regions.

"The health and safety of Ontarians remains our number one priority. While we are cautiously and gradually transitioning some regions out of shutdown, with the risk of new variants this is not a reopening or a return to normal," said Christine Elliott, Deputy Premier and Minister of Health. "Until vaccines are widely available, It remains critical that all individuals and families continue to adhere to public health measures and stay home as much as possible to protect themselves, their loved ones and their communities."

Based on a general improvement in trends of key indicators, including lower transmission of COVID-19, improving hospital capacity, and available public health capacity to conduct rapid case and contact management, the following public health regions will be moving back to the Framework on Tuesday, February 16, 2021 at 12:01 a.m. and will no longer be subject to the Stay-at-Home order:

Grey-Lockdown:

- Niagara Region Public Health

Red-Control:

- Chatham-Kent Public Health;
- City of Hamilton Public Health Services;
- Durham Region Health Department;
- Halton Region Public Health;
- Middlesex-London Health Unit;
- Region of Waterloo Public Health and Emergency Services;
- Simcoe-Muskoka District Health Unit;
- Southwestern Public Health;
- Thunder Bay District Health Unit;
- Wellington-Dufferin Guelph Public Health; and
- Windsor-Essex County Health Unit.

Orange-Restrict:

- Brant County Health Unit;

- Eastern Ontario Health Unit;
- Haldimand-Norfolk Health Unit;
- Haliburton, Kawartha, Pine Ridge District Health Unit;
- Huron Perth Public Health;
- Lambton Public Health;
- Ottawa Public Health;
- Porcupine Health Unit; and
- Public Health Sudbury and Districts.

Yellow-Protect:

- Algoma Public Health;
- Grey Bruce Health Unit;
- Northwestern Health Unit; and
- Peterborough Public Health.

Green-Prevent:

- Leeds, Grenville and Lanark District Health Unit; and
- Timiskaming Health Unit.

For North Bay Parry Sound District, Peel Public Health, Toronto Public Health and York Region Public Health, it is proposed that the shutdown measures and the Stay-at-Home order will continue to apply until at least Monday, February 22, 2021. Please visit Ontario.ca/covidresponse for the full list of public health region classifications.

After returning to the Framework, public health regions will stay in their level for at least two weeks at which time, the government will assess the impact of public health and workplace safety measures to determine if the region should stay where they are or be moved to a different level. Public health regions will move up through the levels, if necessary, based on the set indicators and thresholds outlined in the Framework.

Visitor restrictions for long-term care homes will once again apply to those homes in the public health regions that are in the Orange-Restrict level or higher. In addition, long-term care homes must implement enhanced testing requirements.

Recognizing the risk posed by new variants to the province's pandemic response, Ontario is introducing an "emergency brake" to allow the Chief Medical Officer of Health, in consultation with the local medical officer of health, to immediately advise moving a region into Grey-Lockdown to interrupt transmission. Local medical officers of health also have the ability to issue Section 22 orders under the *Health Protection and Promotion Act*, to target specific transmission risks in the community.

"While the trends in public health indicators are heading in the right direction, we still have work to do," said Dr. David Williams, Chief Medical Officer of Health. "Everyone is strongly advised to continue staying at home, avoid social gatherings, only travel between regions for essential purposes, and limit close contacts to your household or those you live with."

The Chief Medical Officer of Health will continue to consult with public health and other experts, review data, and provide advice to the government on the appropriate and effective measures that are needed to protect the health of Ontarians.

Quick Facts

- Find out what level and which regional public measures are in place for your area.
- On February 10, 2021, Hastings Prince Edward Public Health, Kingston, Frontenac and Lennox & Addington Public Health, and Renfrew County and District Health Unit moved to the Framework at the Green-Prevent level.

- To help stop the spread of COVID-19 and safeguard health system capacity, Ontarians are strongly urged to continue staying at home and limit trips outside their household and between other regions for essential reasons only, not to gather with individuals outside of their household, and to wear a face covering when within two metres distance of another individual who is not part of their household (both indoor and outdoor) or when required, with limited exceptions.
- Ontario has implemented a six-point plan to deal with the new variants of concern which includes mandatory on-arrival testing of international travelers, enhanced screening and sequencing, maintaining public health measures to keep people safe, strengthening case and contact management to track the spread of new cases, enhanced protections for vulnerable populations, and leveraging the latest data to inform public health decisions.
- To support the province's economic recovery, the government has updated the Framework to allow for a safer approach to retail. Limited in-person shopping in Grey-Lockdown zones will be permitted with public health and safety measures, such as limiting capacity to 25 per cent in most retail settings.
- Digital tools have been an important part of the provincial response to COVID-19. To date, almost 6 million self-assessments have been completed using Ontario's health screening tool to help Ontarians navigate their symptoms and decide on next steps. Now, revised and updated screening tools for workers/employees and customer/visitors will help keep Ontarians safe and healthy by pre-screening for symptoms before leaving for work or to visit a business as the province re-opens. The tools help workplaces and businesses meet screening requirements.
- To support the safe return of in-person learning, Ontario has introduced new measures to continue to protect students and staff against COVID-19 in the classroom.

Additional Resources

- Ontario Extending Stay-at-Home Order across Most of the Province to Save Lives.
- Find out about the latest public health measures, advice and restrictions.
- To find the right supports, visit COVID-19: Support for People, which has information about the many available and free mental health services and supports.
- Get tested if you have COVID-19 symptoms, or if you have been advised of exposure by your local public health unit or through the COVID Alert App. Visit Ontario.ca/covidtest to find the nearest testing location.
- Visit Ontario's COVID-19 vaccine web page to view the latest provincial data and information on COVID-19 vaccines.
- Visit Ontario's COVID-19 information website to learn more about how the province continues to protect the people of Ontario from the virus.

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This is **Exhibit "K"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

NEWS RELEASE

Stay-at-Home Order Extended in Toronto and Peel Public Health Regions Along with North Bay-Parry Sound

York Region to Return to Strengthened COVID-19 Response Framework

February 19, 2021
Health

TORONTO — In consultation with the Chief Medical Officer of Health and the local medical officers of health, the Ontario government is maintaining the shutdown, the Stay-at-Home order and all existing public health and workplace safety measures for an additional two weeks in the Toronto and Peel Public Health Regions, along with the North Bay-Parry Sound District. The York Public Health Region will transition out of the shutdown and into the revised and strengthened *COVID-19 Response Framework: Keeping Ontario Safe and Open*.

"Our government's number one priority is the safety of all individuals and families, and that's why we are taking a gradual, cautious approach to returning regions to the Framework," said Christine Elliott, Deputy Premier and Minister of Health. "These are difficult but necessary decisions, in order to protect against COVID-19 variants and maintain the progress we have all made together. Until vaccines are widely available, we continue to urge all Ontarians to follow public health advice and measures, and stay home, stay safe, and save lives."

In the Toronto and Peel Public Health Regions, and the North Bay-Parry Sound District, the shutdown measures and the Stay-at-Home order will continue to apply until at least Monday, March 8, 2021, based on key public health indicators and following consultation with the local medical officers of health. While the Peel and Toronto regions have seen a reduction in COVID-19 transmission from the period of February 8 to 17, 2021, rates still remain too high in the regions, with case rates of 83.4 cases per 100,000 people for Peel and 67.9 cases per 100,000 people for Toronto, both well above the provincial average. During this same period of time, North Bay Parry Sound District has also seen its case rate increase by 11.5 per cent to 14.6 cases per 100,000 people. Variants of concern also remain a serious risk to community transmission and health system capacity.

Based on a general improvement in trends of key indicators, York Region Public Health will be moving back to the Framework at the Red-Control level and will no longer be subject to the Stay-at-Home order. In addition, Lambton Public Health will be moving from the Orange-Restrict level to the Red-Control level as a result worsening public health trends in the region over the past week. These changes will come into effect on Monday, February 22, 2021 at 12:01 a.m.

After returning to the Framework, public health regions are required to stay in their level for at least two weeks. The government will then assess the impact of public health and workplace safety measures to determine if the region should stay where it is or be moved to a different level. Public health regions may be moved to a higher level within the two-week window, if necessary, based on the set indicators and thresholds outlined in the Framework. In addition, Ontario has introduced an "emergency brake" to allow the Chief Medical Officer of Health, in consultation with the local medical officer of health, to immediately advise moving a region into Grey-Lockdown to interrupt transmission.

"While the health indicators have improved enough to allow us to return an additional region to the Framework, we are not yet at the point where we can safely transition back the remainder of the province," said Dr. David Williams, Chief Medical Officer of Health. "Everyone is strongly advised to continue staying at home, avoid social gatherings, only travel between regions for essential purposes, and limit close contacts to your household or those you live with regardless of which level of the Framework you are in."

The Chief Medical Officer of Health will continue to consult with public health and other experts, review data, and provide advice to the government on the appropriate and effective measures that are needed to protect the health of Ontarians.

Quick Facts

- Find out what level and which regional public measures are in place for your area.

- On February 8th the government announced an extension of the shutdown in the majority of public health regions in Ontario and a gradual transition of each region to a revised and strengthened COVID-19 Response Framework when it is safe to do so.
- In addition to the Stay-at-Home orders that apply to the North Bay-Parry Sound District, Toronto and Peel public health regions, the following orders currently in force under the Emergency Management and Civil Protection Act (EMCPA) will be extended to March 8, 2021 and further if necessary: O.Reg 55/21 (Compliance Orders for Retirement Homes), O.Reg 8/21 (Enforcement of COVID-19 Measures), O.Reg. 11/21 (Stay-at-Home Order), O.Reg. 13/21 (Residential Evictions).
- Enforcement of residential evictions will remain paused in the public health regions where the provincial Stay-at-Home order remains in effect.
- Local medical officers of health continue to have the ability to issue Section 22 orders under the Health Protection and Promotion Act, to target specific transmission risks in the community.
- Ontario has implemented a six-point plan to prevent and stop the spread of COVID-19 variants.
- To support the safe return of in-person learning, Ontario has introduced new measures to continue to protect students and staff against COVID-19 in the classroom.

Additional Resources

- Please visit Ontario.ca/covidresponse for the full list of public health region classifications.
- To find the right supports, visit COVID-19: Support for People, which has information about the many available and free mental health services and supports.
- Get tested if you have COVID-19 symptoms, or if you have been advised of exposure by your local public health unit or through the COVID Alert App. Visit Ontario.ca/covidtest to find the nearest testing location.
- Visit Ontario's COVID-19 vaccine web page to view the latest provincial data and information on COVID-19 vaccines.

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This is **Exhibit "L"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

NEWS RELEASE

Ontario Activates Emergency Brake in Thunder Bay District Health Unit and Simcoe-Muskoka District Health Unit

Nine Public Health Regions Moving to New Levels in the COVID-19 Response Framework

February 26, 2021
Health

TORONTO — The Ontario government, in consultation with the Chief Medical Officer of Health, is moving nine public health regions to new levels in the *Keeping Ontario Safe and Open Framework* (the "Framework"). This includes activating an "emergency brake" in Thunder Bay District Health Unit and Simcoe-Muskoka District Health Unit to move the regions to Grey-Lockdown to immediately interrupt transmission and contain community spread. Decisions were made in consultation with the local medical officers of health and are based on the trends in public health indicators and local context and conditions.

"While we continue to see the number of cases and other public health indicators lowering in many regions across the province, the recent modelling shows us that we must be nimble and put in place additional measures to protect Ontarians and stop the spread of COVID-19," said Christine Elliott, Deputy Premier and Minister of Health. "With COVID-19 variants continuing to spread in our communities, it is critically important that everyone continues strictly adhering to all public health and workplace safety measures to help contain the virus and maintain the progress we have made to date."

Based on the latest data, the following public health regions will move from their current level in the Framework to the following levels effective Monday, March 1, 2021 at 12:01 a.m.:

Grey-Lockdown

- Simcoe-Muskoka District Health Unit; and
- Thunder Bay District Health Unit.

Red-Control

- Niagara Region Public Health.

Orange-Restrict

- Chatham-Kent Public Health;
- Middlesex-London Health Unit; and
- Southwestern Public Health.

Yellow-Protect

- Haldimand-Norfolk Health Unit; and
- Huron Perth Public Health.

Green-Prevent

- Grey Bruce Health Unit.

Based on the latest assessment of data the "emergency brake" is being used to place Thunder Bay District Health Unit and Simcoe-Muskoka District Health Unit into Grey-Lockdown, helping to stop the spread of the virus and protect public health and health system capacity in the regions. This is due to a rapid worsening in key public health indicators, as well as a high presence of variants in the Simcoe-Muskoka District Health Unit that continue to increase - the highest in the province. As of February 23, 2021, there has been a total of 170 confirmed cases of a variant of concern in this region.

In Peel Public Health, Toronto Public Health, and North Bay Parry Sound District, the Shutdown measures and the Stay-at-Home order will continue to apply until at least Monday, March 8, 2021, with final decisions to be based on key public health indicators and consultation with the local medical officers of health. All other public health regions will remain at their current level. Please visit Ontario.ca/covidresponse for the full list of public health region classifications.

Based on the latest modelling data, the efforts of Ontarians in following public health measures and advice are working to decrease the number of new cases, deaths and hospitalizations across the province. However, with variants of concern continuing to spread, the number of patients requiring hospitalization and intensive care may rise once again if public health measures are not relaxed carefully and gradually. The actions of everyone over the coming weeks will be critical to maintaining the progress communities have made across the province to date.

"Quickly implementing stronger measures to interrupt transmission of COVID-19 is a key component of the government's plan to safely and gradually return public health regions to the Framework," said Dr. David Williams, Chief Medical Officer of Health. "Due to data and local context and conditions in the Simcoe-Muskoka and Thunder Bay Districts, it was necessary to tighten public health measures in these regions to ensure the health and safety of the region at large and stop the spread of the virus."

The Chief Medical Officer of Health will continue to consult with public health and other experts, review data, and provide advice to the government on the appropriate and effective measures that are needed to protect the health of Ontarians.

Quick Facts

- Find out what level and which public health and workplace safety measures are in place for your area.
- To help stop the spread of COVID-19 and safeguard health system capacity, everyone is strongly urged to continue staying at home and limit trips outside their household and between other regions for essential reasons only, not to gather with individuals outside of their household, and to wear a face covering when within two metres distance of another individual who is not part of their household (both indoor and outdoor) or when required, with limited exceptions.
- Recognizing the risk posed by new variants to the province's pandemic response, Ontario has introduced an "emergency brake" to allow the Chief Medical Officer of Health, in consultation with the local medical officer of health, to immediately advise moving a region into Grey-Lockdown to interrupt transmission.
- Local medical officers of health continue to have the ability to issue Section 22 orders under the Health Protection and Promotion Act, and municipalities may enact by-laws, to target specific transmission risks in the community.
- Ontario has implemented a six-point plan to prevent and stop the spread of COVID-19 variants.

Additional Resources

- Stay-at-Home Order Extended in Toronto and Peel Public Health Regions Along with North Bay-Parry Sound.
- To find the right supports, visit COVID-19: Support for People, which has information about the many available and free mental health services and supports.
- Get tested if you have COVID-19 symptoms, or if you have been advised of exposure by your local public health unit or through the COVID Alert App. Visit Ontario.ca/covidtest to find the nearest testing location.
- Visit Ontario's COVID-19 vaccine web page to view the latest provincial data and information on COVID-19 vaccines.
- Visit Ontario's COVID-19 information website to learn more about how the province continues to protect the people of Ontario from the virus.

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Media Contacts

This is **Exhibit "M"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

NEWS RELEASE

Toronto, Peel and North Bay-Parry Sound Public Health Regions Returning to Strengthened COVID-19 Response Framework

Seven Other Public Health Regions Moving to New Levels in the Framework

March 05, 2021
Health

TORONTO — The Ontario Government, in consultation with the Chief Medical Officer of Health, is transitioning Toronto, Peel and North Bay Parry Sound District public health regions out of the shutdown and into the revised and strengthened *COVID-19 Response Framework: Keeping Ontario Safe and Open* (the "Framework"), with the Stay-at-Home order no longer in effect. In addition, seven other public health regions are being moved to new levels in the Framework. All decisions were made in consultation with the local medical officers of health and are based on the latest trends in public health indicators and local context and conditions.

"Our government is taking a safe and cautious approach to returning to the Framework and due to our progress, all regions of the province will soon be out of the provincewide shutdown," said Christine Elliott, Deputy Premier and Minister of Health. "Despite this positive step forward, a return to the Framework is not a return to normal. As we continue vaccinating more Ontarians, it remains critical for everyone to continue to follow public health measures and stay home as much as possible to protect themselves, their loved ones and their communities."

Based on a general improvement in trends of key indicators, North Bay Parry Sound District will be returning to the Framework at the Red-Control level. Toronto Public Health and Peel Public Health are also making progress, but as their case rates still remain high, they will return to the Framework at the Grey-Lockdown level.

In addition, based on the latest data, the following seven public health regions will also be moving to the following levels in the Framework:

Red-Control

- Peterborough Public Health;
- Public Health Sudbury and Districts; and
- Simcoe-Muskoka District Health Unit.

Orange-Restrict

- Haldimand-Norfolk Health Unit; and
- Timiskaming Health Unit.

Yellow-Protect

- Haliburton, Kawartha, Pine Ridge District Health Unit; and
- Renfrew County and District Health Unit.

All changes will be effective Monday, March 8, 2021 at 12:01 a.m. Please visit Ontario.ca/covidresponse for the full list of public health region classifications.

Based on the latest modelling data, the efforts of Ontarians in following public health measures and advice are working to decrease the number of new cases, deaths and hospitalizations across the province. However, with COVID-19 variants of concern continuing to spread, the actions of everyone over the coming weeks will be critical to maintaining the progress communities have made across the province to date.

"While all regions have returned to the Framework, everyone must remain vigilant to help prevent any further increases in transmission," said Dr. David Williams, Chief Medical Officer of Health. "The best defense against the virus and all of its variants of concern remains continuing to stay at home, avoiding social gatherings, only travelling outside of your community for essential purposes, and limiting close contacts to your household or those you live with."

The Chief Medical Officer of Health will continue to consult with public health and other experts, review data, and provide advice to the government on the appropriate and effective measures that are needed to protect the health of Ontarians.

Quick Facts

- Find out what level and which public health and workplace safety measures are in place for your area.
- From the period of February 23 to March 2, 2021, case rates in North Bay Parry Sound District have decreased by 84.6 per cent to 3.1 cases per 100,000 people and the number of hospitalizations has shrunk from 1 to 0.
- In Toronto Public Health the case rates have decreased by 15.7 per cent to 66.4 cases per 100,000 people and hospitalizations have seen an 11.2 per cent decrease. During this same period of time, Peel Public Health has seen its case rates increase by 6.6 per cent to 91.4 cases per 100,000 people. Peel Region has also seen the number of patients with COVID-19 in intensive care decrease from 26 to 19.
- To help stop the spread of COVID-19 and safeguard health system capacity, everyone is strongly urged to continue staying at home and limit trips outside their household and to other regions for essential reasons only, and not to gather with individuals outside of their household. In addition, people are required to wear a face covering when within two metres distance of another individual who is not part of their household (both indoor and outdoor), with limited exceptions.
- Recognizing the risk posed by new variants to the province's pandemic response, Ontario has introduced an "emergency brake" to allow the Chief Medical Officer of Health, in consultation with the local medical officer of health, to immediately advise moving a region into Grey-Lockdown to interrupt transmission.
- Local medical officers of health continue to have the ability to issue Section 22 orders under the Health Protection and Promotion Act, and municipalities may enact by-laws, to target specific transmission risks in the community.
- Emergency orders O.Reg 8/21 (Enforcement of COVID-19 Measures) and O.Reg 55/21 (Compliance Orders for Retirement Homes) currently in force under the Emergency Management and Civil Protection Act (EMCPA) will be extended to March 22, 2021. Emergency orders O.Reg 11/21 (Stay-at-Home Order), O.Reg.89/21 (Stay-at-Home Order Toronto Public Health), O.Reg. 76/21 (Stay-at-Home Order North Bay Parry Sound District), O.Reg. 73/21 (Stay-at-Home Order Peel Public Health) and O.Reg 13/21 (Residential Evictions) will expire and no longer be in effect as of March 8, 2021.

Additional Resources

- Ontario Activates Emergency Brake in Thunder Bay District Health Unit and Simcoe-Muskoka District Health Unit.
- To find the right supports, visit COVID-19: Support for People, which has information about the many available and free mental health services and supports.
- Get tested if you have COVID-19 symptoms, or if you have been advised of exposure by your local public health unit or through the COVID Alert App. Visit Ontario.ca/covidtest to find the nearest testing location.
- Visit Ontario's COVID-19 vaccine web page to view the latest provincial data and information on COVID-19 vaccines.
- Visit Ontario's COVID-19 information website to learn more about how the province continues to protect the people of Ontario from the virus.

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Media Contacts

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in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

NEWS RELEASE

Ontario Activates Emergency Brake in Sudbury Public Health Region

Immediate action required to interrupt transmission, contain community spread and save lives

March 11, 2021
Health

TORONTO — On the advice of the Chief Medical Officer of Health, the Ontario Government is activating an "emergency brake" in the Public Health Sudbury and Districts region, and moving it to the Grey-Lockdown level in the *Keeping Ontario Safe and Open Framework*. The decision was made due to the concerning trends in public health indicators and in consultation with the local medical officer of health.

"Implementing an emergency brake to immediately interrupt transmission of COVID-19 is a key component of our government's plan to safely and gradually return public health regions to the Framework," said Christine Elliott, Deputy Premier and Minister of Health. "We have seen a rapid rise in the case rate in the Sudbury area, and swift action is needed to protect individuals, families and businesses and save lives."

Based on the latest assessment of data, the "emergency brake" is being used to stop the spread, guard against variants and protect public health and health system capacity in the region. From March 3 to 9, 2021, the region's case rate increased by 54.1 per cent to 75.9 cases per 100,000 people.

The public health region will move to Grey-Lockdown effective Friday, March 12, 2021 at 12:01 a.m.

"As a result of the rapid deterioration of trends in key indicators, the emergency brake is being applied to move Public Health Sudbury and Districts to Grey-Lockdown to help reduce further spread of the virus in the region," said Dr. David Williams, Chief Medical Officer of Health. "We must remain vigilant in adhering to all public health and workplace safety measures to combat the threat posed by variants of concern."

The Chief Medical Officer of Health will continue to consult with public health and other experts, review data, and provide advice to the government on the appropriate and effective measures that are needed to protect the health of Ontarians.

Quick Facts

- Find out what level and which public health and workplace safety measures are in place for your area.
- To help stop the spread of COVID-19 and safeguard health system capacity, everyone is strongly urged to continue staying at home and limit trips outside their household and to other regions for essential purposes only, and not to gather with individuals outside of their household. In addition, people are required to wear a face covering when within two metres distance of another individual who is not part of their household (both indoor and outdoor), with limited exceptions.
- Local medical officers of health continue to have the ability to issue Section 22 orders under the Health Protection and Promotion Act, and municipalities may enact by-laws, to target specific transmission risks in the community.

Additional Resources

- To find the right supports, visit COVID-19: Support for People, which has information about the many available and free mental health services and supports.
- Get tested if you have COVID-19 symptoms, or if you have been advised of exposure by your local public health unit or through the COVID Alert App. Visit Ontario.ca/covidtest to find the nearest testing location.
- Visit Ontario's COVID-19 vaccine web page to view the latest provincial data and information on COVID-19 vaccines.
- Visit Ontario's COVID-19 information website to learn more about how the province continues to protect the people of Ontario from the virus.

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This is **Exhibit "O"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

Update on COVID-19 Projections

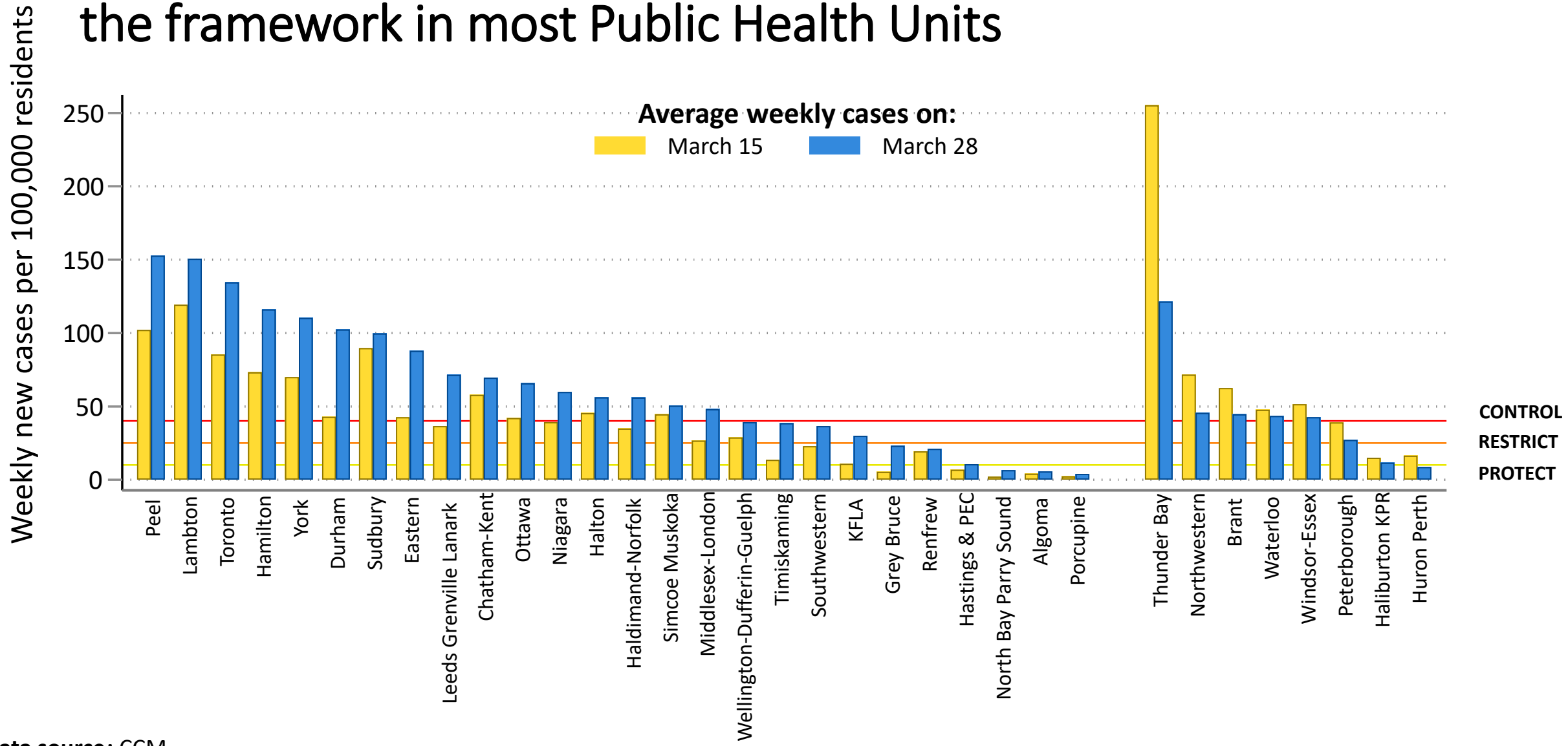
Science Advisory and Modelling Consensus Tables

April 1, 2021

Key Findings

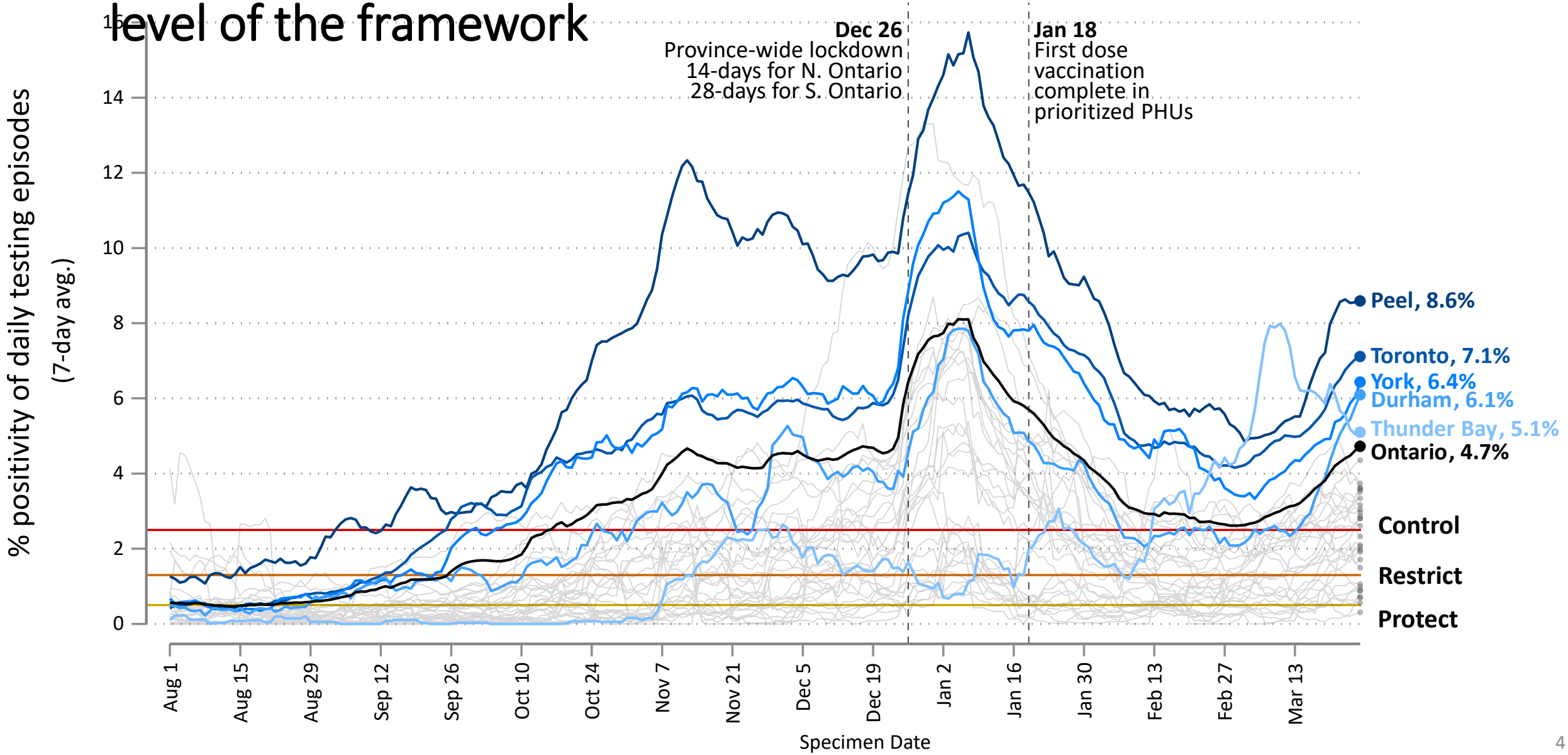
- The **third wave** is here and being **driven by variants of concern**.
- **Younger Ontarians are ending up in hospital.** Risk of ICU admission is **2 x higher** and risk of death is **1.5 x higher** for the B.1.1.7 variant.
- COVID-19 **threatens health system ability to deal with regular ICU admissions** and the ability to care for all patients.
- Vaccination is **not reaching the highest risk communities**, delaying its impact as an effective strategy.
- School disruptions have a significant and highly inequitable **impact** on students, parents and society. Further disruptions should be minimized.
- Stay-at-home orders will control the surge, protect access to care, and increase the chance of the summer Ontarians want.

Cases have increased and are above the second highest level of the framework in most Public Health Units



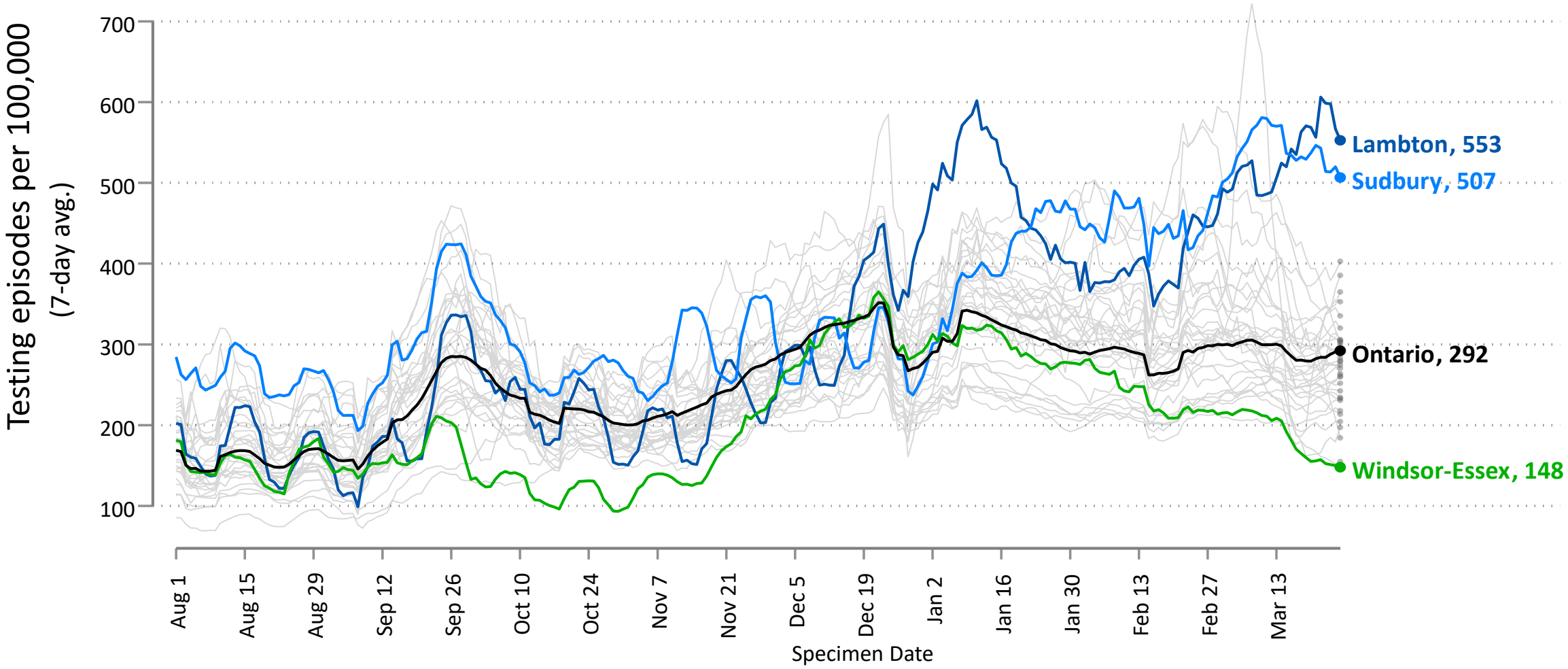
Data source: CCM
Data note: Data for the most recent day have been censored to account for reporting delays

Testing % positivity has increased and is above the second highest level of the framework



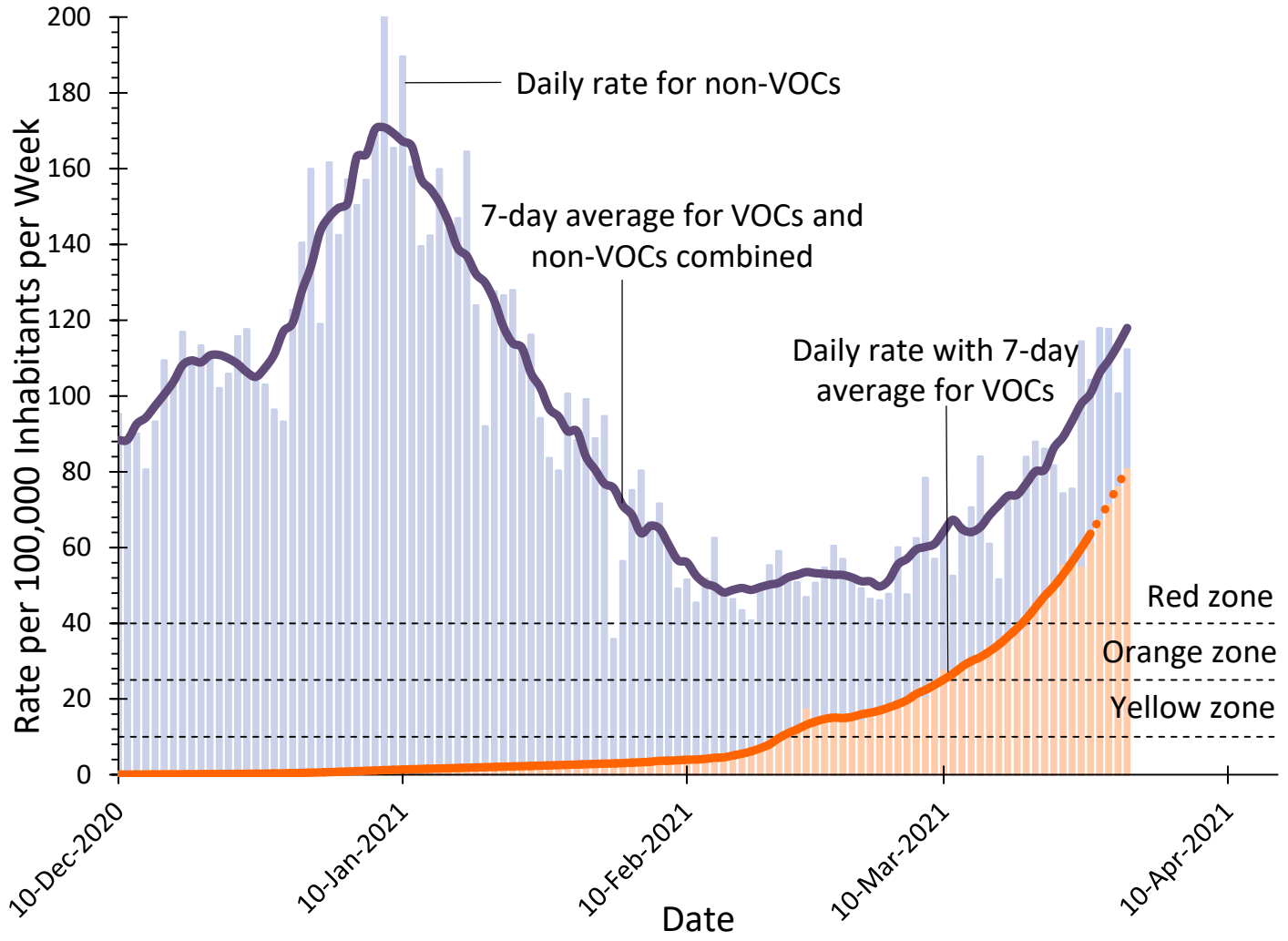
Data source: Ontario Laboratory Information System (OLIS), data up to March 26

Testing rates are flat so case growth is not a result of more testing



Data source: Ontario Laboratory Information System (OLIS), data up to March 26

Cases are increasing. Most new cases are variants of concern.



Variants of concern have more severe consequences and are more fatal

Compared to people infected with the earlier variants, more people with COVID-19 are hospitalized, admitted to ICU, and die if they are infected with the variants of concern.

Short-term case projections depend entirely on system-level public health measures and vaccination

Figure shows example, representative of predictions across 4 models, 3-5 scenarios each.

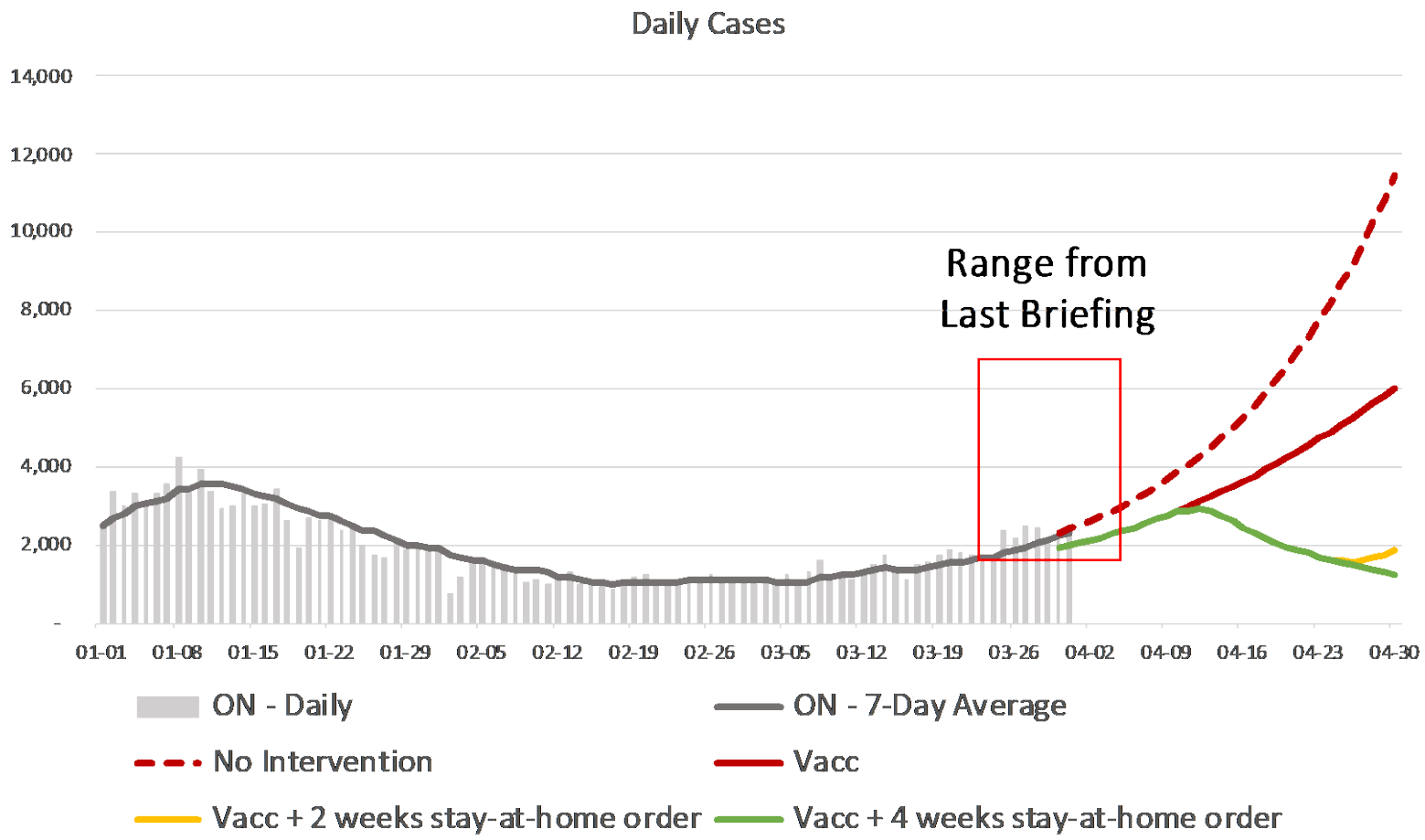
Scenarios:

Stay-at-home order assumptions:

- No stay-at-home
- 2 weeks starting Apr 5
- 4 weeks starting Apr 5

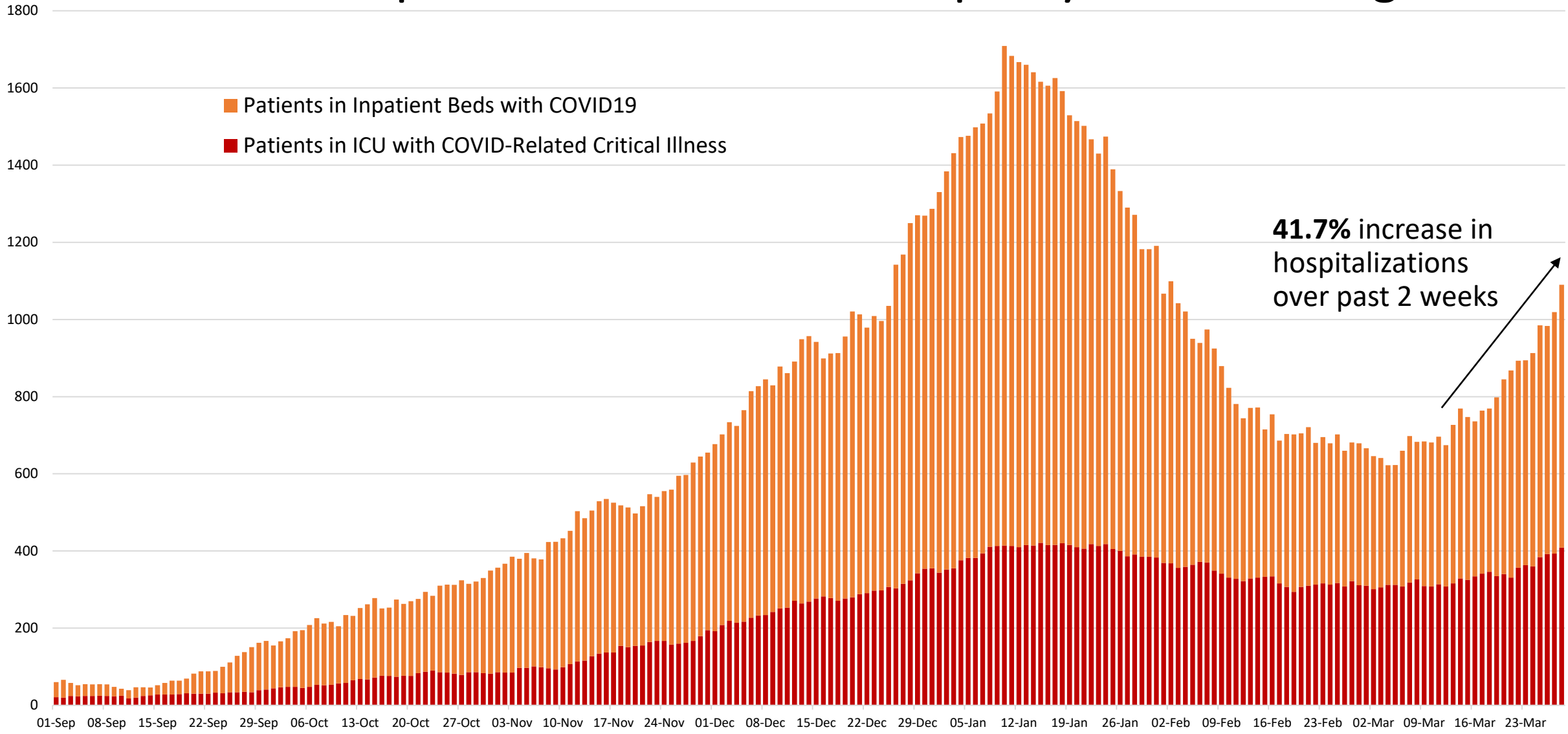
Vaccine assumptions:

- 70% effective in preventing infection
- Administered at constant rate
- Administered randomly to population



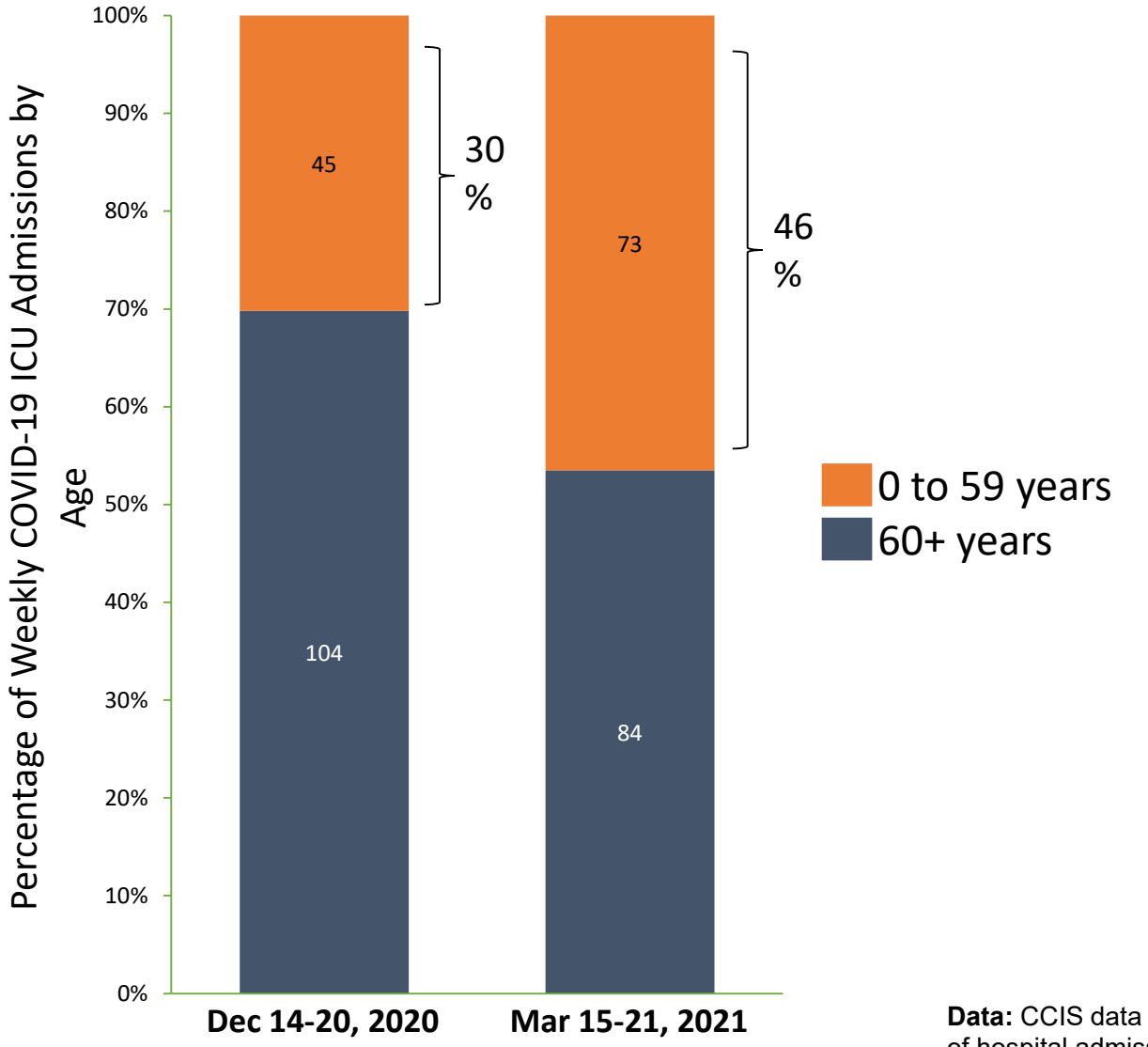
Predictions informed by modeling from COVID-19 ModCollab, Fields Institute, McMasterU, PHO, YorkU
Data (Observed Cases): covid-19.ontario.ca

COVID-19 Hospitalizations and ICU occupancy are increasing



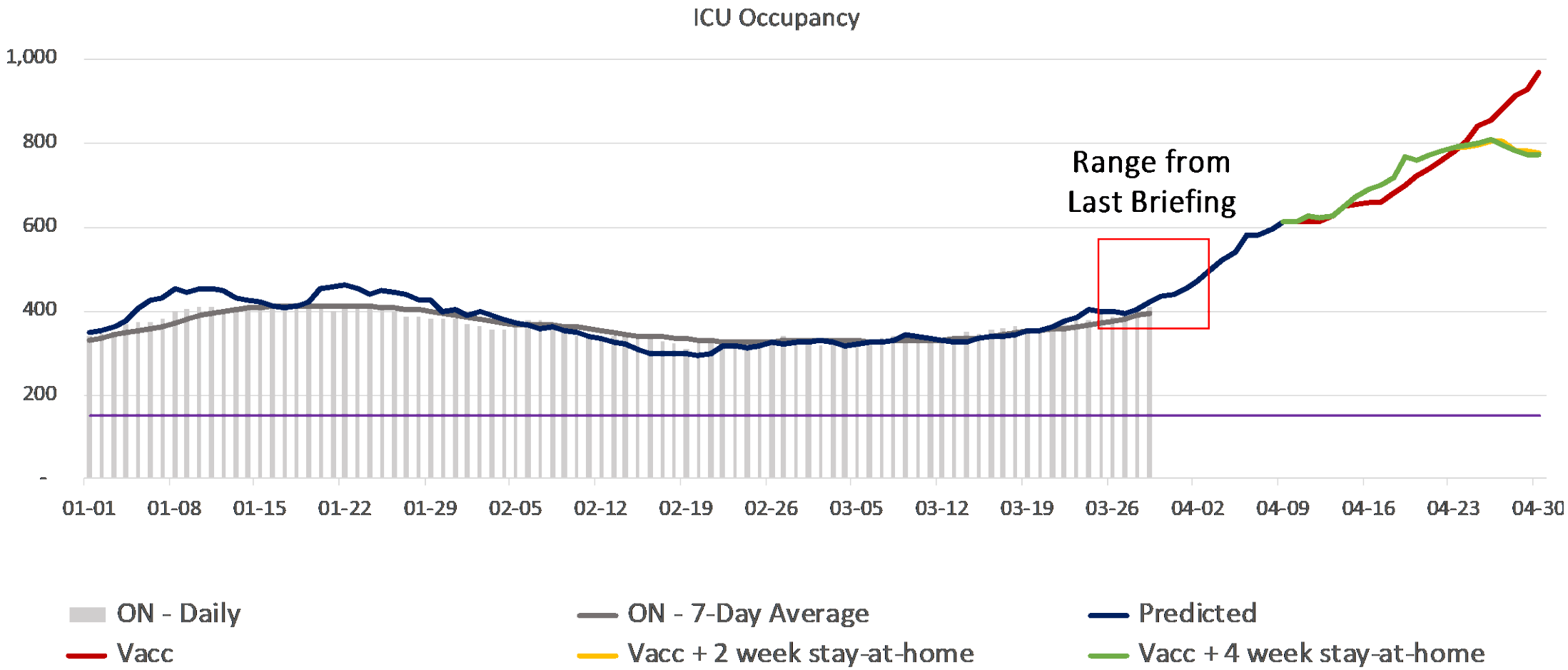
Data Sources: MOH COVID Census and Critical Care Information System

COVID-19 patients admitted to ICU continue to get younger



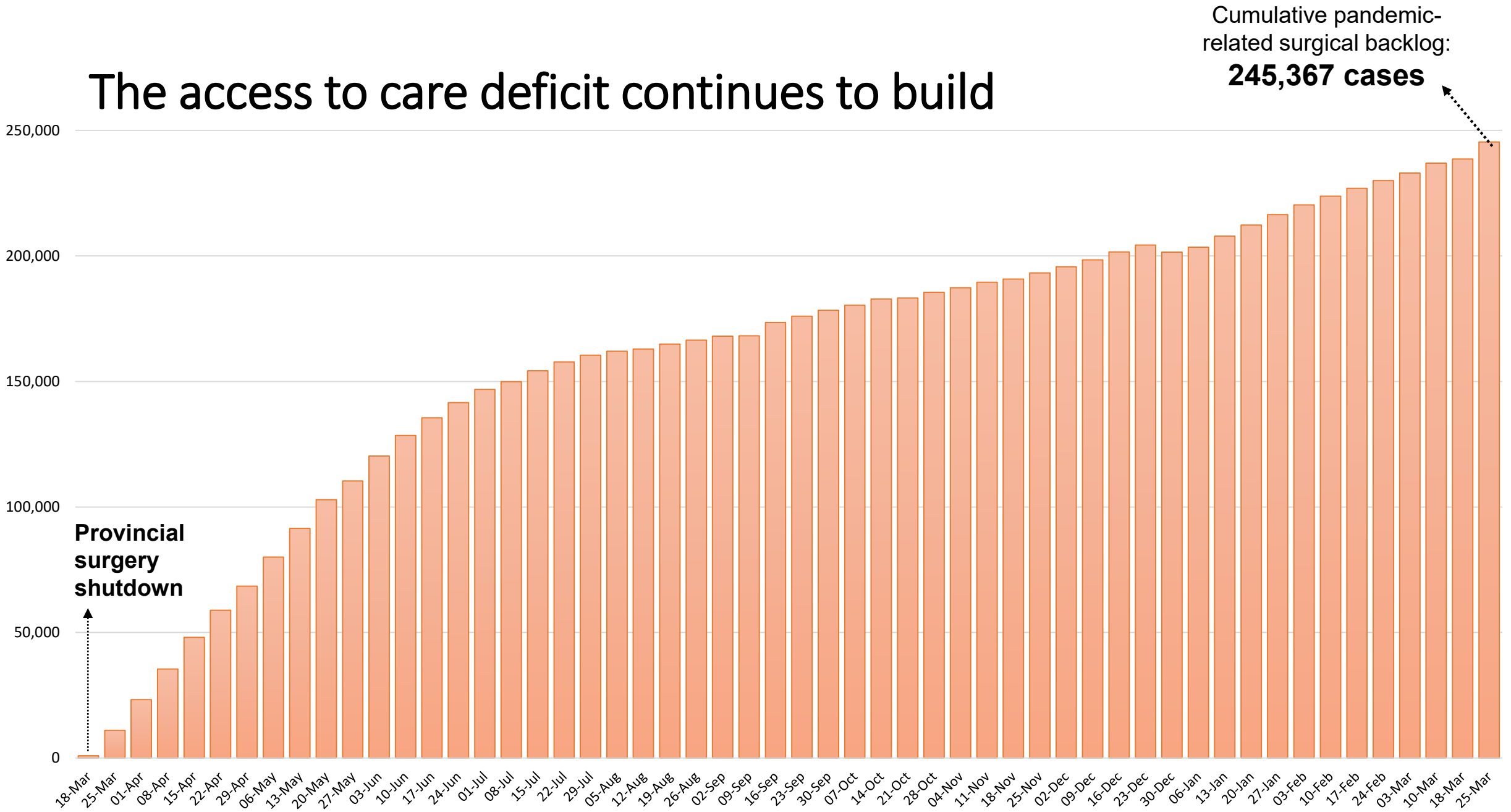
Data: CCIS data up to March 28. Based on date of hospital admission

As with cases, ICU projections depend entirely on system-level public health measures



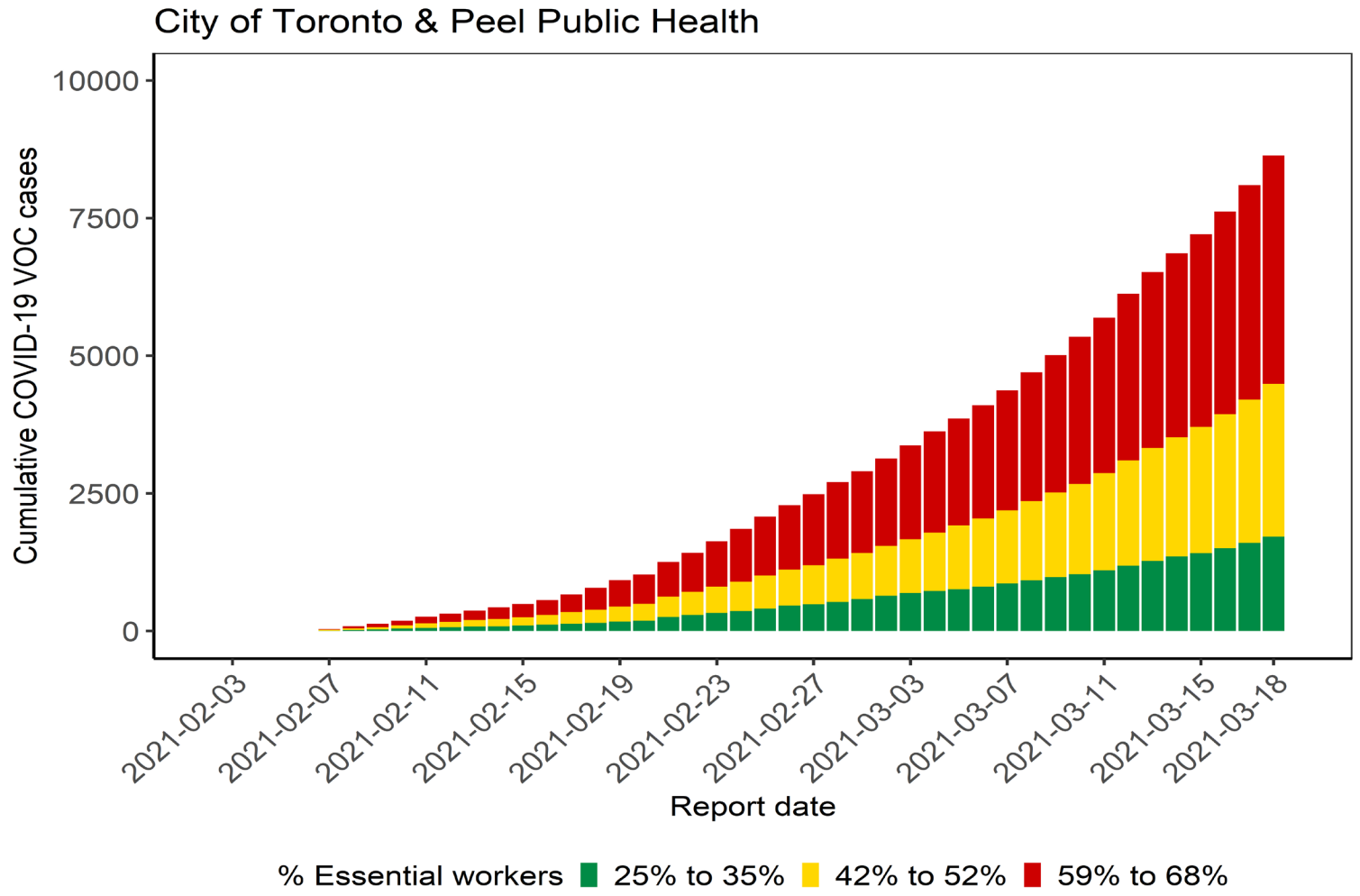
Predictions: COVID-19 ModCollab.
Data (Observed ICU Occupancy): CCSO

The access to care deficit continues to build



Data Source: Wait Times Information System. Backlog estimated based on comparison of 2020/21 with 2019/20 surgical volumes

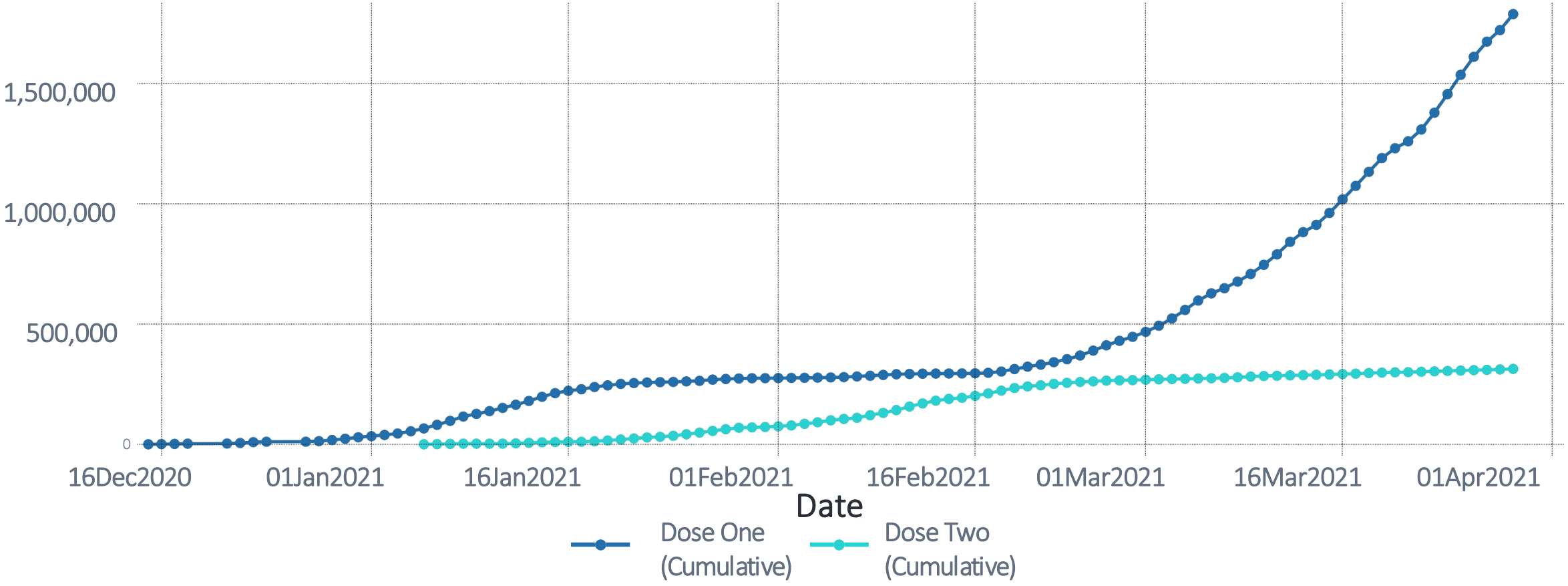
Essential workers are keeping things moving and bearing the brunt of the pandemic. Vaccination and control of workplace outbreaks will be critical.



Source: Chagla Z, Ma H, Sander B, Baral S, Mishra S. (2021). Characterizing the disproportionate burden of SARS-CoV-2 variants of concern among essential workers in the Greater Toronto Area, Canada. https://www.medrxiv.org/content/10.1101/2021.03.22.21254127v1.full.pdf

First dose vaccine coverage expanding but remains incomplete

80 years and older - 17% incomplete; 75-79 years – 40% incomplete; 70-74 years – 72% incomplete

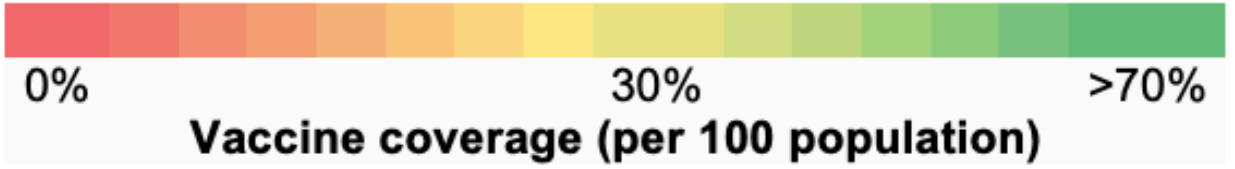


Dose 1 Administered was determined based on the first Time Given for each client.
Dose 2 Administered was determined based on the last Time Given for each client where there is more than 1 dose administered

Vaccination is not reaching the highest risk populations

Figure excludes long-term care vaccination

	Neighbourhood Risk‡ **1** = high incidence of COVID-19 infections → **10** = low incidence of COVID-19 infections										
Age group	1	2	3	4	5	6	7	8	9	10	**Overall**
80+	50%	55%	59%	66%	66%	66%	65%	72%	69%	70%	**64%**
75-79	37%	43%	43%	46%	45%	46%	40%	40%	30%	29%	**39%**
70-74	13%	19%	19%	18%	19%	21%	17%	17%	10%	9%	**16%**
65-69	8%	10%	10%	11%	10%	11%	10%	10%	7%	8%	**9%**
60-64	18%	23%	22%	21%	21%	21%	19%	18%	14%	20%	**20%**
55-59	7%	9%	9%	10%	11%	11%	10%	11%	10%	12%	**10%**
50-54	6%	7%	7%	8%	9%	8%	9%	9%	10%	11%	**8%**
45-49	6%	7%	6%	8%	8%	8%	8%	9%	10%	11%	**8%**
40-44	5%	6%	6%	7%	8%	7%	8%	8%	9%	10%	**7%**
16-39	4%	5%	5%	6%	6%	6%	6%	6%	7%	8%	**6%**
Overall	**8%**	**10%**	**10%**	**11%**	**11%**	**12%**	**11%**	**12%**	**11%**	**13%**	**13%**



School interruptions will have significant impacts on students, families, and society

Economic modeling suggests schooling impacts will have long term economic effects:

- A ~3% drop in lifetime earnings for these cohorts;
- Lost GDP for Canada estimated at 1.6 trillion dollars

Non-COVID health risks include:

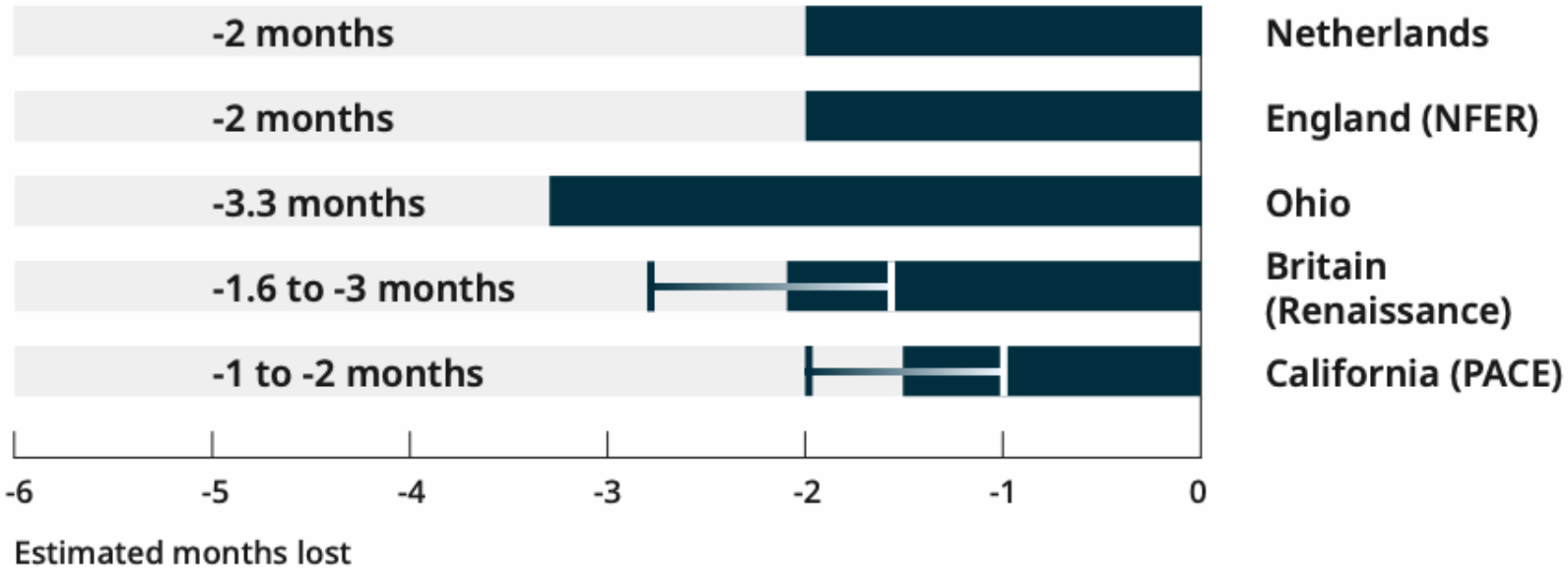
- Loneliness & social isolation,
- Loss of structure affecting physical activity, sleep and mental health, and
- Decreased ability to detect neglect or abuse.

All negative impacts are highly inequitable with greater learning loss for students facing greater disadvantage

Figure 1:

Evidence from International Assessments Reporting Average Learning Loss in Months

Fall 2020



Source: Kelly Gallagher-Mackay, Elizabeth Dhuey, Lisa Hawke, Lance McCready, Sarah Oates, Prachi Srivastava, and Kathryn Underwood

Key Findings

- The **third wave** is here and being **driven by variants of concern**.
- **Younger Ontarians are ending up in hospital.** Risk of ICU admission is **2 x higher** and risk of death is **1.5 x higher** for the B.1.1.7 variant.
- COVID-19 **threatens health system ability to deal with regular ICU admissions** and the ability to care for all patients.
- Vaccination is **not reaching the highest risk communities**, delaying its impact as an effective strategy.
- School disruptions have a significant and highly inequitable **impact** on students, parents and society. Further disruptions should be minimized.
- Stay-at-home orders will control the surge, protect access to care, and increase the chance of the summer Ontarians want.

Contributors

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- **Education Analysis:** Kelly Gallagher-Mackay, Elizabeth Dhuey, Lisa Hawke, Lance McCready, Sarah Oates, Prachi Srivastava, and Kathryn Underwood.

Content provided by Modelling Consensus and Scientific Advisory Table members and secretariat

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* Chairs of Scientific Advisory, Evidence Synthesis, and Modelling Consensus Tables

For table membership and profiles, please visit the About and Partners pages on the Science Advisory Table website.

This is **Exhibit "P"** referred to
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Ryan Cookson

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NEWS RELEASE

Ontario Implements Provincewide Emergency Brake

All 34 Public Health Unit Regions to Move into Shutdown

April 01, 2021
Office of the Premier

TORONTO —The Ontario government, in consultation with the Chief Medical Officer of Health and other health experts, is imposing a provincewide emergency brake as a result of an alarming surge in case numbers and COVID-19 hospitalizations across the province. The provincewide emergency brake will be effective Saturday, April 3, 2021, at 12:01 a.m. and the government intends to keep this in place for at least four weeks.

Details were provided today by Premier Doug Ford, Christine Elliott, Deputy Premier and Minister of Health, Dr. David Williams, Chief Medical Officer of Health, and Dr. Adalsteinn (Steini) Brown, Co-Chair of the Ontario COVID-19 Science Advisory Table.

"We are facing a serious situation and drastic measures are required to contain the rapid spread of the virus, especially the new variants of concern," said Premier Ford. "I know pulling the emergency brake will be difficult on many people across the province, but we must try and prevent more people from getting infected and overwhelming our hospitals. Our vaccine rollout is steadily increasing, and I encourage everyone who is eligible to get vaccinated. That is our best protection against this deadly virus."

Ontario's key indicators and latest modelling show that additional measures must be taken. From March 26 to 28, 2021, provincial case rates have increased by 7.7 per cent to 101.1 cases per 100,000 people. Current COVID-19 related ICU admissions are already over the peak of wave two and hospitals in regional hotspots will need to further ramp down scheduled surgeries. COVID-19 related ICU admissions are projected to exceed 650 beds in a few weeks. These increases are being driven by COVID-19 variants, which are transmitted easily and result in a higher risk of death and hospitalization, including in younger populations.

The provincewide emergency brake would put in place time-limited public health and workplace safety measures to help to stop the rapid transmission of COVID-19 variants in communities, protect hospital capacity and save lives. Measures include, but are not limited to:

- Prohibiting indoor organized public events and social gatherings and limiting the capacity for outdoor organized public events or social gatherings to a 5-person maximum, except for gatherings with members of the same household (the people you live with) or gatherings of members of one household and one other person from another household who lives alone.
- Restricting in-person shopping in all retail settings, including a 50 per cent capacity limit for supermarkets, grocery stores, convenience stores, indoor farmers' markets, other stores that primarily sell food and pharmacies, and 25 per cent for all other retail including big box stores, along with other public health and workplace safety measures;
- Prohibiting personal care services;
- Prohibiting indoor and outdoor dining. Restaurants, bars and other food or drink establishments will be permitted to operate by take-out, drive-through, and delivery only;
- Prohibiting the use of facilities for indoor or outdoor sports and recreational fitness (e.g., gyms) with very limited exceptions;
- Requiring day camps to close; and,
- Limiting capacity at weddings, funerals, and religious services, rites or ceremonies to 15 per cent occupancy per room indoors, and to the number of individuals that can maintain two metres of physical distance outdoors. This does not include social gatherings associated with these services such as receptions, which are not permitted indoors and are limited to five people outdoors.

On the advice of the Chief Medical Officer of Health, all Ontarians are asked to limit trips outside the home to necessities such as food, medication, medical appointments, supporting vulnerable community members, or exercising outdoors with members of their household. Employers in all industries should make every effort to allow employees to work from home.

"Ontario, like many other provinces and jurisdictions around the world, is in the third wave of the COVID-19 pandemic and immediate action is required to help turn the tide," said Christine Elliott, Deputy Premier and Minister of Health. "Implementing a provincewide emergency brake was not an easy decision to make and is not one we take lightly. As we continue to vaccinate more Ontarians, the end is in sight, but right now these necessary measures will help to stop the spread of variants in our communities, protect capacity in our health care system, and save lives."

The current *COVID-19 Response Framework: Keeping Ontario Safe and Open*, will be paused when the provincewide emergency brake comes into effect. The impacts of these time-limited measures will be evaluated throughout the next four weeks to determine if it is safe to lift any restrictions or if they need to be extended. With more than $1.6 billion invested to protect against COVID-19, schools remain safe for students and staff. Keeping schools open is critical to the mental health and well-being of Ontario youth. During the emergency shutdown, schools will remain open for in-person learning with strict safety measures in place. The spring break will continue as planned for the week of April 12. In order to support working families, child care will remain open during the shutdown. Child care settings will continue to adhere to stringent health and safety measures so that they remain safe places for children and staff.

"In the last few weeks a significant increase in COVID-19 cases and variants of concern has been observed across Ontario which has put considerable strain on our public health and health care systems," said Dr. David Williams, Chief Medical Officer of Health. "Implementing a provincewide shutdown is needed to bring the third wave of this pandemic under control so that we can save lives, keep our education system open and allow our vaccination program to take hold."

Quick Facts

- Based on the latest modelling data, variants of concern are continuing to grip the province and drive this third wave of the pandemic. Case rates are rising, younger Ontarians are becoming sicker and ICU capacity is at risk of becoming overwhelmed without stronger public health and workplace safety measures in place.
- The 2021 Budget, *Ontario's Action Plan: Protecting People's Health and Our Economy*, brings the government's total investments to protect the economy to $23.3 billion. This includes an estimated $3.4 billion to support approximately 120,000 small businesses across Ontario via two rounds of the Ontario Small Business Support Grant. Applications for the Ontario Small Business Support Grant have been extended for one week through April 7 and all eligible businesses are encouraged to apply.
- Additionally, the new Ontario Tourism and Hospitality Small Business Support Grant will provide an estimated $100 million in one-time payments of $10,000 to $20,000 to eligible small businesses in the tourism and hospitality sector. Businesses required to close or significantly restrict services due to provincial public health measures can continue to apply for property tax and energy cost rebates. Visit Ontario.ca/COVIDsupport for more information on Ontario's supports for businesses.
- To ensure that every person who requires care in a hospital can access a bed, the government has invested more than $5.1 billion to support hospitals since the start of the pandemic, creating more than 3,100 additional hospital beds and 500 critical care and high intensity medicine beds. This includes $1.8 billion in 2021–22 to continue providing care for COVID-19 patients, addressing surgical backlogs and keeping pace with patient needs through its *Ontario's Action Plan: Protecting People's Health and Our Economy.*
- The province continues to deploy rapid testing in workplaces, including up to 300,000 COVID-19 tests per week for asymptomatic staff in key sectors such as manufacturing, warehousing, supply chain, mining, construction and food processing. More than 4.7 million rapid antigen tests have been sent to over 1,150 workplaces, including 89 essential industry sites, under the Provincial Antigen Screening Program.
- The Ontario government continues to implement its High Priority Communities Strategy to provide targeted supports to communities hardest hit by COVID-19. In these communities 1,000 Community Ambassadors have been mobilized, 30 community testing sites have been opened and nearly 36,000 PPE kits have been distributed to community members.
- Get tested if you have COVID-19 symptoms, or if you have been advised of exposure by your local public health unit or through the COVID Alert App. Visit Ontario.ca/covidtest to find the nearest testing location.
- Emergency orders O. Reg. 55/21 (Compliance Orders for Retirement Homes) and O. Reg. 8/21 (Enforcement of COVID-19 Measures) currently in force, under the Emergency Management and Civil Protection Act, have been extended until April 19, 2021, as the province continues to deal with the impacts of COVID-19.

Additional Resources

- 2021 Budget - Ontario's Action Plan: Protecting People's Health and Our Economy

- The Digital Main Street program helps main street businesses build their online presence and reach more customers.
- Property Tax and Energy Cost Rebates
- Visit Ontario's COVID-19 vaccine web page to view the latest provincial data and information on COVID-19 vaccines.
- Visit Ontario's COVID-19 information website to learn more about how the province continues to protect the people of Ontario from the virus.
- For public inquiries call ServiceOntario, INFOline at 1-866-532-3161 (Toll-free in Ontario only)

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This is **Exhibit "Q"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

NEWS RELEASE

Ontario Enacts Provincial Emergency and Stay-at-Home Order

Additional measures needed to protect health system capacity and save lives during third wave of COVID-19

April 07, 2021
Office of the Premier

TORONTO — The Ontario government, in consultation with the Chief Medical Officer of Health and other health experts, is immediately declaring a third provincial emergency under s 7.0.1 (1) of the *Emergency Management and Civil Protection Act* (EMPCA). These measures are being taken in response to the rapid increase in COVID-19 transmission, the threat on the province's hospital system capacity, and the increasing risks posed to the public by COVID-19 variants.

Details were provided today by Premier Doug Ford, Christine Elliott, Deputy Premier and Minister of Health, Solicitor General Sylvia Jones, and Dr. David Williams, Chief Medical Officer of Health.

"The COVID-19 situation is at a critical stage and we must act quickly and decisively to stay ahead of these deadly new variants," said Premier Ford. "By imposing these strict new measures we will keep people safe while allowing our vaccination program to reach more people, starting with our high risk population and identified hot spots. Although this is difficult, I urge everyone to follow these public health measures and together we will defeat this deadly virus."

Case rates, hospitalizations, and ICU occupancy are increasing rapidly, threatening to overwhelm the health care system. The number of COVID-19 hospitalizations in the province have increased by 28.2 per cent between the period of March 28 and April 5, 2021. In addition, between March 28 and April 5, 2021, Ontario has seen the number of COVID-19 patients in intensive care escalate by 25 per cent. While every action possible is being taken to increase capacity and continue daily surgeries and procedures, the province is reaching a tipping point.

Effective Thursday, April 8, 2021 at 12:01 a.m., the government is issuing a province-wide Stay-at-Home order requiring everyone to remain at home except for essential purposes, such as going to the grocery store or pharmacy, accessing health care services (including getting vaccinated), for outdoor exercise , or for work that cannot be done remotely. As Ontario's health care capacity is threatened, the Stay-at-Home order, and other new and existing public health and workplace safety measures will work to preserve public health system capacity, safeguard vulnerable populations, allow for progress to be made with vaccinations and save lives.

Retail

In addition, the province is also strengthening public health and workplace safety measures for non-essential retail under the provincewide emergency brake. Measures include, but are not limited to:

- Limiting the majority of non-essential retailers to only operate for curbside pick-up and delivery, via appointment, between the hours of 7 a.m. and 8 p.m., with delivery of goods to patrons permitted between 6:00 am and 9:00 pm, and other restrictions;
- Restricting access to shopping malls to limited specified purposes, including access for curbside pick-up and delivery, via appointment, with one single designated location inside the shopping mall, and any number of designated locations outside the shopping mall, along with other restrictions;
- Restricting discount and big box stores in-person retail sales to grocery items, pet care supplies, household cleaning supplies, pharmaceutical items, health care items, and personal care items only;
- Permitting the following stores to operate for in-person retail by appointment only and subject to a 25 per cent capacity limit and restricting allowable hours of operation to between 7 a.m. and 8 p.m. with the delivery of goods to patrons permitted between 6 a.m. and 9 p.m.:
    - Safety supply stores;
    - Businesses that primarily sell, rent or repair assistive devices, aids or supplies, mobility devices, aids or supplies or medical devices, aids or supplies;

    - Rental and leasing services including automobile, commercial and light industrial machinery and equipment rental;
    - Optical stores that sell prescription eyewear to the public;
    - Businesses that sell motor vehicles, boats and other watercraft;
    - Vehicle and equipment repair and essential maintenance and vehicle and equipment rental services; and
    - Retail stores operated by a telecommunications provider or service, which may only permit members of the public to enter the premises to purchase a cellphone or for repairs or technical support.
- Permitting outdoor garden centres and plant nurseries, and indoor greenhouses that engage in sales to the public, to operate with a 25 per cent capacity limit and a restriction on hours of operation to between 7 a.m. and 8 p.m.

These additional and strengthened public health and workplace safety measures will be in effect as of Thursday, April 8, 2021 at 12:01 a.m.

Education

Keeping schools and child care open is critical to the mental health and well-being of Ontario children and youth. Schools and child care will remain open for in-person care and learning in public health regions where it is permitted, with strict safety measures in place.

In addition, beginning next week, education workers who provide direct support to students with special education needs across the province, and all education workers in select hot spot areas, will be eligible to register for vaccination. Vaccinations will commence during the April break starting with priority neighborhoods in Toronto and Peel, then rolling out to priority neighborhoods in other hot spot regions, including York, Ottawa, Hamilton, Halton and Durham. This will be followed by a rollout across the province as supply allows.

"While our government took decisive action by implementing the provincewide emergency brake, more needs to be done to protect against the threats to our health system resources and the continued health and safety of individuals and families across the province," said Christine Elliott, Deputy Premier and Minister of Health. "By further strengthening public health and workplace safety measures, we can work to reduce transmission of the virus while we work to rollout Phase 2 of our vaccine distribution plan, and put more needles in the arms of Ontarians."

"The rapid and increasing spread of COVID-19 and the variants of concern pose significant threats to our health care system and the well-being of Ontarians, requiring immediate and decisive action," said Solicitor General Sylvia Jones. "The declaration of a third provincial emergency is necessary to provide the government with the tools needed to help protect the public, reduce the spread of the virus and save lives."

Vaccinations

As part of Phase Two of its COVID-19 vaccine distribution plan, people living in regions with the highest rates of transmission will be prioritized to receive a vaccine, starting with the most at-risk in the Peel and Toronto public health regions. This initiative will be expanded to additional "hot spot" regions based on established patterns of transmission, severe illness, and mortality.

To support this expanded vaccination effort, mobile teams are being organized to administer vaccines in high-risk congregate settings, residential buildings, faith-based locations, and locations occupied by large employers in hot spot neighbourhoods to individuals aged 18 or over. Pop-up clinics will also be set-up in highly impacted neighborhoods, including at faith-based locations and community centres in those hot spots, in collaboration with public health units and community organizations within those communities. The province will provide additional resources to support these mobile and pop-up clinics in the hardest-hit neighbourhoods.

The government will also extend booking for COVID-19 vaccination appointments to more age groups through its provincial booking system, for public health regions with highly impacted neighbourhoods, on Friday, April 9, 2021. Booking eligibility will be extended to include individuals aged 50 and over for COVID-19 vaccination appointments at mass immunization clinics in high-risk areas as identified by postal code, using the provincial booking system.

Workplace Inspections

Health and safety inspectors and provincial offenses officers will increase inspections and enforcement at essential businesses in regional hot zones to continue protecting essential workers while on the job. There have been 19,500 COVID-related workplace inspections and investigations across the province since the beginning of 2021. During those visits, over 450 COVID-19 related tickets have been issued and OHS inspectors have issued over 14,446 OHS orders and stopped unsafe work related to COVID-19 a total of 24 times.

Rapid Testing

Rapid testing continues to be deployed in workplaces for asymptomatic staff in key sectors such as manufacturing, warehousing, supply chain, mining, construction and food processing. Approximately 5.4 million rapid antigen tests have been sent to over 1,150 workplaces, including 100 essential industry sites, under the Provincial Antigen Screening Program. To encourage the use of these tests under the program, additional outreach will occur to employers in regions with highest rates of transmission to increase access to testing, and the process for enrollment in the screening program will be streamlined to allow for quick access to these supports.

"As we continue to see COVID-19 variants of concern drive this third wave of COVID-19, it is evident stronger public health and workplace measures are needed to help interrupt the spread of the virus," said Dr. David Williams, Chief Medical Officer of Health. "By all of us staying at home, while still taking some time to enjoy the outdoors with the people we live with in our local neighbourhoods and maintaining two metres physical distance from others, we can reduce our mobility, minimize transmission, protect our loved ones and our communities, safeguard health system capacity, and save lives."

Quick Facts

- Over the past week, the province's positivity rate is 5.1 per cent, well above the high-alert threshold of 2.5 per cent, and as of April 6, 2021, there has been a total of 2,483 cases with one of the three variants of concern (VoC). The percent of cases in the last week that tested positive for a mutation or VOC was 63.1 per cent.
- On Saturday April 3, 2021, in response to an alarming surge in case numbers and COVID-19 hospitalizations across the province and in consultation with the Chief Medical Officer of Health, the government imposed a provincewide emergency brake, implementing additional time-limited public health and workplace safety measures, including encouraging remote work in all industries to the greatest extent possible and the closure of additional workplaces, further capacity limits on some essential businesses which are able to remain open, and strengthened advice on limiting trips outside of the home for essential reasons.
- On the advice of the Chief Medical Officer of Health, all Ontarians are asked to limit trips outside the home to necessities such as food, medication, medical appointments, supporting vulnerable community members, or exercising outdoors with members of their household in our their communities. Individuals should remain in their local communities and avoid all non-essential travel – even within the province – and to stay home when ill even with mild symptoms. Employers in all industries should make every effort to allow employees to work from home.
- To ensure that every person who requires care in a hospital can access a bed, the government has invested more than $5.1 billion to support hospitals since the start of the pandemic, creating more than 3,100 additional hospital beds and 500 critical care and high intensity medicine beds. This includes $1.8 billion in 2021–22 to continue providing care for COVID-19 patients, addressing surgical backlogs and keeping pace with patient needs through its Ontario's Action Plan: Protecting People's Health and Our Economy.
- The Ontario government continues to implement its High Priority Communities Strategy to provide targeted supports to communities hardest hit by COVID-19. In these communities 1,000 Community Ambassadors have been mobilized, 30 community testing sites have been opened and nearly 36,000 PPE kits have been distributed to community members.
- Get tested if you have COVID-19 symptoms, or if you have been advised of exposure by your local public health unit or through the COVID Alert App. Visit Ontario.ca/covidtest to find the nearest testing location.

Additional Resources

- Ontario Implements Provincewide Emergency Brake
- Ontario Moving to Phase Two of COVID-19 Vaccine Distribution Plan
- 2021 Budget - Ontario's Action Plan: Protecting People's Health and Our Economy
- The Digital Main Street program helps main street businesses build their online presence and reach more customers.
- Property Tax and Energy Cost Rebates
- Visit Ontario's COVID-19 communications resources web page for resources in multiple languages to help local communication efforts.
- Visit Ontario's COVID-19 vaccine web page to view the latest provincial data and information on COVID-19 vaccines.
- Visit Ontario's COVID-19 information website to learn more about how the province continues to protect the people of Ontario from the virus.
- For public inquiries call ServiceOntario, INFOline at 1-866-532-3161 (Toll-free in Ontario only).

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This is **Exhibit "R"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

NEWS RELEASE

Ontario Moves Schools to Remote Learning Following Spring Break

Continued Rise in COVID-19 Cases Demands Shift to Protect Students and Staff and Slow Community Spread

April 12, 2021
Office of the Premier

TORONTO — The Ontario government, in consultation with the Chief Medical Officer of Health, has made the difficult decision to move elementary and secondary schools to remote learning following the April break. This move has been made in response to the rapid increase in COVID-19 cases, the increasing risks posed to the public by COVID-19 variants, and the massive spike in hospital admissions.

Details were provided today by Premier Doug Ford, Christine Elliott, Deputy Premier and Minister of Health, Stephen Lecce, Minister of Education, and Dr. David Williams, Chief Medical Officer of Health.

"We are seeing a rapidly deteriorating situation with a record number of COVID cases and hospital admissions threatening to overwhelm our health care system," said Premier Ford. "As I have always said we will do whatever it takes to ensure everyone stays safe. By keeping kids home longer after spring break we will limit community transmission, take pressure off our hospitals and allow more time to rollout our COVID-19 vaccine plan."

With appropriate measures in place, schools have been safe places for learning throughout the pandemic, as confirmed by the Chief Medical Officer of Health and local medical officers of health and have demonstrated low rates of in-school transmission. However, increasing rates of community spread pose a threat to the health and safety of school communities. As a result, all publicly funded and private elementary and secondary schools in the province are to move to teacher-led remote learning when students return from the April break on April 19, 2021. Private schools operating in-person this week are to transition to remote learning by April 15, 2021. This action is being taken in support of the Government's broader efforts to limit the spread of COVID-19. Data will be assessed on an ongoing basis and health officials will be consulted to determine when it will be safe to resume in-person learning.

Child care for non-school aged children will remain open, before and after school programs will be closed and free emergency child care for the school-aged children of eligible health care and frontline workers will be provided. To protect the most vulnerable, boards will make provisions for continued in-person support for students with special education needs who require additional support that cannot be accommodated through remote learning.

"This was not a decision we made lightly, as we know how critical schools are to Ontario students. Our priority has always been to keep schools open, however sharply rising community transmission can put our schools and Ontario families at risk," said Minister Lecce. "While Ontario's plan has kept schools safe, as confirmed by the Chief Medical Officer of Health, we are taking decisive and preventative action today to ensure students can safely return to learning in our schools."

Case rates, hospitalizations, and ICU occupancy are increasing rapidly, threatening to overwhelm the health care system. The number of COVID-19 hospitalizations in the province have increased by 22.1 per cent between the period of April 4 and 10, 2021. In addition, during this same period of time, Ontario has seen the number of COVID-19 patients in intensive care increase from 494 to 605.

Since April 8, the province has been under a provincewide Stay-at-Home order, requiring everyone to remain at home except for essential purposes, such as going to the grocery store or pharmacy, accessing health care services (including getting vaccinated), for outdoor exercisewith your household in your home community, or for work that cannot be done remotely. As Ontario's health care capacity is threatened, the Stay-at-Home order, and other new and existing public health and workplace safety measures, will work to preserve public health system capacity, safeguard vulnerable populations, allow for progress to be made with vaccinations and save lives.

With students moving to remote learning, vaccine prioritization of education workers who provide direct support to students with special education needs across the province, and all education workers in select hot spot areas, starting with Peel and Toronto, will continue. Starting today, special education workers across the province and education workers in Peel and Toronto hot spots will be eligible to register for vaccination by calling the provincial vaccine booking line at 1-833-943-3900. More information is available at Ontario.ca/covidvaccine.

It is critically important that as Ontarians receive the vaccine, everyone continues to wear a mask, maintain physical distancing when outside of their immediate household and frequently wash their hands. As well, continue to monitor for symptoms of COVID-19 and get tested if symptoms are present.

"As we continue to see rapid growth in community transmission across the province, it is necessary to take extra precautions and measures to ensure the continued health and safety of students, teachers and their families," said Dr. David Williams, Chief Medical Officer of Health. "As the fight against this third wave of the pandemic continues, everyone must continue following all public health and workplace safety measures and stay at home to prevent further transmission of the virus, so we can once again resume in person learning in our schools."

Quick Facts

- As of April 10, 2021, Ontario currently has 1,646 COVID-19 patients requiring acute care, which includes 605 patients in ICU, with 382 on a ventilator.
- Based on the latest modelling data, cases across the province are continuing to grow and the number of people requiring an intensive care bed is projected to rise to approximately 800 people within the next 10 days.
- Some jurisdictions around the world, including those in Canada have implemented similar time-limited measures to respond to a dramatic resurgence in cases. Based on their experiences, measures of four to six weeks are expected to interrupt transmission of COVID-19 in Ontario.
- Municipalities and local medical officers of health may have additional restrictions or targeted requirements in their region.
- Get tested if you have symptoms compatible with COVID-19, or if you have been advised of exposure by your local public health unit or through the COVID Alert App. Visit Ontario.ca/covidtest to find the nearest testing location.
- Prior to April break, more than 99 per cent of students and staff did not have a current case of COVID-19. Since September, 99.2 per cent of students and 98.6 per cent of staff never reported a COVID-19 case.

Additional Resources

- Visit Ontario's website to learn more about how the province continues to protect Ontarians from COVID-19
- Learn about Ontario’s vaccination program to help protect us against COVID-19.
- Support for parents/students
- COVID-19: enhanced public health and workplace safety measures
- COVID-19 public health measures and advice

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Learn about Ontario’s early years, education and training systems. Includes information on child care, elementary schools, secondary schools, colleges, universities, skills training and financial aid. Learn more

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This is **Exhibit "S"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

Hospitalized and ICU cases

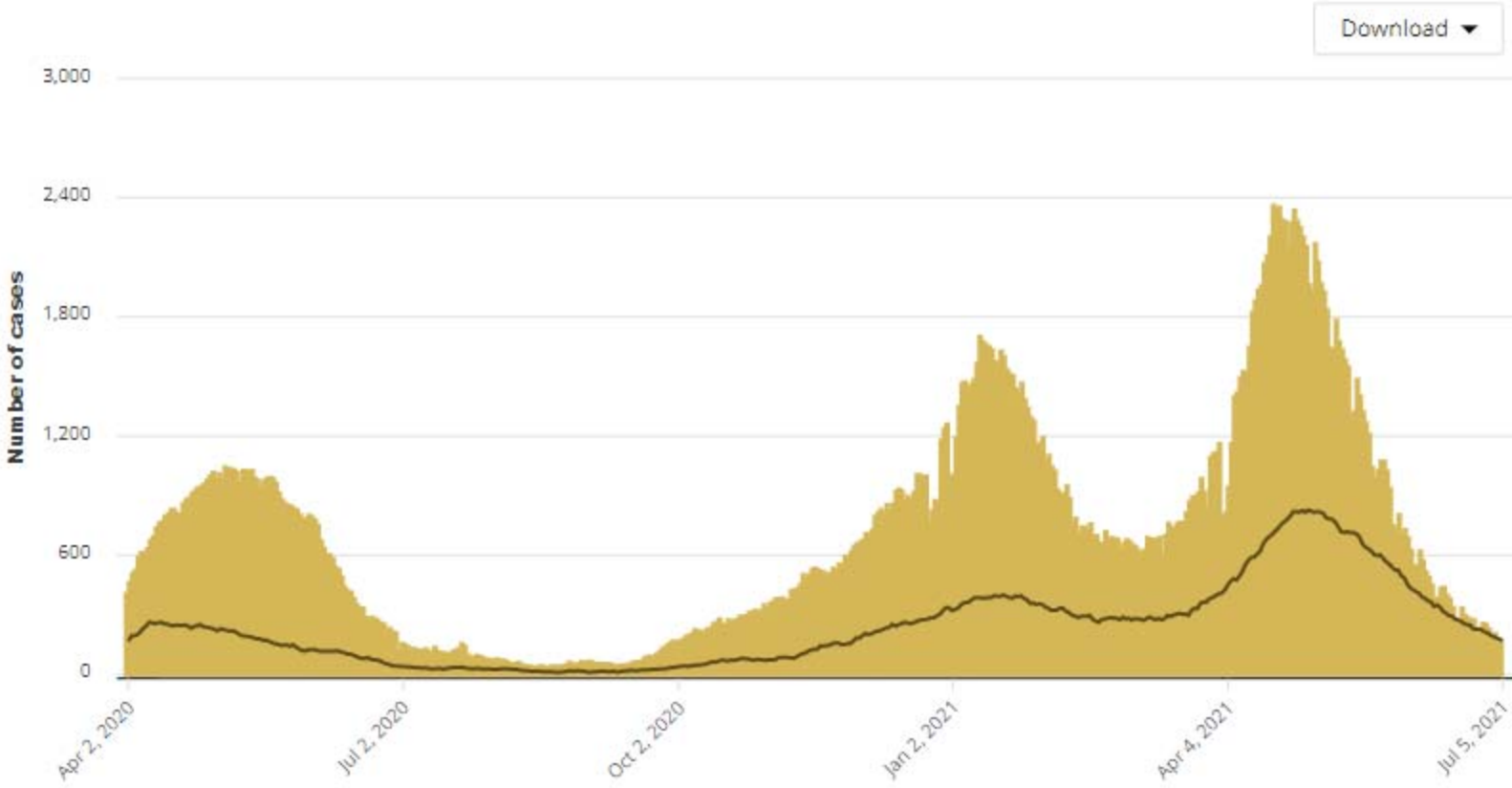
Each data point shows how many people were hospitalized and how many people who still tested positive for COVID-19 were in the ICU each day. Go to a detailed table that includes people who are in the ICU due to a COVID-19-related illness but no longer test positive for the virus.

Graph | Table

All time

Hospitalized (including people in ICU)

In ICU (testing positive)



This is **Exhibit "T"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

Update on COVID-19 Projections

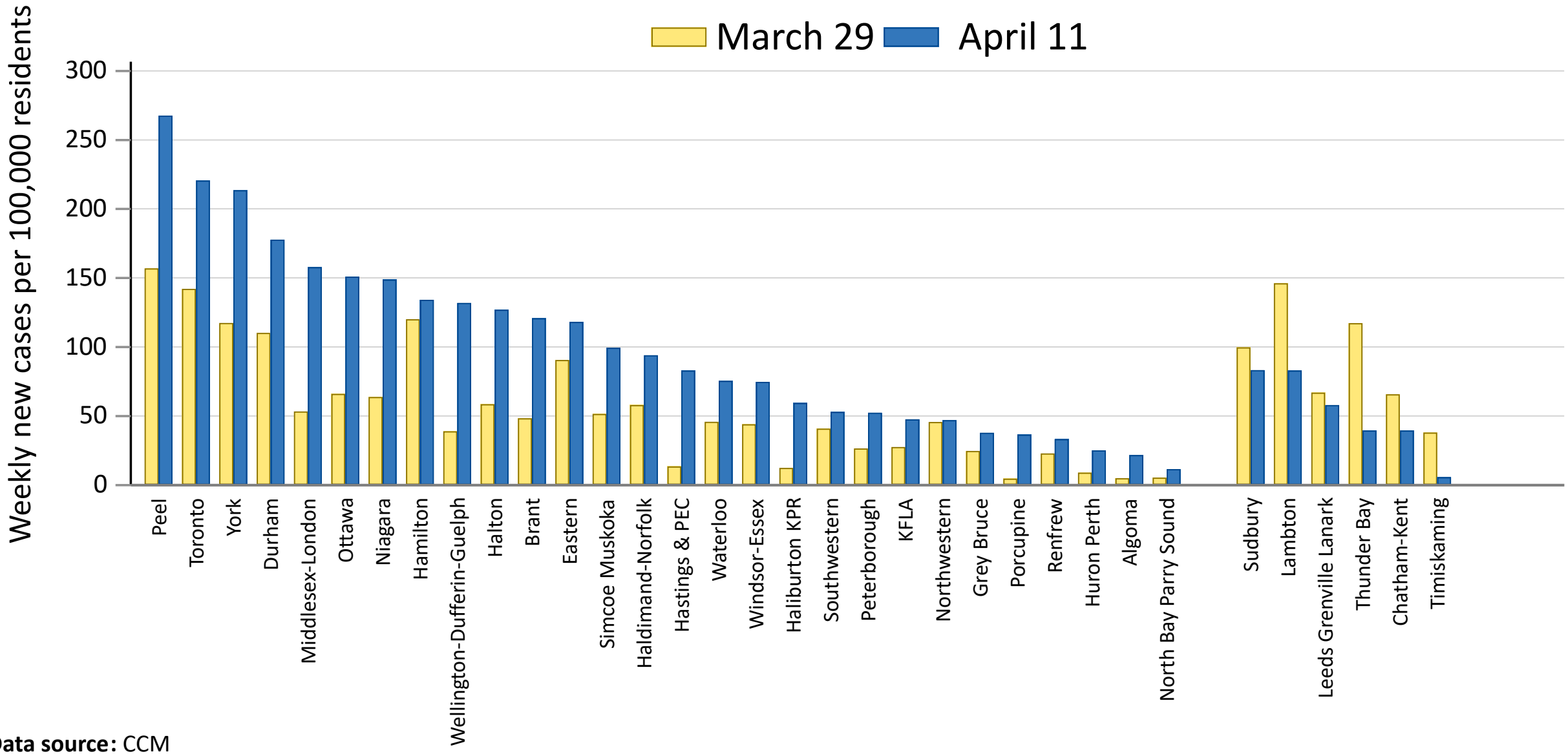
Science Advisory and Modelling Consensus Tables

April 16, 2021

Key Findings

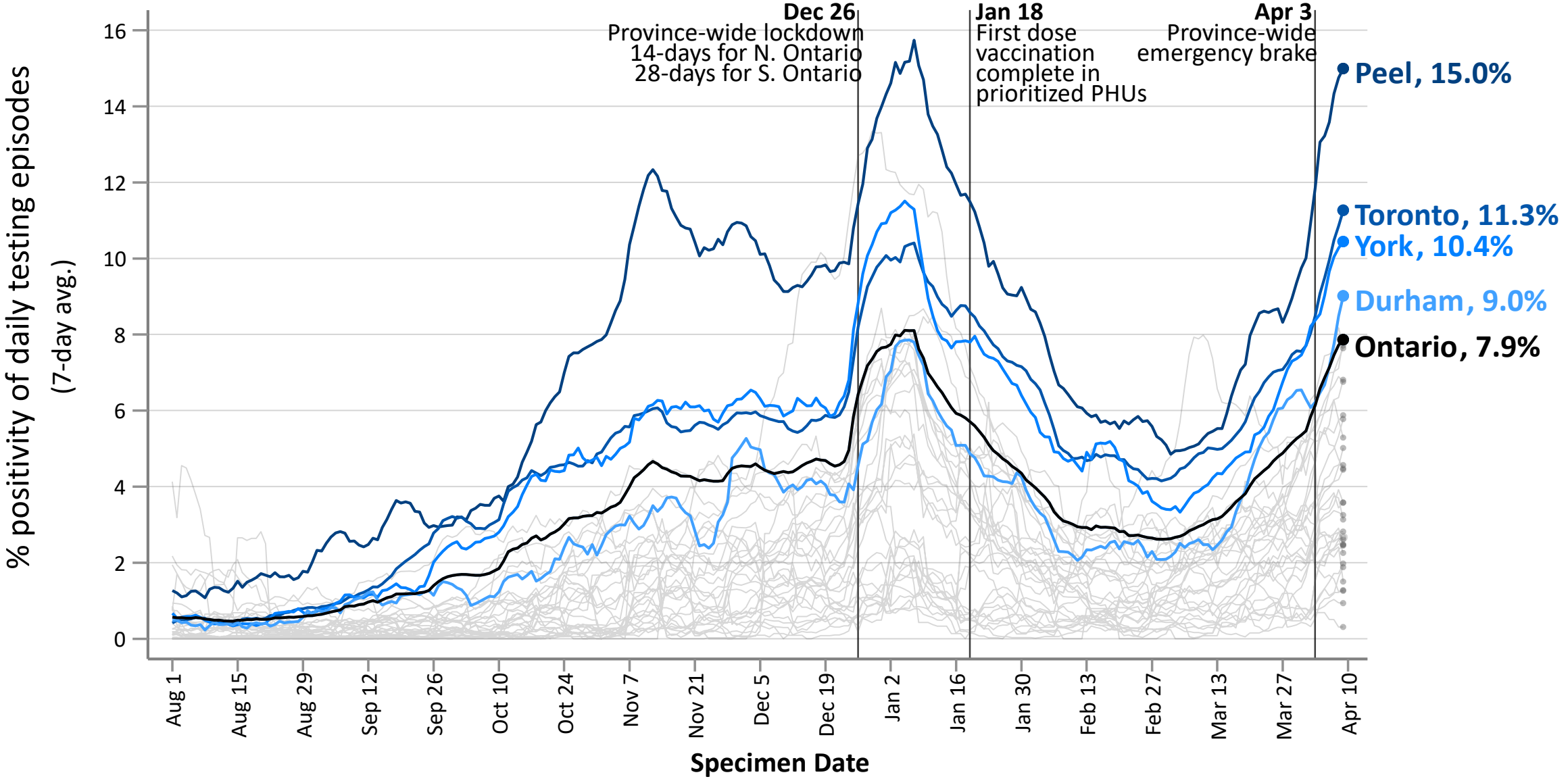
- COVID-19 cases, hospitalizations and ICU occupancy are **at their highest levels since March 2020** and variant cases continue to rise sharply.
- ICU occupancy is **compromising care for all patients.**
- Ontarians can help themselves and others by limiting mobility to truly necessary trips and **always wearing a mask and keeping 6 feet distant** when in contact with anyone outside their household.
- Although improving, vaccination is not reaching people at high-risk fast enough to overcome the level of serious illness in our communities and our hospitals.
- Without stronger system-level measures and immediate support for essential workers and high-risk communities, **high case rates will persist through the summer.**

Cases are **rapidly** increasing in most Public Health Units



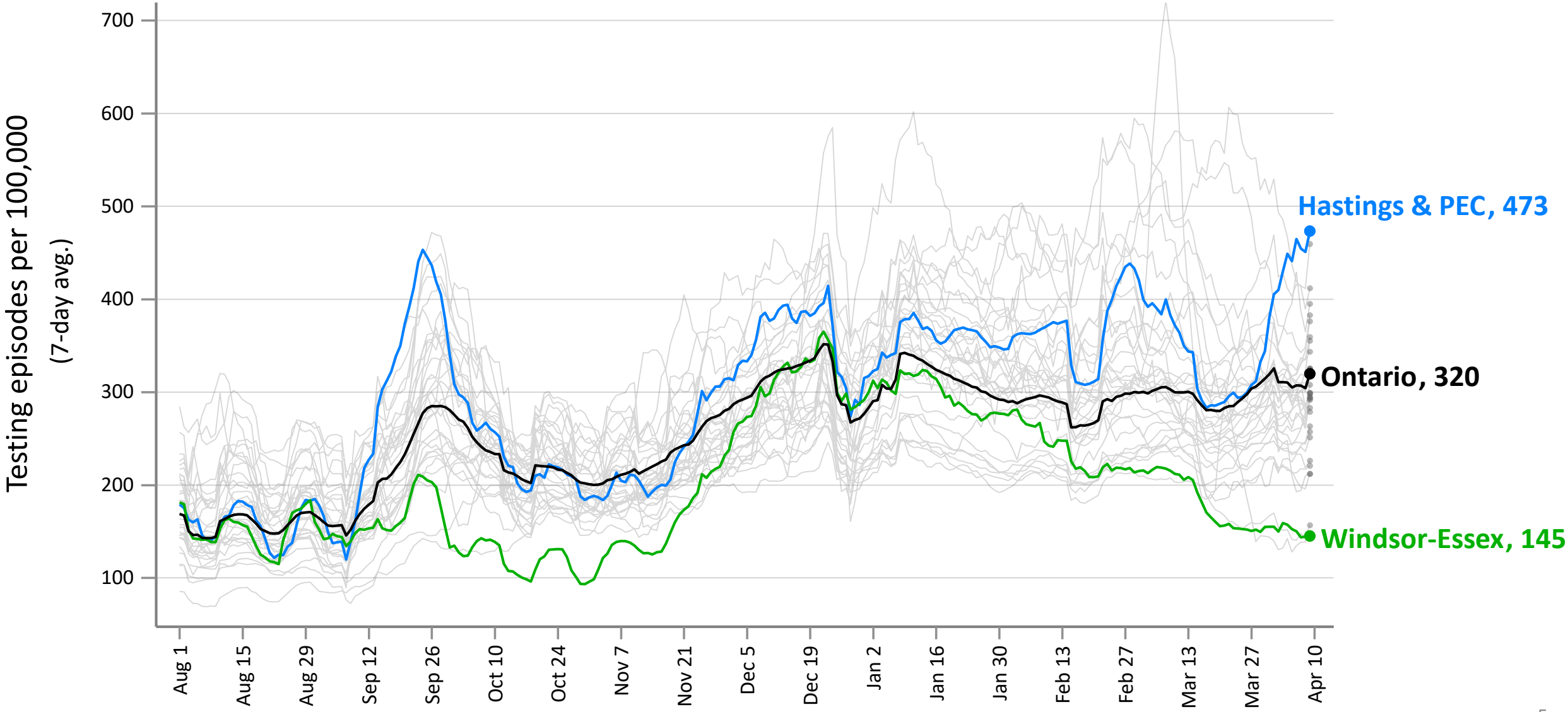
Data source: CCM
Data note: Data for the most recent day have been censored to account for reporting delays

Test positivity rates are increasing across Ontario



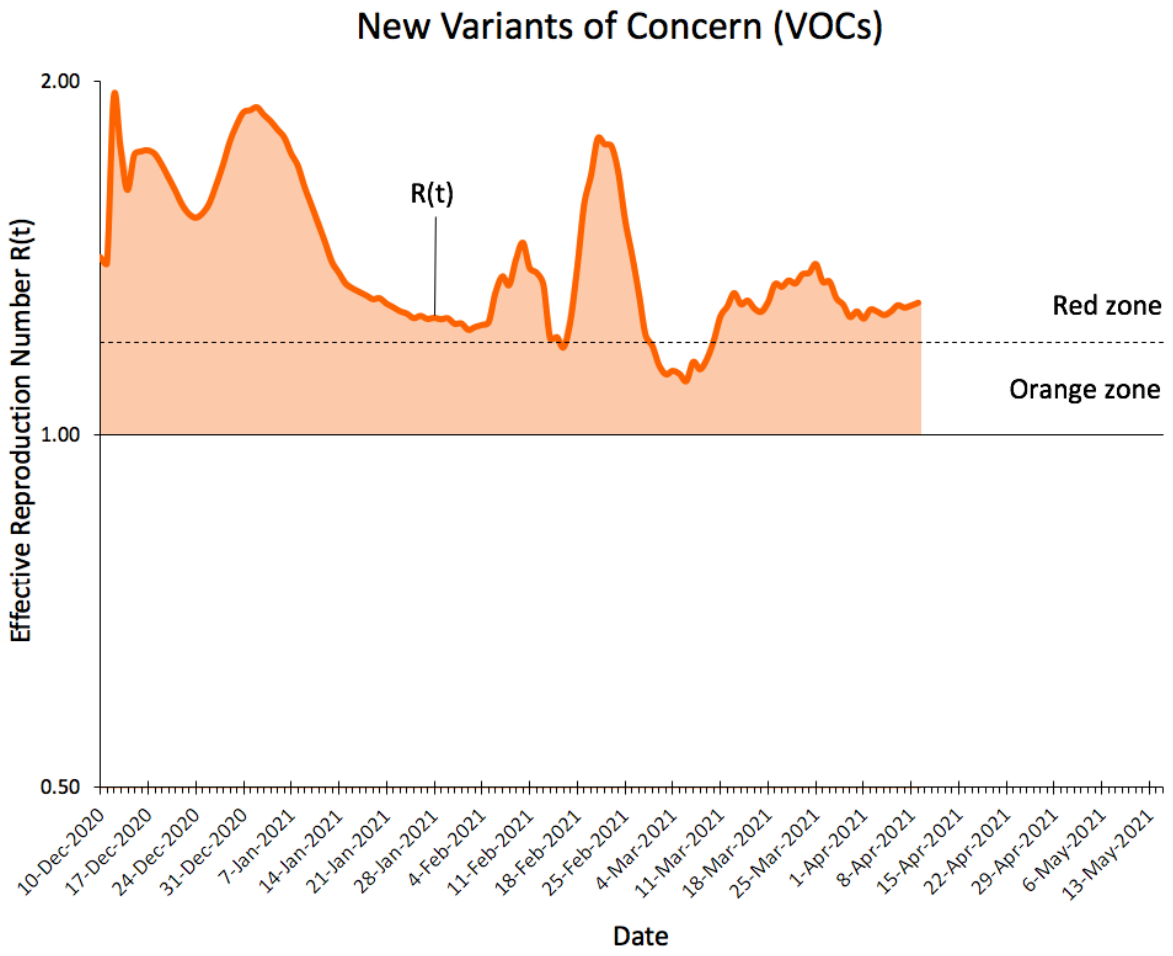
Data source: Ontario Laboratory Information System (OLIS), data up to April 9

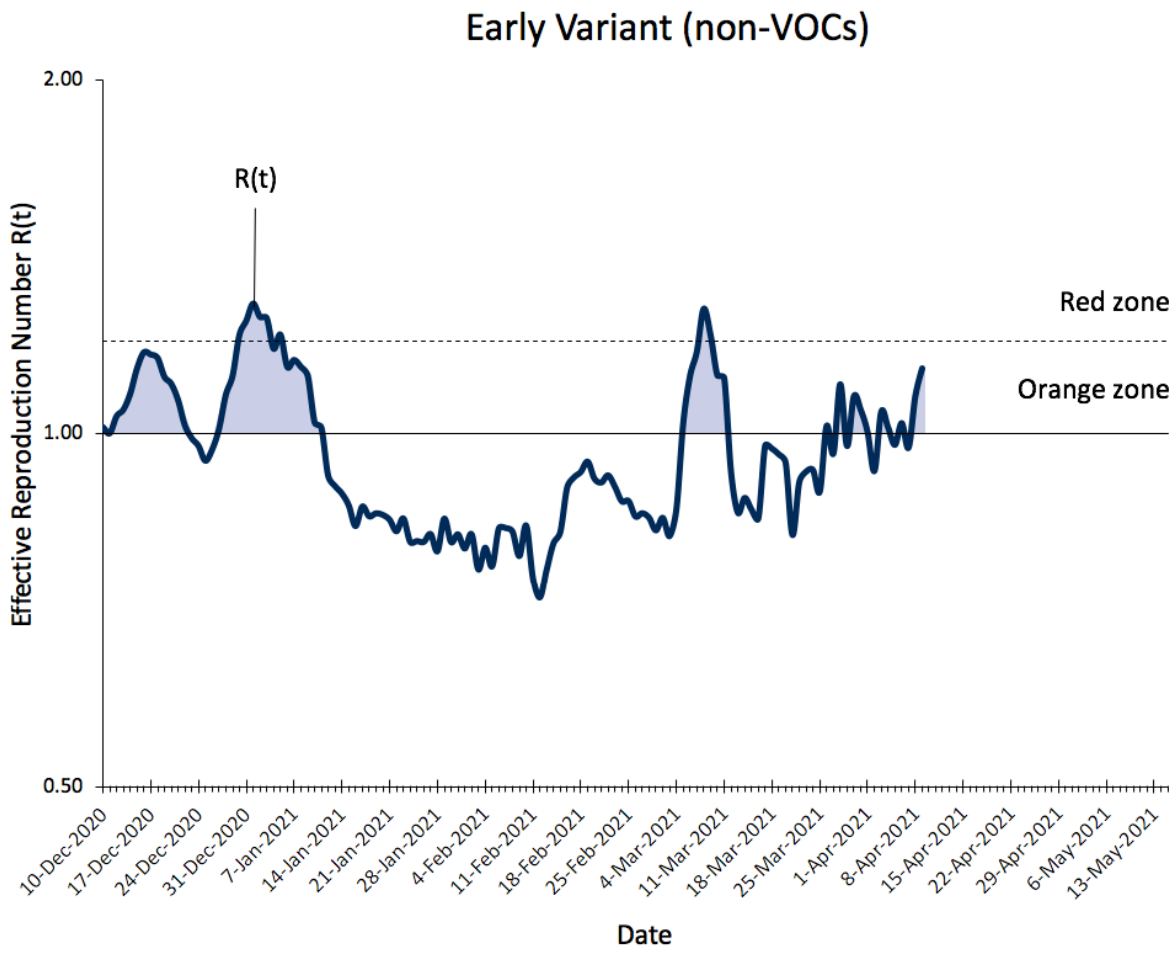
Ontario testing rates are flat – the increase in cases is because there are more cases, not more tests being done



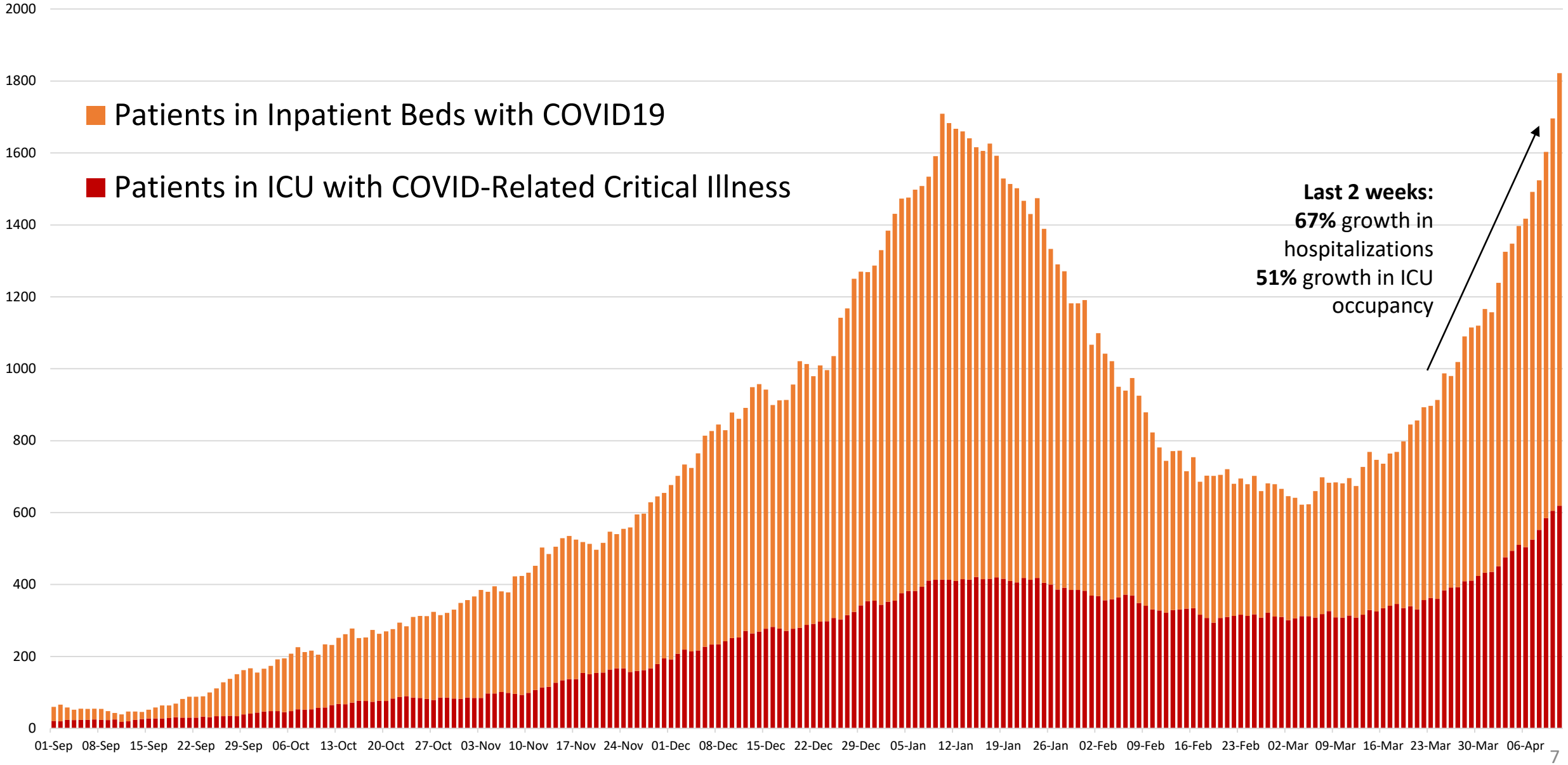
Data source: Ontario Laboratory Information System (OLIS), data up to April 9

The number of variant cases continues to rise and variants now dominate, but even the original strain is rising.





A record number of Ontarians are in hospital due to COVID-19



Data Sources: MOH COVID Inpatient Census and Critical Care Information System

A 6 week stay-at-home order with a vaccination rate of at least 100K doses per day is the only way to flatten the curve.

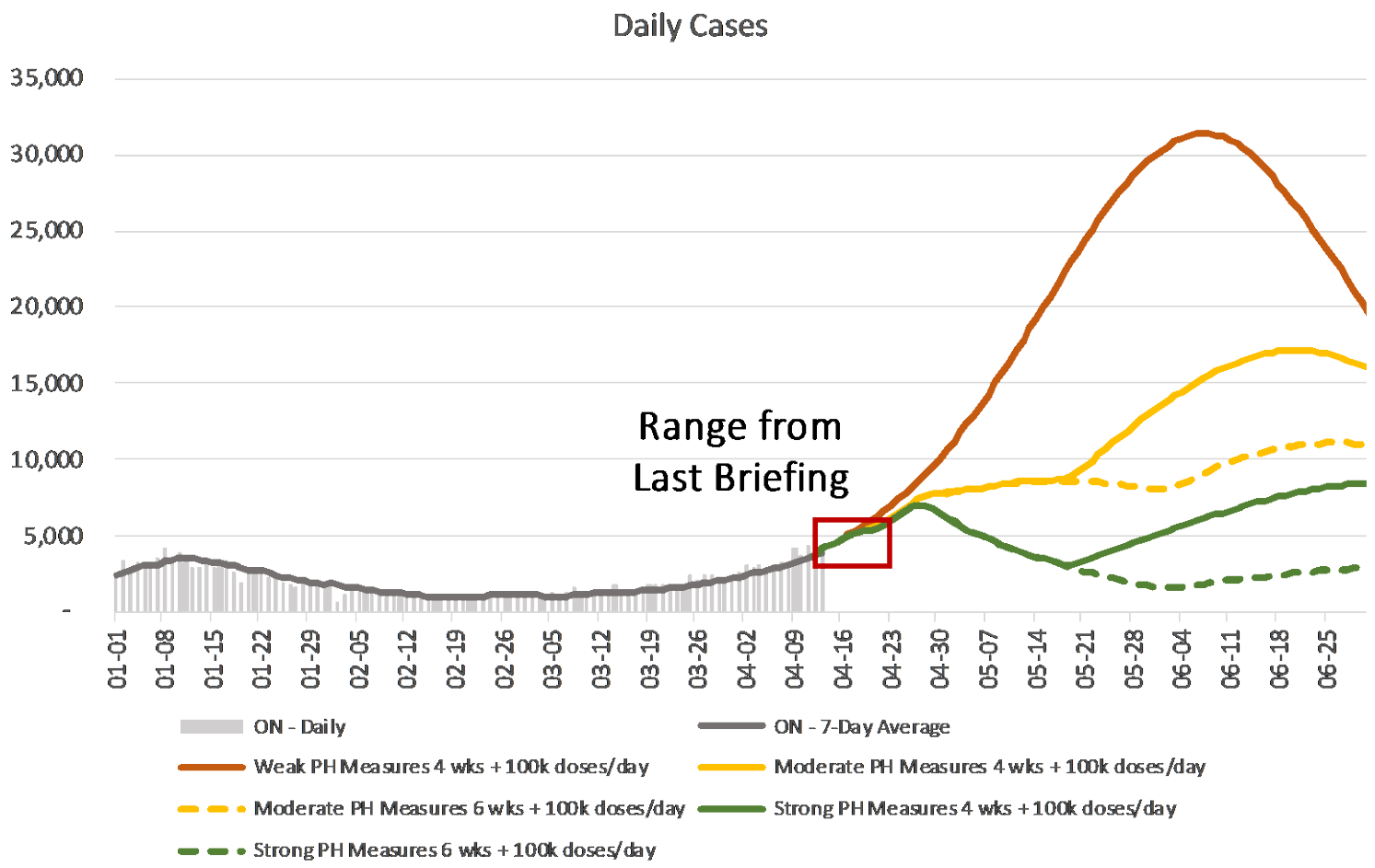
Figure summarizes predictions across 4 models with many scenarios.

Stay-at-home order assumptions:

- 4 or 6 weeks starting Apr 8
- Weak to strong effect on transmission

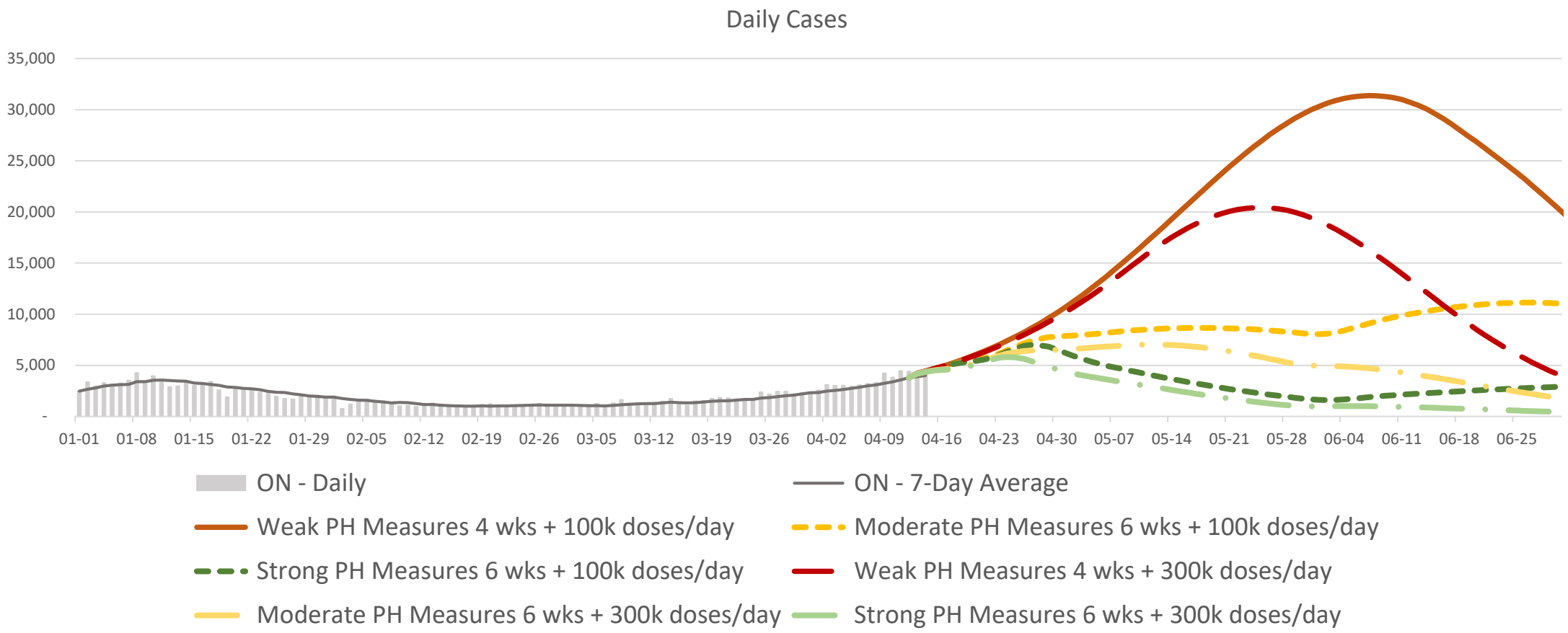
Vaccine assumptions:

- 60% effective in preventing infection
- 100,000 doses/day
- Administered at random

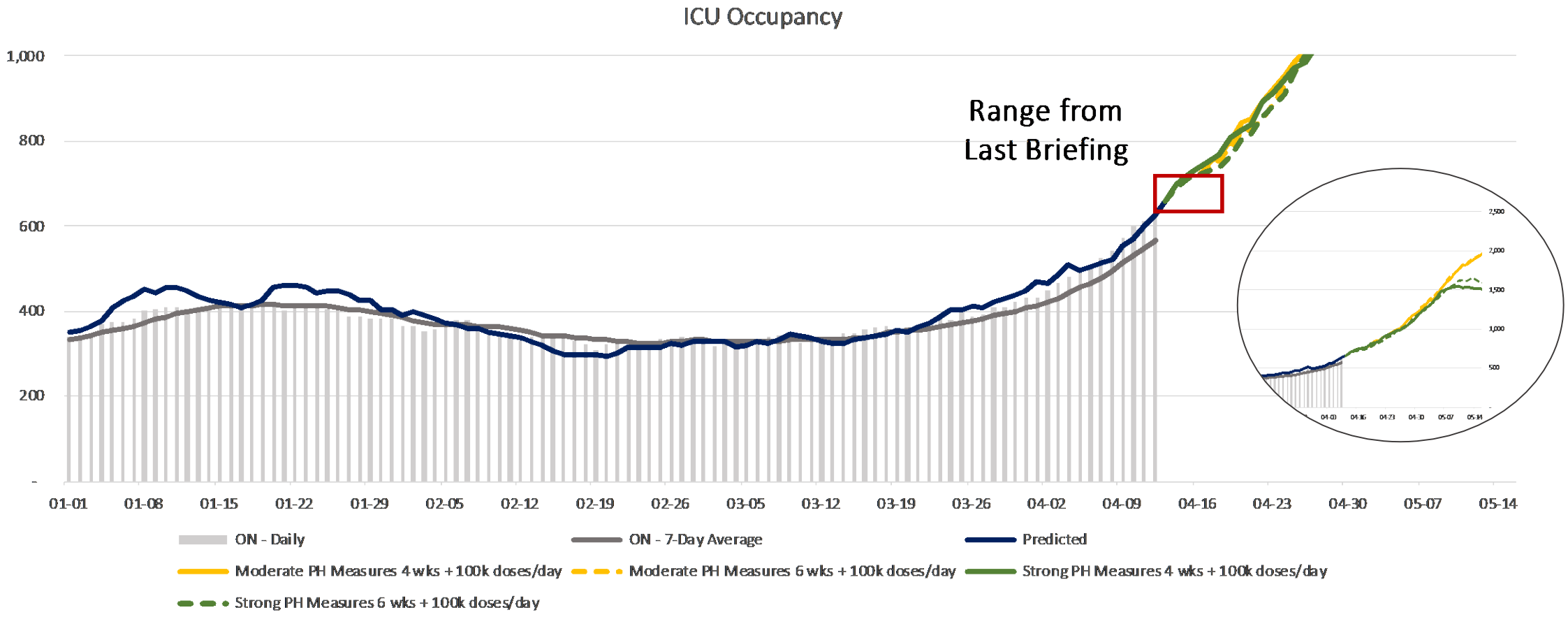


Predictions informed by modeling from COVID-19 ModCollab, Fields Institute, McMasterU, PHO, YorkU
Data (Observed Cases): covid-19.ontario.ca

Under every scenario, more vaccines mean a faster resolution in the long-run

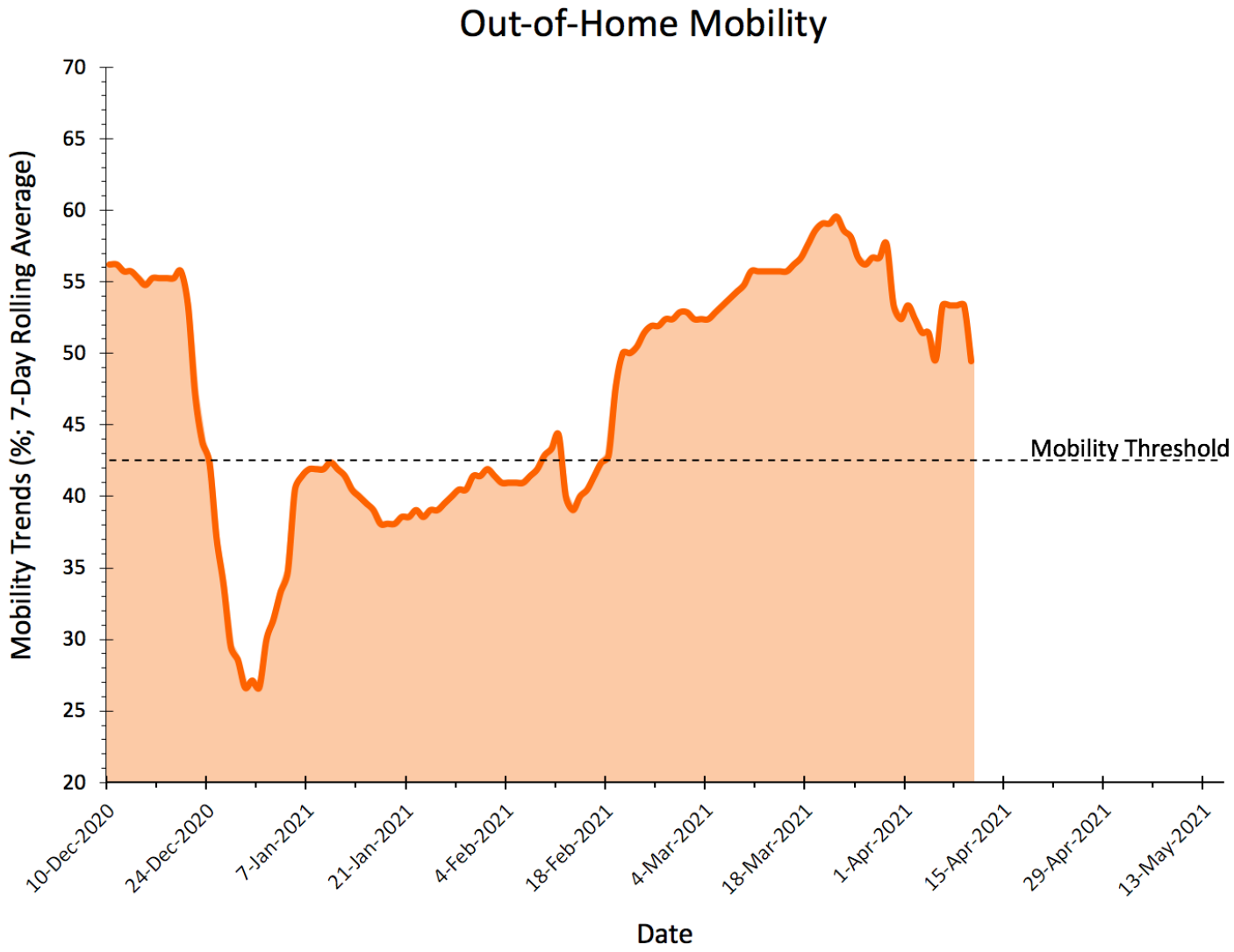


As predicted, ICU occupancy is rising dramatically. System-level public health measures will help blunt some of the impact.



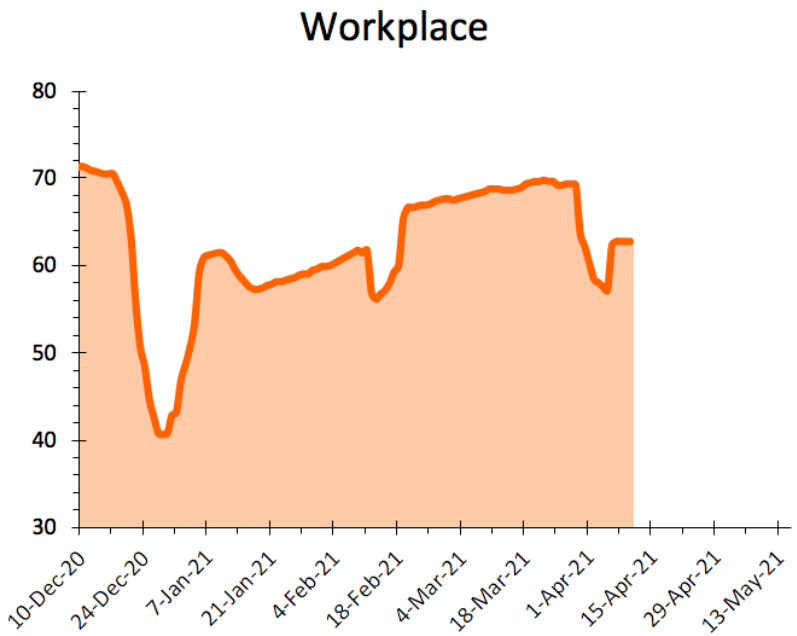
Predictions: COVID-19 ModCollab.
Data (Observed ICU Occupancy): CCSO

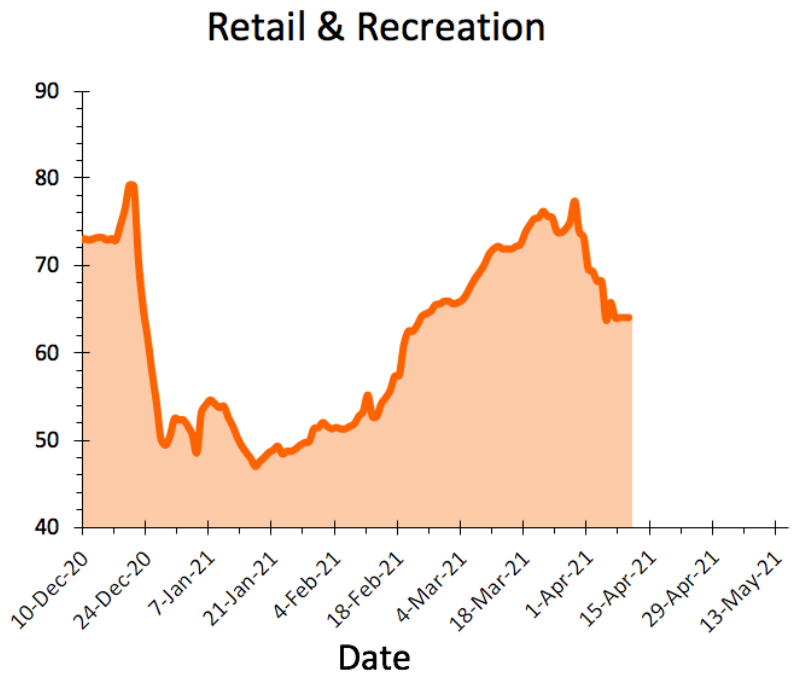
Mobility has declined slightly but not enough to bring current growth under control.

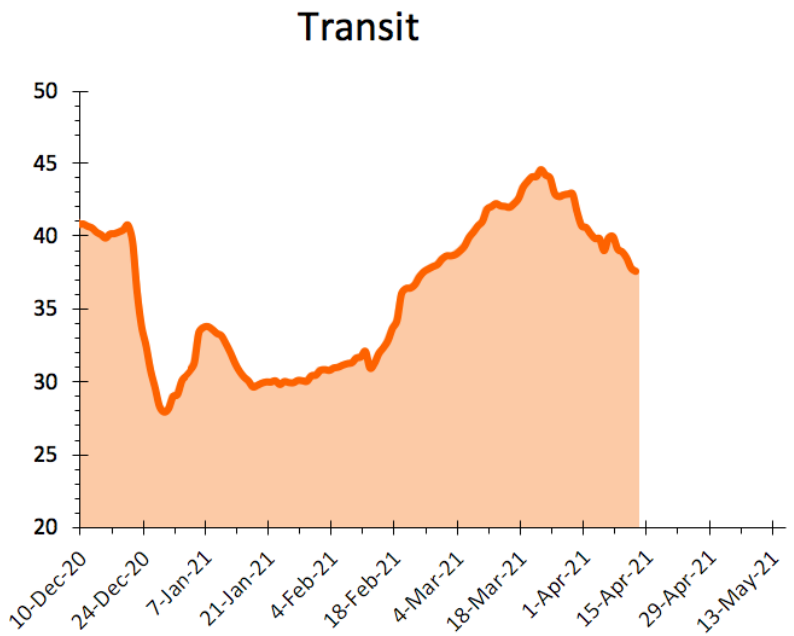


Predictions: COVID-19 SAT.
Data Google and Apple Mobility data

Mobility has declined slightly across settings. Further reducing mobility and always wearing a mask and distancing is how Ontarians help reduce cases.

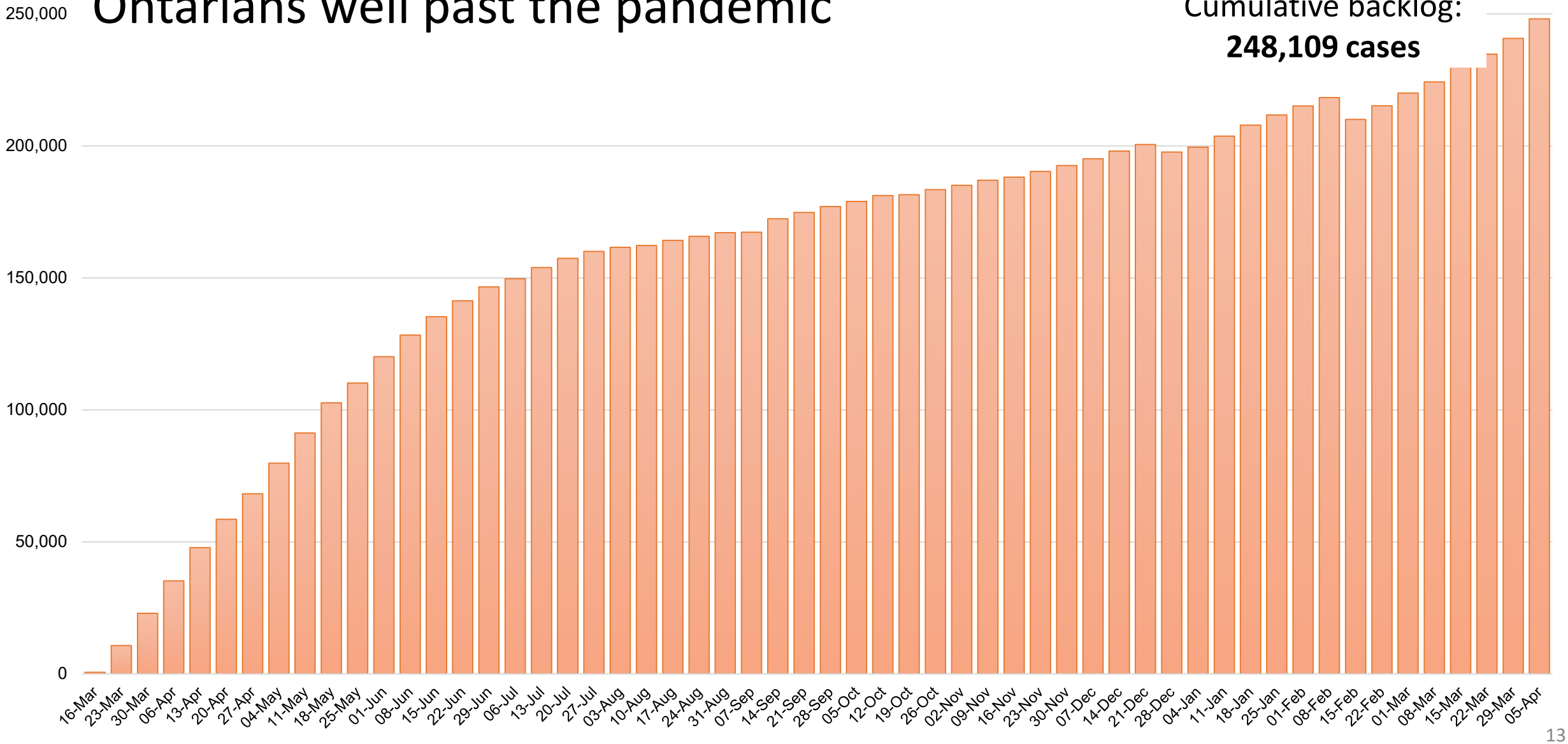






Predictions: COVID-19 SAT.
Data Google and Apple Mobility data

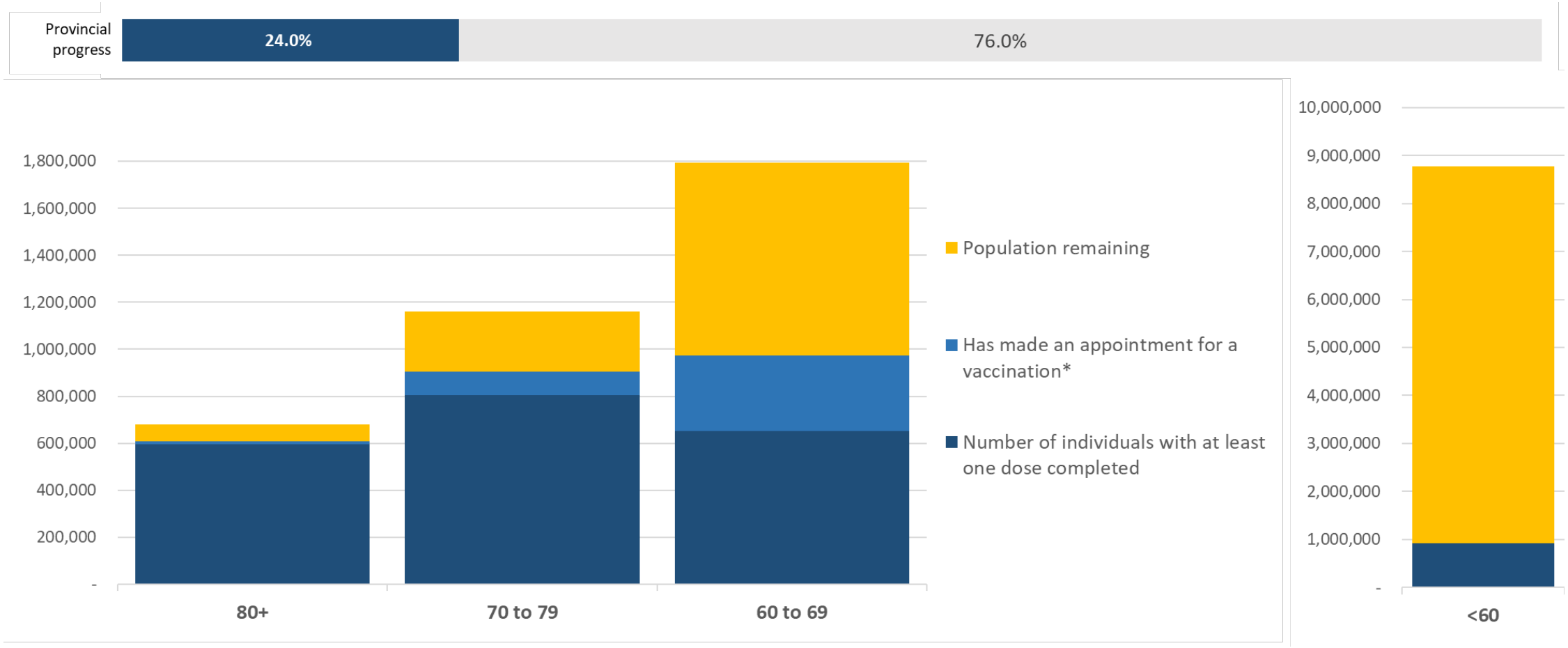
The access to care deficit is building which will be felt by Ontarians well past the pandemic



Data Source: Wait Times Information System. Backlog estimated based on comparison of 2020/21 with 2019/20 surgical volumes

First dose vaccine coverage expanding but remains incomplete

More than 3m doses administered

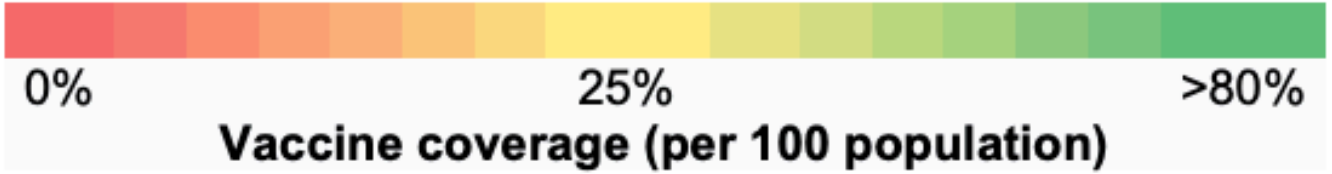


Data Sources
MOF Population Projections
COVAX analytical file, extracted, 8:00 pm Apr 12 2021, CPAD, MOH
COVAX Skedulo, extracted 6:00pm Apr 12 2021

Vaccination by risk is improving but remains a key to controlling spread

Figure excludes long-term care vaccination – at least 1 dose as of April 12, 2021

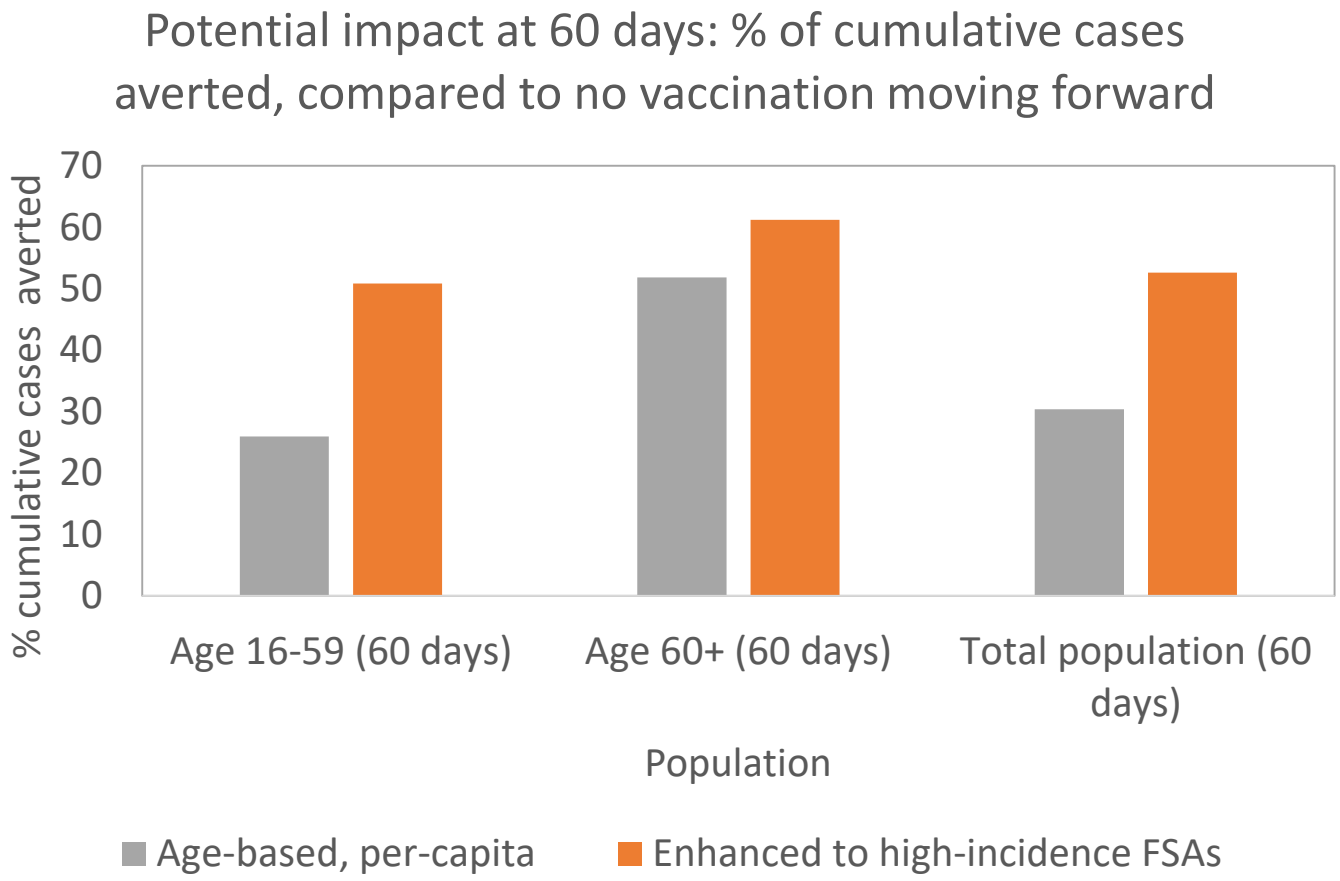
	Neighbourhood Risk‡										
	1 = high incidence of COVID-19 infections → **10 =** low incidence of COVID-19 infections										
Age group	1	2	3	4	5	6	7	8	9	10	**Overall**
80+	65%	68%	70%	75%	77%	77%	79%	81%	82%	82%	**76%**
75-79	63%	68%	70%	73%	75%	74%	75%	77%	74%	71%	**72%**
70-74	57%	64%	62%	66%	65%	64%	63%	62%	51%	39%	**58%**
65-69	42%	48%	44%	39%	41%	38%	36%	34%	22%	19%	**35%**
60-64	40%	42%	38%	36%	35%	34%	30%	27%	23%	27%	**33%**
55-59	20%	25%	21%	20%	21%	22%	20%	20%	17%	17%	**20%**
50-54	14%	18%	13%	13%	13%	13%	13%	13%	13%	14%	**14%**
45-49	9%	14%	9%	11%	11%	11%	11%	11%	13%	14%	**11%**
40-44	7%	9%	9%	10%	10%	11%	10%	11%	12%	13%	**10%**
16-39	5%	7%	6%	8%	8%	8%	8%	8%	10%	10%	**8%**
Overall	**15%**	**20%**	**18%**	**19%**	**20%**	**20%**	**19%**	**19%**	**20%**	**20%**	**23%**



Source: ICES

What happens if we vaccinate 3 million adults over the next 30 days?

100,000 vaccinations per day, top 20% highest incidence neighbourhoods



Number vaccines per case averted

Analysis: COVID Heterogeneity Research Group, COVID-19 ModCollab, PHO.
Data: CCM

Key Findings

- COVID-19 cases, hospitalizations and ICU occupancy are **at their highest levels since March 2020** and variant cases continue to rise sharply.
- ICU occupancy is **compromising care for all patients.**
- Ontarians can help themselves and others by limiting mobility to truly necessary trips and **always wearing a mask and keeping 6 feet distant** when in contact with anyone outside their household.
- Although improving, vaccination is not reaching people at high-risk fast enough to overcome the level of serious illness in our communities and our hospitals.
- Without stronger system-level measures and immediate support for essential workers and high-risk communities, **high case rates will persist through the summer.**

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- **Science Advisory Table:** Peter Juni

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For table membership and profiles, please visit the About and Partners pages on the Science Advisory Table website.

This is **Exhibit "U"** referred to
in the Affidavit of DR. DAVID McKEOWN,
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COVID cases in ICU and ICU occupancy*

Hospitals' ability to maintain scheduled surgeries is at risk as there are more than 150 COVID+ patients in ICU in Ontario.

Table 4: COVID-19 cases in ICU (+/- daily change) and available adult baseline beds – April 18

Total CRCI patients in ICU	# CRCI patients in ICU with mechanical ventilation	# CRCI patients in ICU not on mechanical ventilation	Total suspected COVID-19 patients in ICU	# suspected COVID-19 patients in ICU with mechanical ventilation	# suspected COVID-19 patients in ICU not on mechanical ventilation	# available baseline adult ICU beds in the system
755 (+14)	516 (+10)	239 (+4)	322 (+14)	110 (-6)	212 (+20)	400 (+3)

Table 5: ICU occupancy (adult baseline beds and adult vented beds), province and region – April 18

Region	Number of patients in ICU	Number of ICU beds	ICU occupancy	Number of vented patients	Number of vented beds	Vented occupancy
1 -West	563	675	83.4%	235	431	54.5%
2 -Central	424	490	86.5%	217	372	58.3%
3 -Toronto	385	437	88.1%	205	312	65.7%
4 -East	446	559	79.8%	228	364	62.6%
5 -North	87	144	60.4%	23	81	28.4%
ONTARIO	**1905 (+5)**	**2305 (+8)**	**82.6% (-0.1%)**	**908 (+9)**	**1560 (+8)**	**58.2% (+0.3%)**

Data source: Critical Care Information System (CCIS), CritiCALL based on patient counts April 18, 2021 at 11:59 pm; COVID status as of 6 am April 19, 2021.
Data quality notes and caveats: Incremental beds that were readily available in the case of a surge in ICU admissions have returned to their previous function in the hospital (e.g., acute beds), and have been removed from the above table as of October 14. CRCI includes patients in ICU currently testing positive for COVID and patients who remain in ICU due to COVID but are currently testing negative.

Ontario

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NEWS RELEASE

Ontario Releases Three-Step Roadmap to Safely Reopen the Province

Province Safely Reopening Outdoor Recreational Amenities Prior to End of Stay-at-Home Order

May 20, 2021
Office of the Premier

TORONTO — The Ontario government, in consultation with the Chief Medical Officer of Health, has released its Roadmap to Reopen, a three-step plan to safely and cautiously reopen the province and gradually lift public health measures based on the provincewide vaccination rate and improvements in key public health and health care indicators. In response to recent improvements to these indicators, Ontario will allow more outdoor recreational amenities to reopen, with restrictions in place, effective May 22, 2021 at 12:01 a.m.

"As a result of the strict public health measures we introduced to stop the spread of COVID-19 variants, we are seeing a steady improvement in our situation as ICU and hospital numbers begin to stabilize," said Premier Doug Ford. "While we must remain conscious of the continued threat the virus poses, with millions of Ontarians having received at least their first dose of vaccine we can now begin the process of a slow and cautious re-opening of the province in full consultation with our public health professionals."

Roadmap to Reopen outlines three steps to easing public health measures, guided by the following principles:

- **Step One** An initial focus on resuming outdoor activities with smaller crowds where the risk of transmission is lower, and permitting retail with restrictions. This includes allowing outdoor gatherings of up to 10 people, outdoor dining with up to four people per table and non-essential retail at 15 per cent capacity.
- **Step Two** Further expanding outdoor activities and resuming limited indoor services with small numbers of people where face coverings are worn. This includes outdoor gatherings of up to 25 people, outdoor sports and leagues, overnight camps, personal care services where face coverings can be worn and with capacity limits, as well as indoor religious services, rites or ceremony gatherings at 15 per cent capacity.
- **Step Three** Expanding access to indoor settings, with restrictions, including where there are larger numbers of people and where face coverings can't always be worn. This includes indoor sports and recreational fitness; indoor dining, museums, art galleries and libraries, and casinos and bingo halls, with capacity limits.

The province will remain in each step for at least 21 days to evaluate any impacts on key public health and health system indicators. If at the end of the 21 days, the following vaccination thresholds have been met, along with positive trends in other key public health and health system indicators, then the province will move to the next step:

- **Step 1:** 60 per cent of adults vaccinated with one dose.
- **Step 2:** 70 per cent of adults vaccinated with one dose and 20 per cent vaccinated with two doses.
- **Step 3:** 70 to 80 per cent of adults vaccinated with one dose and 25 per cent vaccinated with two doses.

Based on current trends in key health indicators, including the provincial vaccination rate, the government expects to enter Step One of the Roadmap the week of June 14, 2021. The province will confirm closer to the expected start of Step One.

"While we know that now is not yet the moment to reopen, Ontarians deserve to know the path forward on what we will carefully reopen and when, starting with the settings we know are safest," said Christine Elliott, Deputy Premier and Minister of Health. "Brighter days are ahead and we believe this Roadmap represents a path out of the pandemic and will encourage Ontarians to get vaccinated and to continue following public health advice."

The provincewide emergency brake restrictions remain in effect while the province assesses when it will be moving to Step One of the roadmap with the Stay at Home order expiring on June 2, 2021. During this time, the government will continue to work with stakeholders on reopening plans to ensure full awareness of when and how they can begin to safely reopen.

Due to the continuing success of Ontario's vaccine rollout and the collective efforts of Ontarians in following public health and workplace safety measures to date, effective May 22, 2021 at 12:01 a.m. the province will reopen outdoor recreational amenities with restrictions in place, such as the need to maintain physical distancing. These amenities include but are not limited to golf courses and driving ranges, soccer and other sports fields, tennis and basketball courts, splash and spray pads and skate parks. No outdoor sports or recreational classes are permitted. Outdoor limits for social gatherings and organized public events will be expanded to five people, which will allow these amenities to be used for up to five people, including with members of different households. All other public health and workplace safety measures under the provincewide emergency brake will remain in effect.

At this time, publicly funded and private elementary and secondary schools in the province will continue to operate under teacher-led remote learning. Data will be assessed on an ongoing basis and medical experts, including the Chief Medical Officer of Health, and other health officials will be consulted to determine if it may be safe to resume in-person learning.

"Due to the stringent efforts of Ontarians following public health and workplace safety measures, we have reached the point where we can begin preparing to exit the provincewide emergency brake and lift the Stay-at-Home order," said Dr. David Williams, Chief Medical Officer of Health. "We must remain vigilant however, as the fight against COVID-19 is not over and our case counts, ICU capacity and hospitalizations are still concerning. It remains critical that all Ontarians continue to follow all public health and workplace safety measures currently in place to help further reduce transmission and save lives."

The government will continue to work with the Public Health Measures Table, Public Health Ontario, and other public health and scientific experts to determine public health guidance for Ontarians to follow, including protocols for masking and outdoor/indoor gatherings, after being fully vaccinated.

Quick Facts

- Based on the latest modelling data COVID-19 case, positivity and hospitalization rates are decreasing, and control of the pandemic is improving. Maintaining the current rate of vaccination and public health and workplace safety measures will help to ensure Ontario starts to safely and gradually reopen.
- Ontario has administered first doses of the COVID-19 vaccines to over 58.5 per cent of Ontarians aged 18 and over. Over two million doses of the COVID-19 vaccine have been administered in Ontario since the start of May, and the province remains on track to have administered first doses to 65 per cent of Ontarians aged 18 and over by the end of May.
- The government has extended the provincewide Stay-at-Home Order until June 2, 2021, and has maintained all public health and workplace safety measures under the provincewide emergency brake to help to stop the rapid transmission of COVID-19 variants in communities, protect hospital capacity and save lives.
- The Stay-at-Home order currently in effect requires everyone to remain at home except for specified purposes, such as going to the grocery store or pharmacy, accessing health care services (including getting vaccinated), for outdoor exercise, or for work that cannot be done remotely.
- If passed by the Legislature, powers under the Reopening Ontario (A Flexible Response to COVID-19) Act, 2020 (ROA) will be extended to December 1, 2021 to ensure public health measures currently in place can be extended and adjusted as necessary, to deal with the impacts of COVID-19 and support a gradual re-opening of the province. There are currently 29 orders in effect under the ROA. Orders can be extended for up to 30 days at a time under the ROA, and the government must report on all order extensions to the Select Committee on Emergency Management Oversight.
- As of 8:00 a.m. on Tuesday, May 18, 2021, individuals aged 18 and over in 2021 across Ontario are eligible to book a COVID-19 vaccine appointment through the provincial booking system and call centre, or directly through public health units that use their own booking system.

Additional Resources

- Roadmap to Reopen
- Ontario Extending Stay-at-Home Order Until June 2
- COVID-19 Vaccine Booking Expanding to Ontarians 18+ Ahead of Schedule
- Visit Ontario's COVID-19 communications resources web page for resources in multiple languages to help local communication efforts.
- Visit Ontario's website to find out if you are eligible to receive a COVID-19 vaccine at this time.
- Eligible groups can use Ontario's vaccine booking system to find out how to schedule an appointment, or can call the Provincial Vaccine Booking Line number at 1-833-943-3900. For general inquiries, individuals can call the Provincial Vaccine Information Line number at 1-888-999-6488 or TTY service is also available by calling 1-866-797-0007.
- Visit Ontario's COVID-19 vaccine web page to view the latest provincial data and information on COVID-19 vaccines.

- Visit Ontario's COVID-19 information website to learn more about how the province continues to protect the people of Ontario from the virus.
- For public inquiries call ServiceOntario, INFOline at 1-866-532-3161 (Toll-free in Ontario only).

Related Topics

Arts and Culture
Learn more about the live performances, cultural institutions and creative grants the province has to offer. Learn more

Business and Economy
Information about Ontario's economy and how to do business here. Includes economic development opportunities, research funding, tax credits for business and the Ontario Budget. Learn more

Environment and Energy
Learn more about how Ontario protects and restores wildlife and the environment. Includes information on conservation and the electricity system. Learn more

Government
Learn about the government services available to you and how government works. Learn more

Health and Wellness
Get help navigating Ontario's health care system and connecting with the programs or services you're looking for. Learn more

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Ryan Cookson

A Commissioner for the Taking of Affidavits

Public Health Ontario | Santé publique Ontario

EVIDENCE BRIEF

Considerations for Public Health Measures for Individuals with Partial Vaccination for SARS-CoV-2

Date: 04/15/2021

Key Messages

- Effectiveness of the first dose of a two-dose vaccination schedule of vaccines available in Canada to prevent symptomatic or asymptomatic severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection ranges between 60-80% at approximately 21-28 days after first dose; however, data indicate that the current viral vector vaccine in Canada (i.e., AstraZeneca) has less first-dose effectiveness than mRNA vaccines (i.e., Pfizer-BioNTech and Moderna).

- Clear messaging is required for the public to understand that the protective effects of the first dose of the vaccines takes weeks to develop and is neither immediate nor the same as being fully vaccinated. Further, an individual's risk factors for severe SARS-CoV-2 infection (e.g., age, immunocompromise) can impact vaccine effectiveness. Nonetheless, widespread coverage with a first dose would be sufficient to lower case rates in the population thereby allowing reductions in population level measures rather than individual level measures.

- No jurisdictions with total population vaccination programs using vaccines approved in Canada have indicated that societal public health measures can be relaxed for partially vaccinated individuals.

- Relaxing public health measures for partially vaccinated individuals is not advisable; current public health measures should remain for partially vaccinated individuals. Focus should be turned to rapidly deploying vaccine to have high first-dose coverage in the population, including reducing health inequities related to accessing first dose vaccination in the communities with the highest rates of SARS-CoV-2 that are also more likely to be of low socioeconomic status.

Issue and Research Question

This evidence brief explores whether or not it would be advisable to loosen public health measures recommended for individuals after a single dose of a two-dose vaccination schedule (also termed partially vaccinated individuals or series initiation) for SARS-CoV-2. This evidence brief does not address recommendations that are specific to health care workers who are partially vaccinated, or case/contact measures for individuals who are partially vaccinated.

Currently in Ontario, there is a low proportion of partially and fully vaccinated individuals.[1] Incentives to receive the first dose of a vaccine given the long period between vaccine doses will be called upon by the public. However, any incentives must be based on available evidence and expert opinion such that the pandemic is controlled and moves towards a return to a new normal with respect to public health measures. Moreover, at this time there are no recommendations for public health measures affecting fully vaccinated individuals in the general community in Ontario at this time.

Methods

The National Advisory Committee on Immunization (NACI) has released a summary and review of vaccine intervals in Canada in the context of limited vaccine supply.[2] The review is recent to late March 2021. The NACI report has been reviewed and briefly summarized alongside evidence from previous reports from Public Health Ontario (PHO), with a focus on the points relevant to considerations for public health measures for individuals who have been partially vaccinated (received the first of a two-dose vaccination schedule) against SARS-CoV-2.[3]

Main Findings

Vaccine Effectiveness after a First Dose of Vaccine

Vaccine efficacy to prevent symptomatic disease from clinical trial data with Pfizer-BioNTech and Moderna 14 days after the first dose and up until the second dose (typically either 21 or 28 days post-first dose) is estimated to be 92%.[2] For AstraZeneca, the efficacy to prevent symptomatic disease from clinical trial data between 22 and 90 days after the first dose was reported to be 76%.[2]

Real-world vaccine effectiveness (VE) data are predominantly from non-peer reviewed preprint publications using different study designs, dose intervals, study populations, outcomes measured (e.g., laboratory confirmed versus hospitalizations or deaths), and outcome dates (e.g., date of symptom onset, specimen collection). Results reported for each vaccine, mostly pertaining to mRNA vaccines, varied considerably.

The following summary of real-world VE is for vaccines intended to be given as a 2-dose regimen that have been approved by Health Canada as of April 8, 2021 (Pfizer-BioNTech COVID-19 vaccine [BNT162b2], Moderna COVID-19 vaccine [mRNA-1273], Oxford University/AstraZeneca [AZD1222/ChAdOx1-S]) and is based on the PHO's *COVID-19 Real-World Vaccine Effectiveness – What We Know So Far* document and the NACI Statement on Extended dose intervals for COVID-19 vaccines.[2,4] There is currently limited VE data on specific populations who are at increased risk of severe outcomes from COVID-19 and who may have a suboptimal immune response. While emerging data has helped to identify special populations (e.g., transplant patients, individuals with malignant hematological disorders or solid tumors on active therapy) as potentially having a lower response to a first dose of vaccine, a comprehensive list of other groups that may experience decreased response from a single dose has not yet been identified due to lack of data.[5] Therefore, it is important to note that the following summary of VE after a first dose of vaccine pertains to the general, community-dwelling population.

Recognizing differences between specific vaccines and populations studied, overall VE is good 21-28 days after the first dose of vaccine. Real-world studies have reported VE of 60 to 80% for preventing SARS-CoV-2 infection (asymptomatic and symptomatic COVID-19 disease) 3-4 weeks after receiving a single dose of Pfizer, Moderna or AstraZeneca vaccine; this increases to greater than 85% after a second

dose.[6-9] The VE for preventing severe disease and COVID-19-related hospitalization is 70 to 90% after the first dose of vaccine and the VE for reducing deaths attributable to COVID-19 is 70 to 85% after the first dose.[9-11] After a second dose, VE for prevention of severe disease and hospitalization increases with most estimates of VE being greater than 90%.[6,12] Please see COVID-19 Real-World Vaccine Effectiveness – What We Know So Far for further detail including study characteristics.[4]

The VE for preventing asymptomatic infection is particularly important given the challenges of preventing asymptomatic transmission with other public health measures. Data from Israel indicate that VE for preventing asymptomatic infection is 29%, 14 to 20 days after the first dose, and 52%, 21 to 27 days, after the first dose, increasing to 90%, 7 days after the second dose which is likely a first dose effect given timing. However it is important to note that this was in the context of a rapid decline in cases amidst deployment of a national vaccine campaign and in the absence of systematic asymptomatic testing.[6] A US retrospective cohort study of asymptomatic patients undergoing screening before surgical and medical procedures found a VE of 79% more than 10 days after the first dose (before the second dose) and a VE of 80% after the second dose. However the VE after the second dose was estimated starting at 0 days after the second dose, which also likely represents a first dose effect.[13]

Emerging data demonstrates that vaccination is associated with reduced spread in individuals and populations, regions, or facilities with higher rates of vaccination or those that were vaccinated earlier than others. However, these estimates are for individuals receiving *at least one dose* of vaccine and includes individuals that have received 2 doses.

- In an observational study in Israel, breakthrough infections occurring 12-37 days after individuals received the first dose of the Pfizer vaccine had significantly reduced viral loads at the time of testing, potentially decreasing viral shedding and contagiousness of the disease.[14]

- An analysis of early statewide vaccination efforts in the US found that vaccination was effective in reducing daily COVID-19 case growth rates by 0.124, 0.347, 0.345, 0.464, 0.490, and 0.756 percentage point declines, respectively, in the 1-5, 6-10, 11-15, 16-20, 21-25, and 26 or more days after the start of vaccination (i.e., administration date of first COVID-19 vaccine dose).[15]

- A separate analysis of vaccination rates and COVID-19 incidence found that the cumulative county-level vaccination rate in the US (percentage of the county population who have received at least one dose) was significantly associated with a corresponding decline in COVID-19 incidence; that is, higher vaccination rates translated to a decreased county-level COVID-19 incidence.[16]

- In Israel, where COVID-19 cases and hospitalizations started to decline after implementation of a national vaccine campaign that prioritized vaccination of older individuals, an analysis between early-vaccinated cities and late-vaccinated cities found a larger and earlier decrease in the number of COVID-19 cases and hospitalizations of older individuals (> 60 years) in earlier compared to later-vaccinated cities. While a concurrent lockdown could have also influenced results, the study authors noted that these same downward trends in older individuals were not observed during previous lockdowns in which measures of clinical outcomes had similar dynamics across age groups. At the time of the study, 68.7% of individuals over 16 years had received the first dose and 48% had received the second dose of vaccine.[17]

Extended Dose Intervals for COVID-19 Vaccines in Canada

The NACI recommendation to allow for an extended interval between first and second doses of vaccine aims to minimize death and disease at a population level by immunizing as many individuals, as quickly as possible in the context of a limited supply.[18] This recommendation was informed by modelling developed by the Public Health Agency of Canada (PHAC) which compared the impact of different vaccination strategies under real-world effectiveness conditions.[19] Results showed that longer intervals of up to 6 months between the first and second dose prevented more hospitalizations and deaths. Conditions under which extended dose intervals led to worse outcomes included VE of less than 65% for preventing death after the first dose or protection waning to 0% by month 3 before the scheduled second dose at 6 months. Achieving the benefits of the extended dose interval strategy greatly depends on accelerated, widespread first dose vaccine coverage in individuals 20-74 years old since older adults were prioritized for early vaccination.[19]

Jurisdictional Responses to Public Health Measures Based on the Two-dose Vaccination Schedule for SARS-CoV-2

In brief, Canada, England, Scotland, Denmark, United States, and Israel all do not have public health measures specific to individuals who are partially vaccinated (i.e., single dose in a two-dose vaccine schedule) even though some of these countries have high vaccine coverage.[3,20-29]

Discussion and Conclusions

Vaccination, including after the first dose of a two-dose vaccine schedule, provides significant protection from symptomatic disease and severe outcomes such as hospitalization and death compared to not being vaccinated against SARS-CoV-2. Therefore, it is expected that widespread coverage of the population with the first dose of vaccine will lower case rates in the population. However, there is no evidence whether a single dose of a two-dose vaccine schedule will either increase or decrease the emergence of VOC.[2]

Those countries that are leading in total population vaccination coverage have not opted to reduce observed public health measure recommendations to partially vaccinated individuals. The rationale for not having different public health measures for partially vaccinated individuals has not been described by the jurisdictions reviewed, although we note that some jurisdictions (i.e., Israel) chose to provide both doses of a two-dose regimen within a shorter interval than Ontario. A literature review on the topic was not performed for this evidence brief.

Implications for Practice

Public health messaging regarding vaccination needs to be transparent about decision-making reasons in order to avoid unintended negative impacts such as public mistrust impacting vaccination uptake or willingness to follow public health measures. Ontario's vaccine coverage, including proportion of the population having received a first dose, lags behind countries that have been able to follow recommended vaccination schedules and sufficient procurement. At this time, with low proportions of partially vaccinated and fully vaccinated individuals in the Ontario population,[1] and in the context of high disease incidence including VOC, it is not advisable to reduce public health measures for partially vaccinated individuals despite data demonstrating decreased incidence in asymptomatic and symptomatic disease, and data is still needed regarding risk of transmission to others after receiving the

first dose of a vaccine available in Canada. Moreover, VOC for which reduced vaccine efficacy for in vitro studies and effectiveness is documented, will continue to pose a higher risk to the community until there is low circulation of SARS-CoV-2 overall.

Valuable data for vaccines available in Canada that are still needed to better inform decisions regarding public health measures for partially vaccinated individuals includes: real world data of implications from countries with more comprehensive vaccination coverage enacting public health measures for partially vaccinated individuals, effectiveness of partially vaccinated versus fully vaccinated individuals including a time to event analysis (e.g., hazard analysis), what individual level factors influence first-dose vaccine effectiveness, risk of spread from partially vaccinated individuals to unvaccinated individuals, duration of immunity from single dose vaccination, effectiveness of single dose vaccination in subgroups that have not been studied, and what influence that changes to public health measures for partially vaccinated and/or fully vaccinated individuals may have on vaccine uptake for one dose and both doses.

Current data from Forward Sortation Area (first three digits of the postal code) analyses in Toronto show that the areas with the highest burden of disease have the lowest vaccine coverage rates.[30] News reports have stated that the analyses indicates higher socioeconomic status neighbourhoods in Toronto, based on postal code and census data, have higher vaccine coverage than low socioeconomic neighbourhoods where rates of SARS-CoV-2 and severe outcomes of COVID-19 are higher.[31,32] Hot spot communities are known to often have higher concentrations of populations who are disproportionately affected by COVID-19 in Ontario due to a number of intersecting equity factors and factors related to the determinants of health. These populations include Black, racialized, lower income and materially deprived communities.[33] Focusing strategies to vaccinate these populations at risk is already proposed in Phase 2 of Ontario's vaccination plan.[33,34]

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This is **Exhibit "X"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

NEWS RELEASE

Ontario Maintains COVID-19 Restrictions as Stay-at-Home Order is Set to Expire

Measures address ongoing risks as province prepares to safely and cautiously reopen

June 01, 2021
Solicitor General

TORONTO — As was previously announced, Ontario's Stay-at-Home order will expire on June 2, 2021. When it does, all other public health and workplace measures will remain in place provincewide until Ontario enters Step One of the Roadmap to Reopen, at which point some restrictions will ease with an initial focus on outdoor settings.

"We've seen great progress in our fight against COVID-19 in recent weeks, but now is not the time to let our guard down," said Solicitor General Sylvia Jones. "With the Stay-At-Home order set to expire, we need to provide people with certainty so that they can continue to follow public health guidance. Doing so will help us to meet our goal of starting to gradually lift some restrictions when we enter Step One of the Roadmap when it is safe to do so."

On April 7, 2021, in response to the rapid increase in COVID-19 transmission driven by new, more contagious variants, the Ontario government declared a provincial emergency and issued a Stay-at-Home order as well as enhanced public health measures. In a concentrated effort to reduce mobility and opportunities for transmission, the Stay-At-Home order required Ontarians to remain at home except for the purposes set out in the order, such as exercise, going to the grocery store or pharmacy, or accessing health care services. Once the Stay-at-Home order expires on June 2, these restrictions will no longer be in effect.

However, all other existing measures will remain in place provincewide, including restrictions on gatherings, businesses, services and activities. This includes limiting indoor gatherings to households only and outdoor gatherings to up to five people, subject to limited exceptions, maintaining a cap of 25 per cent capacity for essential retail where only certain goods are permitted to be sold, restricting non-essential retail to curbside pickup and delivery only, as well as limiting short-term rentals to individuals in need of housing and allowing Ontario Parks and campgrounds on public lands to be used for day-use only, subject to limited exceptions.

Ontarians will be able to leave home to travel within the province to a secondary residence for any reason, however, they are not be permitted to host members of another household indoors except for a person from another household who lives alone or a caregiver.

A simple, easy-to-understand summary of restrictions can be found on the province's "Reopening Ontario" webpage, which provides details on what public health measures are in place before the province enters Step One of the Roadmap to Reopen. As always, anyone who may have been exposed to COVID-19 or who may be exhibiting symptoms of the virus should use the province's self-assessment tool to determine what they should do next, including getting a test and isolating if necessary.

"As we continue to accelerate second doses of the COVID-19 vaccine for Ontarians, maintaining public health measures will ensure we continue to protect our hospital capacity and help stop the spread of COVID-19 variants," said Christine Elliott, Deputy Premier and Minister of Health. "As we look towards Step One of Ontario's Roadmap and begin to gradually lift public health measures, it remains critical that all Ontarians continue to follow public health advice and roll up their sleeves to receive the vaccine. Every dose administered means we are one step closer to the end of the pandemic."

With the expiry of the Stay-at-Home order, emergency order O. Reg 266/21 (Residential Evictions) will also expire on June 2, 2021. Emergency orders currently in effect under the *Emergency Management and Civil Protection Act* have been extended until June 16, 2021:

- O. Reg. 8/21 Enforcement of COVID-19 Measures
- O. Reg. 55/21 Compliance Orders for Retirement Homes
- O. Reg. 271/21 Work Redeployment for Local Health Integration Networks and Ontario Health
- O. Reg. 272/21 Transfer of Hospital Patients

- O. Reg. 288/21 Closure of Public Lands for Recreational Camping
- O. Reg. 293/21 Persons Entering Ontario From Manitoba or Quebec
- O. Reg. 304/21 Work Redeployment for Independent Health Facilities
- O. Reg. 305/21 Regulated Health Professionals
- O. Reg. 317/21 Agreements Between Health Service Providers and Retirement Homes

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Additional Resources

- Ontario Releases Three-Step Roadmap to Safely Reopen the Province
- For up-to-date information on the province's vaccine rollout and instructions on how to book an appointment, visit Ontario's vaccine webpage.
- For resources in multiple languages to help local communication efforts in responding to COVID-19, visit Ontario's COVID-19 communication resources webpage.
- Visit Ontario's website to learn more about how the province continues to protect the people of Ontario from COVID-19.

Related Topics

Government

Learn about the government services available to you and how government works. Learn more

Health and Wellness

Get help navigating Ontario's health care system and connecting with the programs or services you're looking for. Learn more

Law and Safety

Ontario's laws and related information about our legal system, emergency services, the Ontario Provincial Police and victim services. Learn more

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This is **Exhibit "Y"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

Update on COVID-19 Projections

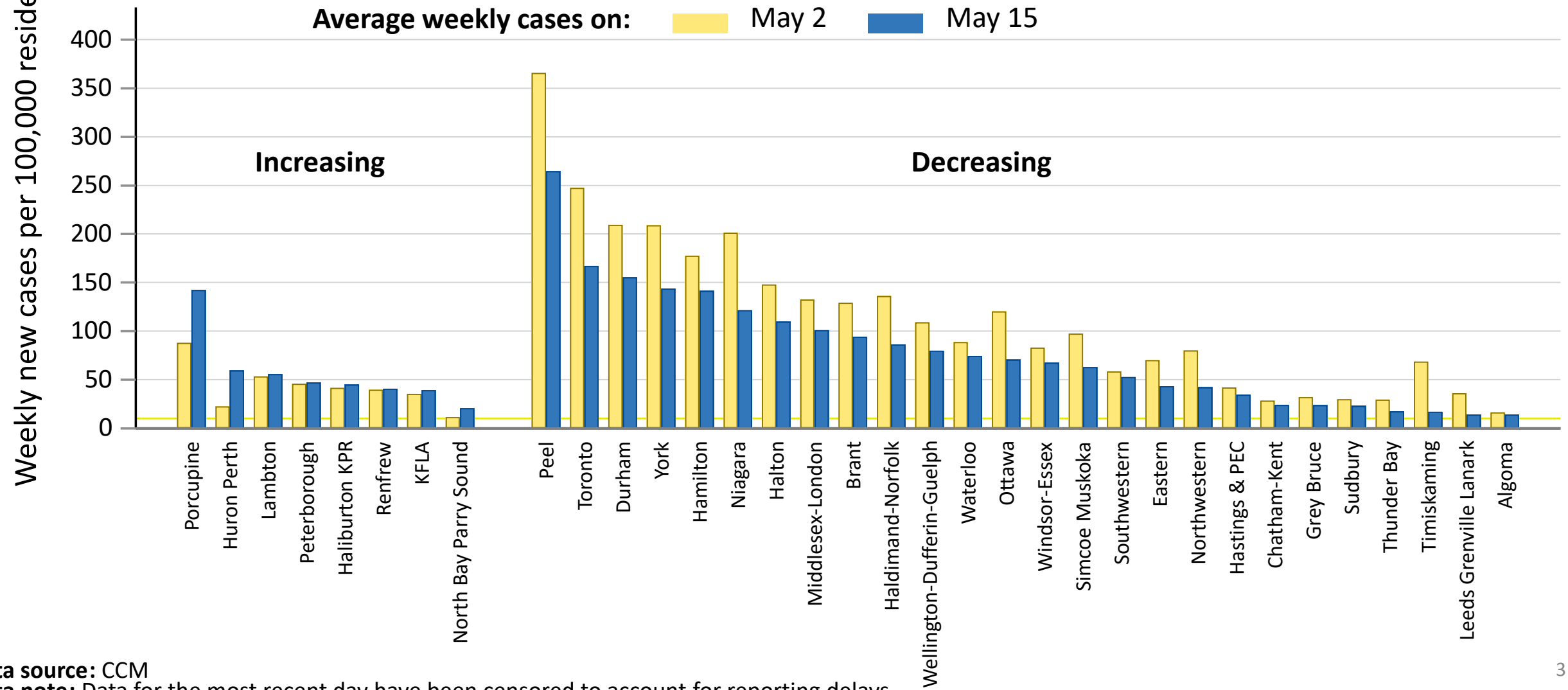
Science Advisory and Modelling Consensus Tables

May 20, 2021

Key Findings

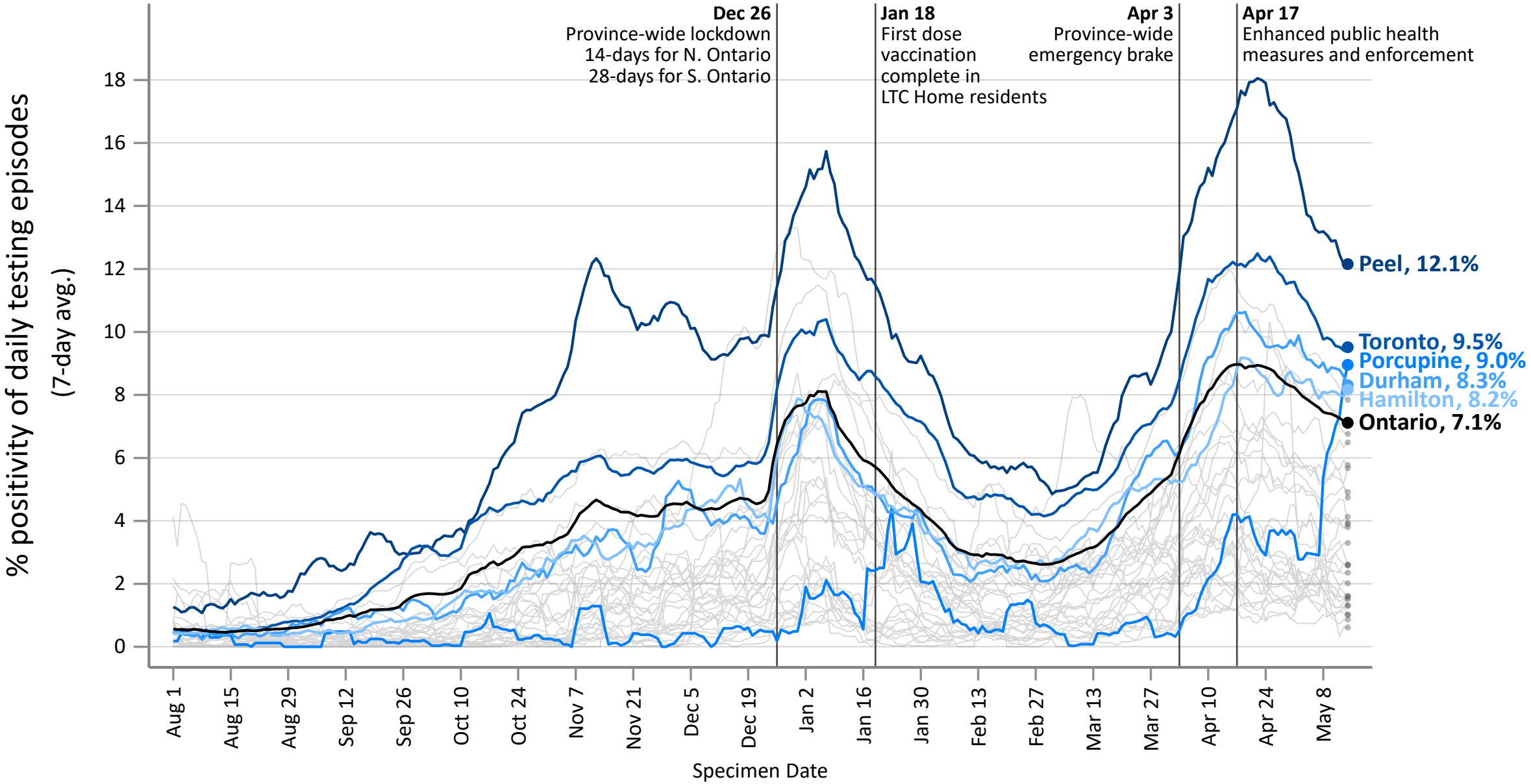
- Cases, positivity and hospitalization rates are decreasing. **Control of the pandemic is improving** due to current public health measures and the efforts of Ontarians.
- The access to care deficit continues but high-priority surgeries are being performed at higher rates.
- **Maintaining progress on vaccinations and maintaining some public health measures** until mid-June can help ensure a good summer:
  - School re-opening will create an increase in cases, but this may be manageable.
  - **Outdoor activities are much safer** than indoor activities and should be encouraged.

Cases are decreasing in most Public Health Units, with the greatest progress made in hotspot areas



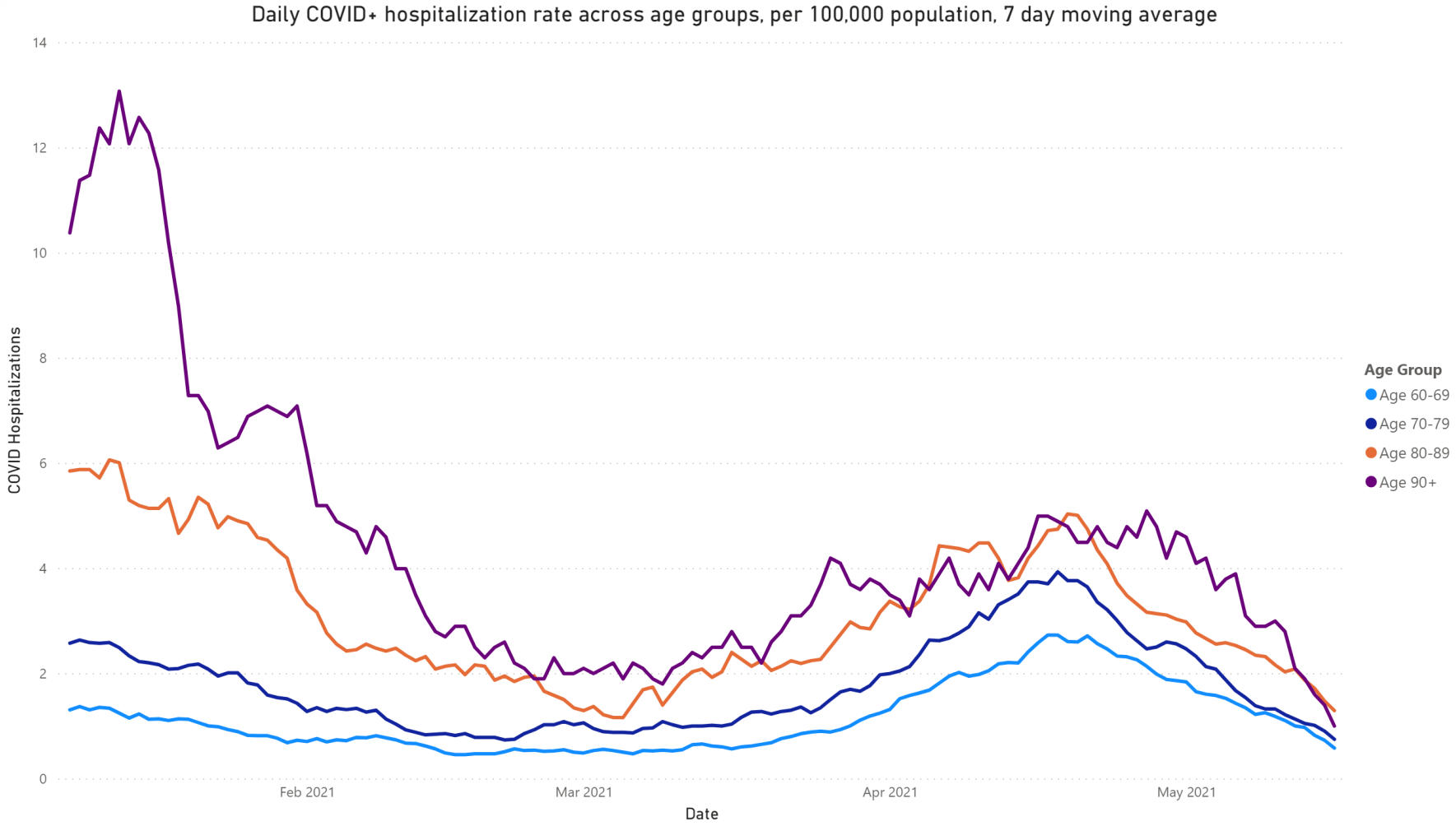
Data source: CCM
Data note: Data for the most recent day have been censored to account for reporting delays

% positivity is declining across Ontario

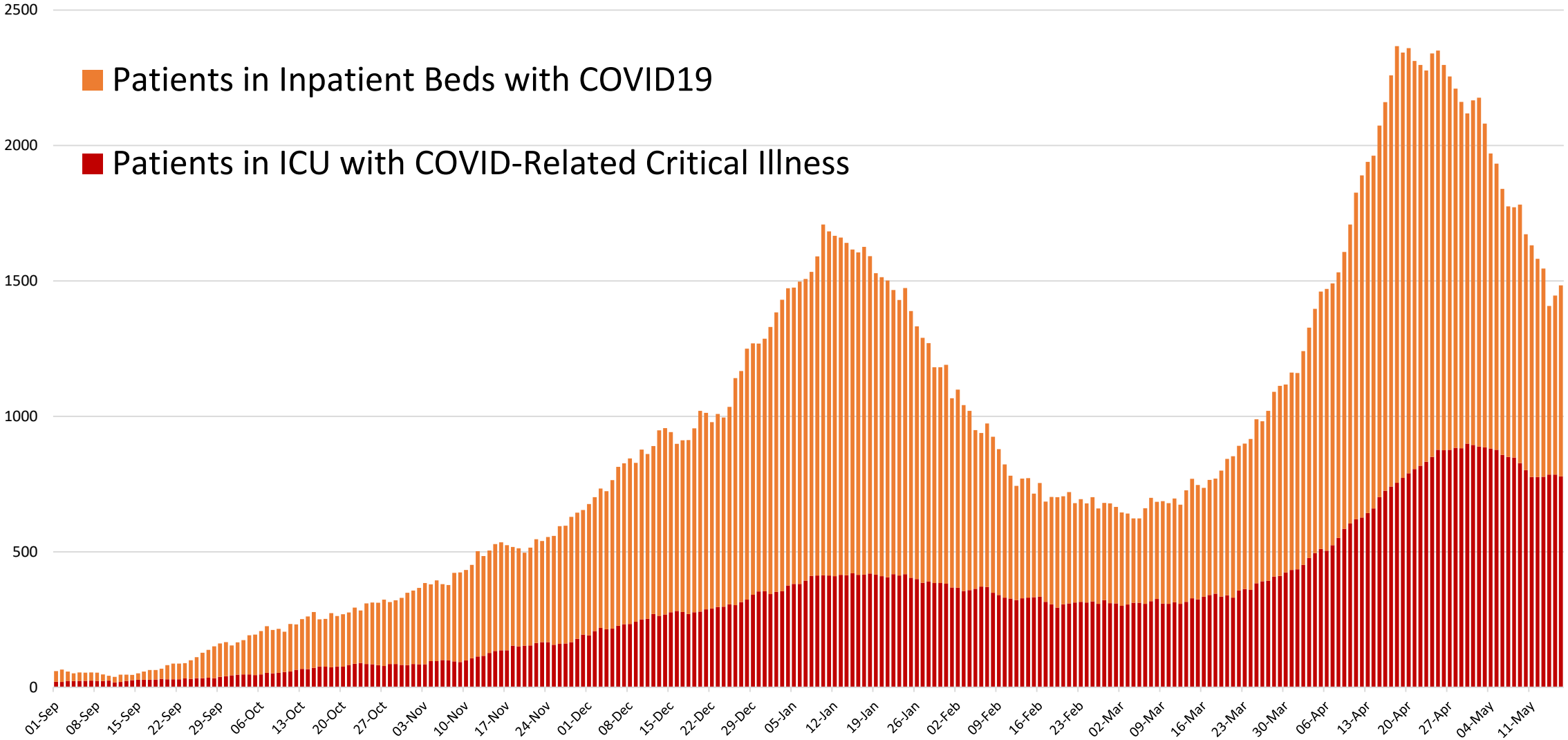


Data source: Ontario Laboratory Information System (OLIS), data up to May 14

Higher vaccination coverage is starting to control hospitalizations in older age groups



Hospitalization rates are down, ICU occupancy has dropped slightly



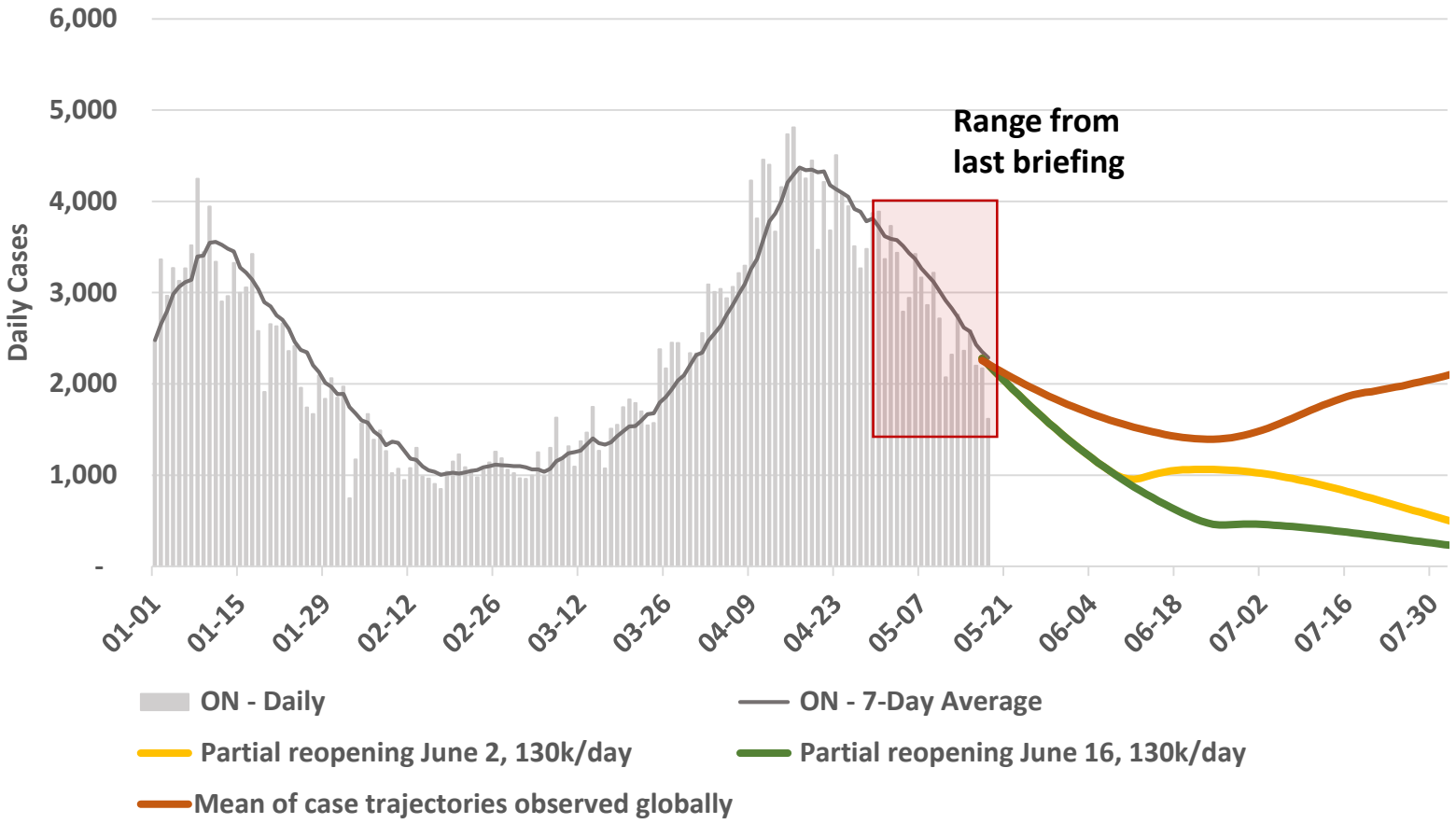
Data Sources: MOH COVID Inpatient Census and Critical Care Information System

Continued efforts to control spread of COVID-19 can help limit the impact of all variants of the virus

Figure shows predictions based on 5 models.

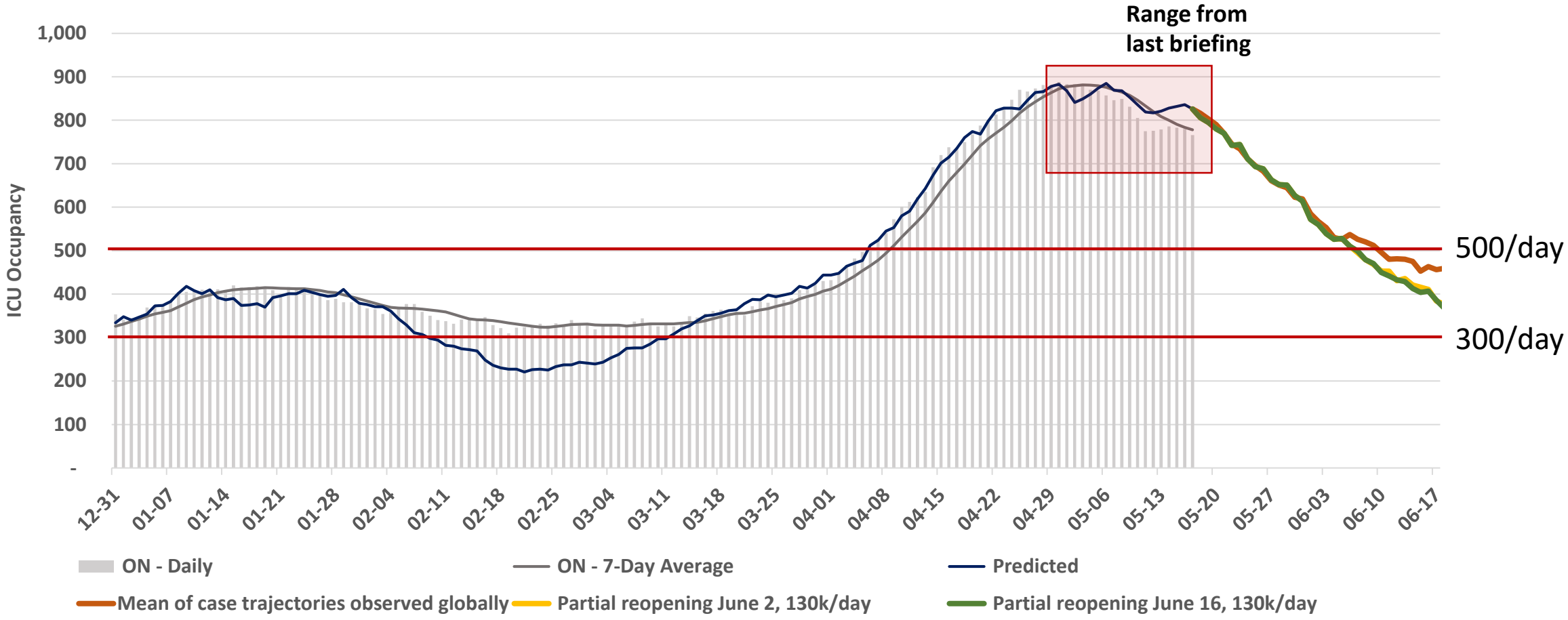
- Partial reopening June 2 or 16
- Vaccinating 100k-150k/day
- New VOC not explicitly considered

Not shown: 2 models looked at school opening June 2: School opening associated with a 6-11% increase in new daily cases



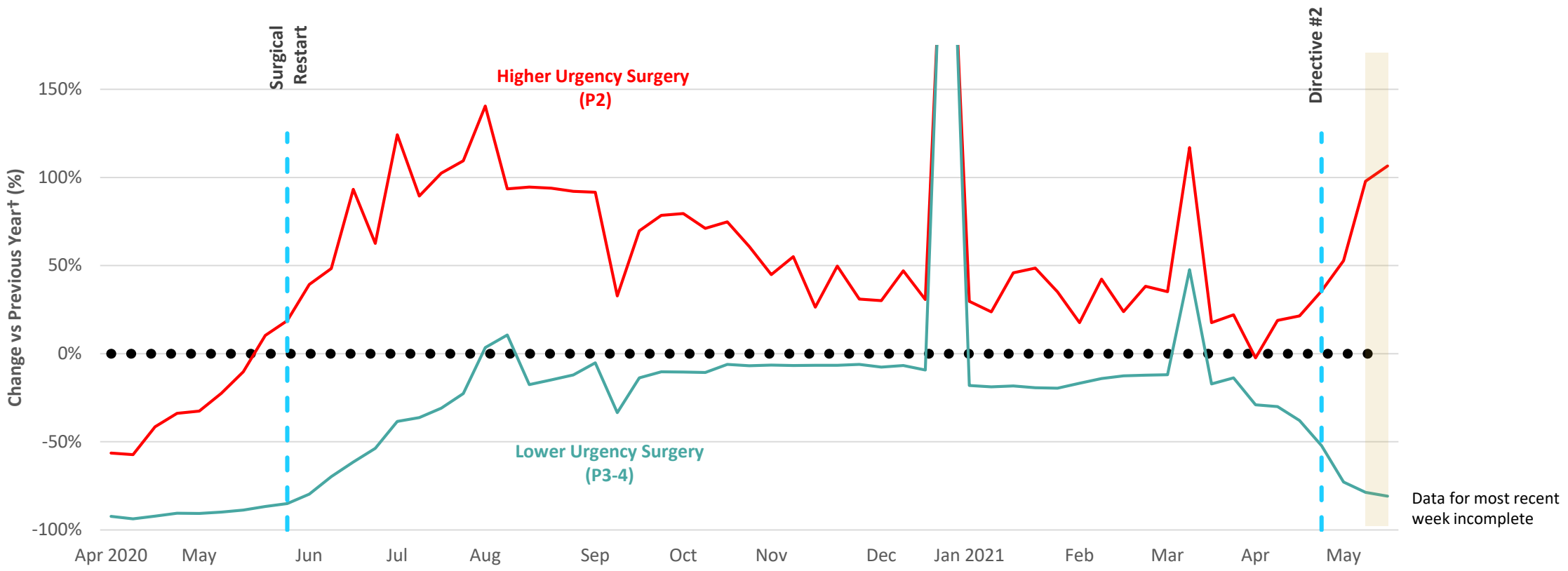
Predictions informed by modeling from COVID-19 ModCollab, Fields Institute, McMasterU, PHO, YorkU
Data (Observed Cases): covid-19.ontario.ca

ICU occupancy continues to decrease slowly, with potentially fewer than 500 patients with COVID-19 in ICUs by mid-June



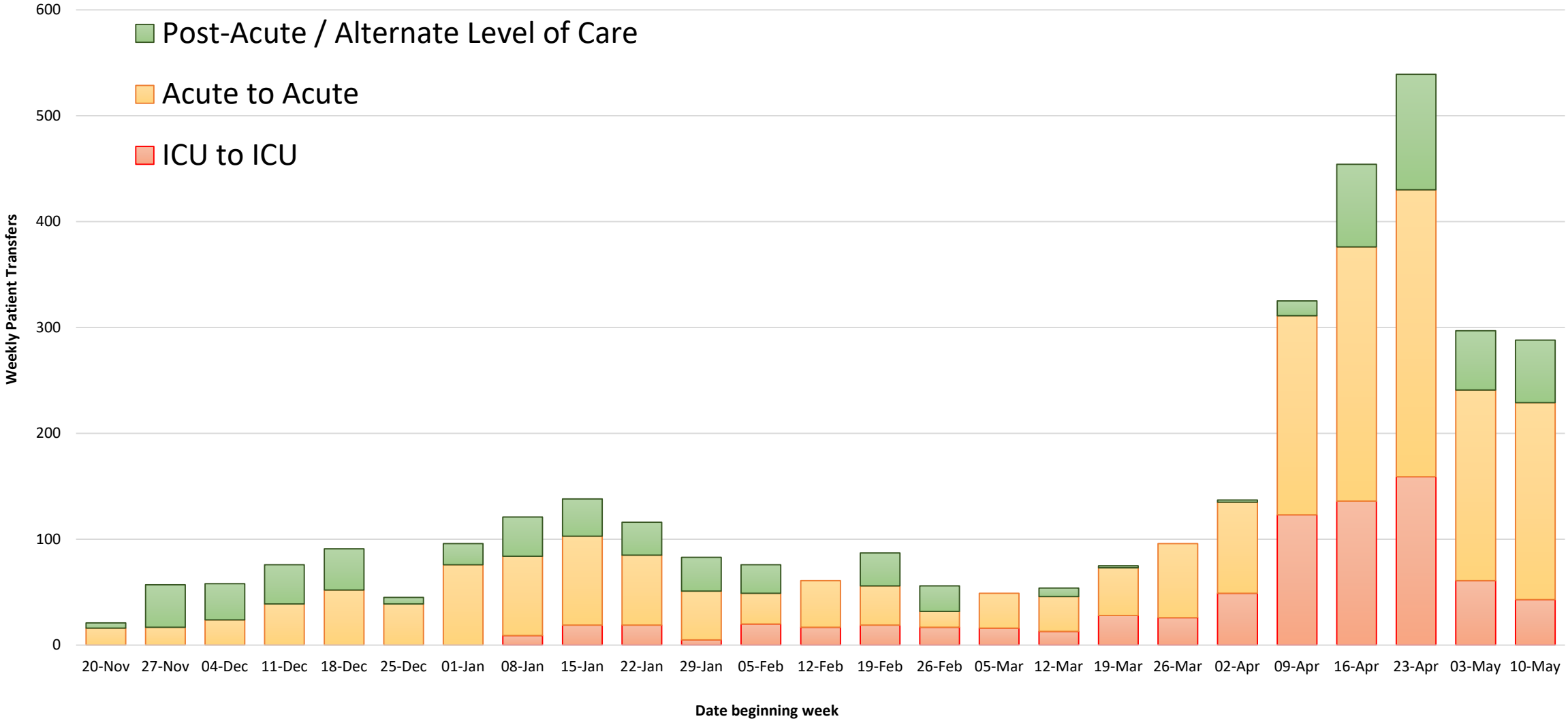
Predictions: COVID-19 ModCollab.
Data (Observed ICU Occupancy): CCSO

Higher priority procedures were more likely to be completed throughout the pandemic



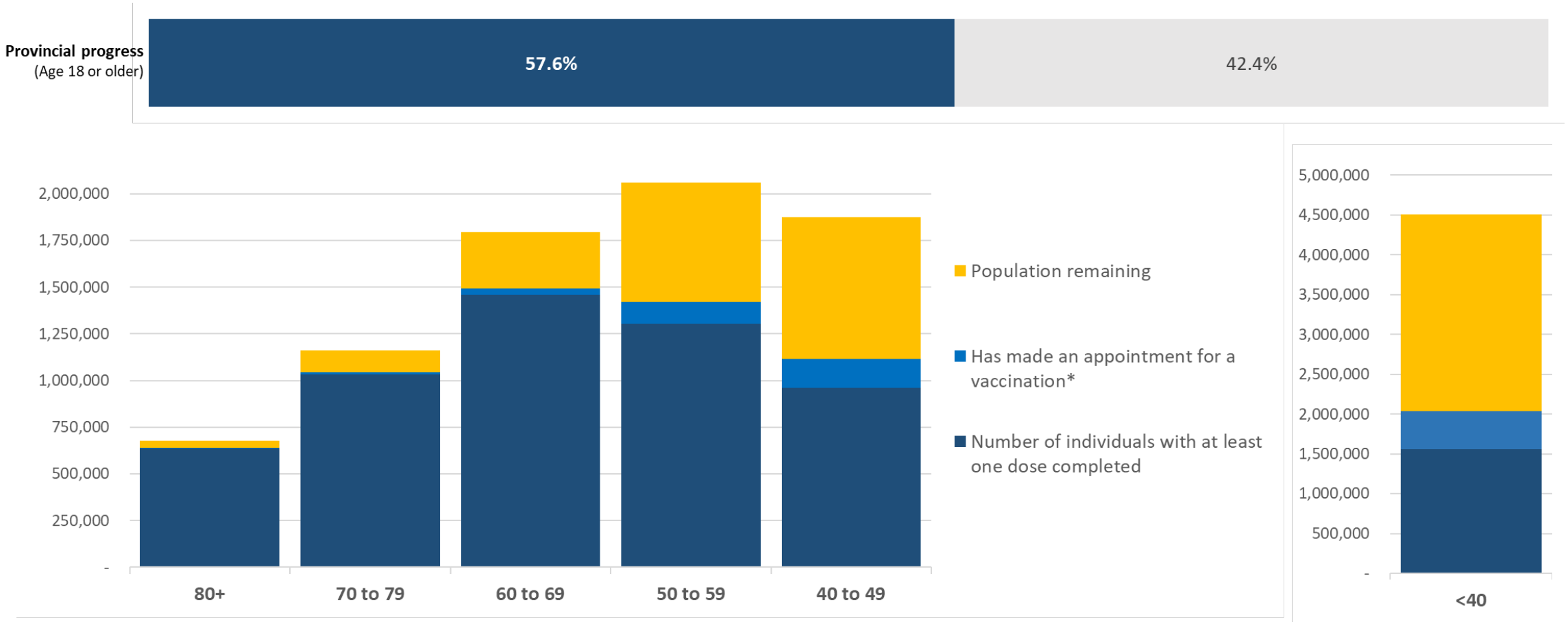
† As of the week of March 8, 2021, the comparator year was rolled back to 2019 to ensure the baseline for comparison continues to be pre-pandemic data

While the situation is improving, a high volume of patient transfers continues due to system capacity pressures



Data Sources: GTA IMS Transport Tracking, Ontario Health

Vaccination coverage continues to increase



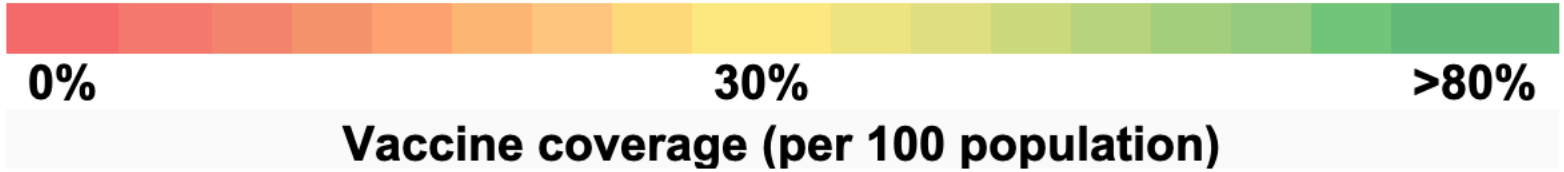
* Note that this is just *Pending Appointments*. Anyone that has made an appointment and received a vaccine will be counted under "Individuals with at least one dose". Data for Appointments reflect 21 PHUs that are captured through the provincial booking system. Appointments made through other systems (e.g., local PHU booking systems, pharmacies, primary care) are not included.
Age is based on year of birth. Age <40 includes those age 18-39. Figure for age <40 is shown separately because of the difference in scale of the overall population size.

Data Sources
MOF 2020 Population Projections
COVAX analytical file, extracted, 8:00 pm May 18 2021, CPAD, MOH
COVAX Skedulo, extracted 6:00pm May 18 2021

The hotspot strategy is working. Continued efforts are key to a good summer.

Figure excludes long-term care vaccination – at least 1 dose as of May 17, 2021

	Neighbourhood Risk‡ **1 =** high incidence of COVID-19 infections → **10 =** low incidence of COVID-19 infections										
Age group	1	2	3	4	5	6	7	8	9	10	**Overall**
80+	73%	75%	78%	80%	81%	83%	84%	86%	87%	87%	**82%**
75-79	75%	78%	80%	82%	83%	84%	85%	86%	87%	85%	**83%**
70-74	75%	79%	79%	81%	82%	83%	84%	85%	85%	82%	**82%**
65-69	75%	77%	77%	77%	79%	80%	81%	81%	81%	76%	**79%**
60-64	74%	76%	75%	74%	76%	77%	78%	77%	77%	70%	**75%**
55-59	70%	72%	68%	65%	66%	67%	67%	67%	65%	54%	**66%**
50-54	68%	68%	62%	57%	57%	56%	55%	54%	50%	41%	**57%**
45-49	61%	62%	56%	51%	51%	49%	49%	47%	41%	36%	**51%**
40-44	52%	55%	50%	46%	48%	46%	46%	43%	38%	33%	**46%**
16-39	41%	44%	38%	32%	31%	29%	29%	25%	21%	21%	**32%**
Overall (16+)	**57%**	**60%**	**55%**	**52%**	**53%**	**53%**	**53%**	**51%**	**51%**	**49%**	**54%**

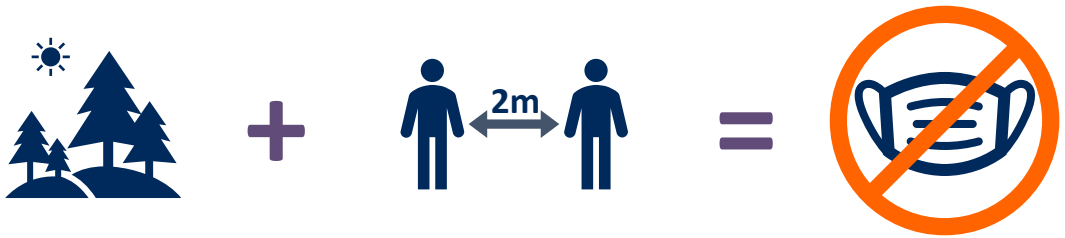


Source: ICES

Outdoor activities can be much safer

Two-out-of-three rule for outdoor activities

Outdoors + Distance = No Masks Needed



Outdoors + No Distance = Masks Needed

Always wear masks and distance indoors

Byproducts to avoid when engaging in outdoor activities

Dining indoors, dining with others, sharing food or drinks

Crowding and going to crowded places

Carpooling with others

Travel between regions

Sharing overnight accommodation with others

Locker rooms and shared amenities

Marr L, Virginia Tech 2021

Select examples of safer outdoor activities

Camping

- Local camping with your own household is safer
- Camping elsewhere with your own household is not safer
- Camping with people outside your household is not safer

Basketball

- Basketball with masks is safer

Tennis

- Single tennis is safer
- Doubles tennis with masks is safer

Singing and playing music

- Singing outside where there is social distancing is safer

Note: Indoor facilities associated with outdoor recreation (e.g., change rooms and clubhouses) present a greater risk and should remain closed at this time

Key Findings

- Cases, positivity and hospitalization rates are decreasing. **Control of the pandemic is improving** due to current public health measures and the efforts of Ontarians.
- The access to care deficit continues but high-priority surgeries are being performed at higher rates.
- **Maintaining progress on vaccinations and maintaining some public health measures** until mid-June can help ensure a good summer:
  - School re-opening will create an increase in cases, but this may be manageable.
  - **Outdoor activities are much safer** than indoor activities and should be encouraged.

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This is **Exhibit "Z"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

INSTRUCTIONS FROM THE MEDICAL OFFICER OF HEALTH

DATE: Thursday June 10, 2021 **EFFECTIVE:** Friday, June 11, 2021 at 12:01 a.m.

TO: All persons responsible for a business or organization **(workplace)** in the Porcupine Health Unit **(PHU)** region, where workers (including employees, those hired under third party agencies, contractors, vendors, volunteers or students and any other such persons) are present at the workplace or the public are regularly present.

First of all, I would like to thank you for your ongoing efforts to comply with public health requirements that aim to protect your staff, patrons and other members of our community. I would like to thank you for your strong commitment to encourage workers to receive their vaccinations against COVID-19.

As much as we have achieved by working together in the face of this pandemic, at this time, I must ask for your continued patience and support in the interests of protecting the health of our community.

While our vaccination rates are strong and growing daily, other trends in public health and health system indicators are very concerning:

- Our data reflects that Porcupine Health Unit has one of the highest rates of COVID-19 transmission in the province, with approximately 300 cases per 100,000 for the past 3 weeks;
- There have been multiple COVID-19 outbreaks across the region, including in workplaces and remote communities with limited access to health care services;
- The surge in cases in our community has affected health care and public health capacity, requiring additional support from other health units as well as the Ontario Ministry of Health's Provincial Work Force;
- We have clear evidence that the Delta variant – significantly more transmissible than the B.1.1.7 variant – is circulating in our region - with cases confirmed so far in Timmins. The Province has identified Porcupine as one of the seven health unit regions where the delta variant is of concern.

These trends are worrisome and require extreme caution as we move to lift public health measures. Some municipalities and First Nation communities have already responded to these developments by declaring a state of emergency.

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Branch Offices: Cochrane, Hearst, Hornepayne, Iroquois Falls, Kapuskasing, Matheson,
Moosonee, Smooth Rock Falls

With strong support from Ontario's Chief Medical Officer of Health, who recognizes the need for an approach tailored to the Porcupine Health Unit's unique circumstances, we will therefore be taking more gradual approach to reopening starting on June 11, 2021 at 12:01 a.m.

While operating under some of the new provincial Step 1 Rules immediately, we must maintain some Shutdown-level restrictions to minimize the person-to-person interactions that are fueling uncontrolled transmission of COVID-19 within our communities.

I anticipate these continued Shutdown-level restrictions will remain necessary for no longer than the next two weeks, remaining in place until June 25, 2021 at 12:01 a.m. I will regularly assess our progress against key public health and health system indicators and will report publicly on our progress.

Ontario's new Step 1 Rule continue to require persons responsible for a business or organization that is open to operate the business or organization in compliance with the instructions of public health officials. This includes the following instructions issued by me in this document.

These instructions will be enforced by provincial offences officers and public health officials under one or more of the *Health Protection and Promotion Act*, *Reopening Ontario (A Flexible Response to COVID-19) Act, 2020* and/or the *Emergency Management and Civil Protection Act*. Failure to comply is a provincial offence. Among enforcement actions that may be taken, you may be charged, and penalties imposed including fines, imprisonment and/or closure of premises.

Should you have any questions, please do not hesitate to contact the Porcupine Health Unit at 1-800-461-1818 or visit our website: https://www.porcupinehu.on.ca/en/your-health/infectious-diseases/novel-coronavirus/covid-orders/covid-moh-instructions/.

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These instructions remain in effect until amended or rescinded by me.

ENSURE STRICT COMPLIANCE WITH ALL STEP 1 RULES AND INSTRUCTIONS THAT APPLY

1. You must familiarize yourself with all Step 1 Rules and instructions that apply to your workplace and ensure strict compliance with them, at all times, by workers and members of the public present at the workplace.

2. Ontario's Step 1 Rules are contained at Schedules 6 through 10 of Ontario Regulation 82/20 and may be accessed at: https://www.ontario.ca/page/emergency-information. The Shutdown Rules are contained at Schedules 1 through 5 of this same regulation.

3. Until more positive trends in key public health and health system indicators are demonstrated in the PHU region, the instructions set out in paragraphs 5 to 39 below continue some Shutdown-level requirements, maintaining a higher level of restriction than the Step 1 Rules. For greater certainty, nothing in the Step 1 Rules or in these instructions precludes any business or organization from:

    a) providing goods by mail or other forms of delivery or making goods available for pick-up; and
    b) providing services online, by telephone or by other remote means.[1]

[1] See Step 1 Rules, section 1(7), Schedule 6, O. Reg. 82/20

4. **Physical distancing and masks or face coverings in lines, etc.** In addition to the requirements of section 5, Schedule 6, O. Reg. 82/20, the person responsible for a business or place that is open must not permit patrons to line up or congregate outside of the business or place, unless they are both,

    a) maintaining a physical distance of at least two metres from other groups of persons; and
    b) wearing a mask or face covering in a manner that covers their mouth, nose and chin, unless they are entitled to any of the exceptions set out in subsection 2(5) Schedule 6, O. Reg. 82/20.[2]

5. **Sale and service of liquor.**

    a) The person responsible for a business or place that is open and in which liquor is sold or served under a licence or a special occasion permit shall ensure that,
        i. liquor is sold or served only between 9 a.m. and 9 p.m.; and
        ii. no consumption of liquor is permitted in the business or place between the hours of 10 p.m. and 9 a.m.
    b) The conditions set out in subsection a) do not apply with respect to businesses and places in airports.
    c) The conditions set out in subsection a) do not apply with respect to,
        i. the sale of liquor for removal from licensed premises in accordance with section 56.1 of Regulation 719 (Licences to Sell Liquor) made under the Liquor Licence Act; and
        ii. the sale of liquor for delivery in accordance with section 56.2 of Regulation 719 (Licences to Sell Liquor) made under the *Liquor Licence Act*.

6. **Discount and big box retailers selling groceries.** In addition to the requirements of section 2, Schedule 7, O. Reg. 82/20, discount and big box retailers that engage in retail sales to the public must meet the following conditions:

    a) The discount or big box retailer sells groceries to the public.
    b) In-store shopping must only be available for grocery items, pet care supplies, household cleaning supplies, pharmaceutical items, health care items, school supplies, household safety supplies and personal care items.
    c) No other goods or services may be sold to the public unless the discount or big box retailer complies with any conditions that are applicable with respect to the sale of those goods or services by other retail establishments under the Step 1 Rules as modified by these instructions (e.g., to exclude in-store shopping for non-essential retail etc.).[3]

7. **Safety supply stores.** In addition to the requirements of section 2, Schedule 7, O. Reg. 82/20, safety supply stores must meet the following conditions:

    a) They must only permit members of the public to enter the business premises by appointment.
    b) They must open no earlier than 7:00 a.m. and close no later than 8:00 p.m. and must not deliver goods to patrons outside of the hours of 6:00 a.m. to 9:00 p.m.[4]

[2] See Shutdown Rules, section 4, Schedule 1, O. Reg. 82/20
[3] See Shutdown Rules, section 3(1), Schedule 2, O. Reg. 82/20
[4] See Shutdown Rules, section 4(2), Schedule 2, O. Reg. 82/20

8. **Businesses that primarily sell, rent or repair assistive devices, aids or supplies, mobility devices, aids or supplies or medical devices, aids or supplies.** In addition to the requirements of section 2, Schedule 7, O. Reg. 82/20, these businesses must meet the following conditions:

    a) They must only permit members of the public to enter the business premises by appointment.
    b) They must open no earlier than 7:00 a.m. and close no later than 8:00 p.m. and must not deliver goods to patrons outside of the hours of 6:00 a.m. to 9:00 p.m.[5]

9. **Optical stores that sell prescription eyewear to the public.** In addition to the requirements of section 2, Schedule 7, O. Reg. 82/20, these stores must meet the following conditions:

    a) They must only permit members of the public to enter the business premises by appointment.
    b) They must open no earlier than 7:00 a.m. and close no later than 8:00 p.m. and must not deliver goods to patrons outside of the hours of 6:00 a.m. to 9:00 p.m.[6]

10. **Retail stores operated by telecommunications providers.** In addition to the requirements of sections 2 and 30, Schedule 7, O. Reg. 82/20, these stores must meet the following conditions:

    a) They must only permit members of the public to enter the premises by appointment and only for the purchase of cell phones, for repairs or for technical support.
    b) They must open no earlier than 7:00 a.m. and close no later than 8:00 p.m. and must not deliver goods to patrons outside of the hours of 6:00 a.m. to 9:00 p.m.[7]

11. **Stores, other than establishments described in section 3, Schedule 7, O. Reg. 82/20, that sell liquor, including beer, wine and spirits.** In addition to the requirements of section 2, Schedule 7, O. Reg. 82/20, these stores must meet the following condition:

    a) They must open no earlier than 7:00 a.m. and close no later than 8 p.m. and must not deliver goods to patrons outside of the hours of 6:00 a.m. to 9:00 p.m.[8]

12. **Outdoor garden centres and plant nurseries.** In addition to the requirements of section 2, Schedule 7, O. Reg. 82/20, outdoor garden centres and plant nurseries must meet the following condition:

    a) They must open no earlier than 7:00 a.m. and close no later than 8:00 p.m. and must not deliver goods to patrons outside of the hours of 6:00 a.m. to 9:00 p.m.[9]

13. **Indoor greenhouses.** In addition to the requirements of section 2, Schedule 7, O. Reg. 82/20, indoor greenhouses must meet the following condition:

    a) They must open no earlier than 7:00 a.m. and close no later than 8:00 p.m. and must not deliver goods to patrons outside of the hours of 6:00 a.m. to 9:00 p.m.[10]

[5] See Shutdown Rules, section 4(2), Schedule 2, O. Reg. 82/20
[6] See Shutdown Rules, section 4(2), Schedule 2, O. Reg. 82/20
[7] See Shutdown Rules, section 33, Schedule 2, O. Reg. 82/20
[8] See Shutdown Rules, section 5, Schedule 2, O. Reg. 82/20
[9] See Shutdown Rules, section 9.1, Schedule 2, O. Reg. 82/20
[10] See Shutdown Rules, section 9.2, Schedule 2, O. Reg. 82/20

14. **Restaurants, bars, food trucks, concession stands and other food or drink establishments.** In addition to the requirements of section 3, Schedule 7, O. Reg. 82/20, establishments other than those described in subsection (3) may open only for the purpose of providing take-out, drive-through or delivery service.[11]

15. **Nightclubs and strip clubs that open solely as food or drink establishments.** In addition to the requirements of section 4, Schedule 7, O. Reg. 82/20, these nightclubs and strip clubs may open only for the purpose of providing take-out, drive-through or delivery service.[12]

16. **Shopping malls.** In addition to the requirements of section 5, Schedule 7, O. Reg. 82/20, shopping malls must meet the following conditions:

    a) Members of the public must only be permitted to enter the shopping mall for the purpose of accessing a business or place that is permitted to be open under the Step 1 Rules as modified by these instructions.
    b) Subject to subparagraph c), the shopping mall must open no earlier than 7:00 a.m. and close no later than 8:00 p.m. and must not deliver goods to patrons outside of the hours of 6:00 a.m. to 9:00 p.m.
    c) A shopping mall may open outside of the hours described in subparagraph b) only for the purpose of providing access for members of the public to a business or place that,
        i. is permitted to open during those hours under the Step 1 Rules as modified by these instructions; and
        ii. only has public entrances that open into the interior of the shopping mall.
    d) For greater certainty, section 8(2) paragraph 5 of Schedule 7, O. Reg. 82/20 does not prevent a restaurant, bar or other food or drink establishment within a shopping mall from opening and operating in compliance with section 3 of Schedule 7 as modified by these instructions.[13]

17. **Fitting rooms in a business.** Fitting rooms in a business may open if patrons are not permitted to occupy adjacent fitting room stalls at any one time.[14]

18. **Businesses that sell motor vehicles etc.** These requirements apply to businesses that sell:

    - Motor vehicles, including cars, trucks and motorcycles;
    - Recreational vehicles, including motor homes;
    - Trailers and travel trailers;
    - Boats and other watercraft; or
    - Other motorized vehicles, including power-assisted bicycles, golf carts, scooters, snowmobiles and all-terrain vehicles.

    In addition to the requirements of section 5.2, Schedule 7, O. Reg. 82/20, these businesses must meet the following conditions:

    a) Members of the public must only be permitted to enter the premises by appointment.

    b) They must open no earlier than 7:00 a.m. and close no later than 8:00 p.m. and must not deliver goods to patrons outside of the hours of 6:00 a.m. to 9:00 p.m.

[11] See Shutdown Rules, section 6, Schedule 2, O. Reg. 82/20
[12] See Shutdown Rules, section 6, Schedule 2, O. Reg. 82/20
[13] See Shutdown Rules, section 8, Schedule 2, O. Reg. 82/20
[14] See Shutdown Rules, section 8.1, Schedule 2, O. Reg. 82/20

c) They must limit the number of persons in the place of business so that the total number of persons in the place of business at any one time does not exceed 25 per cent capacity, as determined in accordance with subsection 3(3) of Schedule 6.[15]

19. **Outdoor markets, including farmer's markets and holiday markets.** In addition to the requirements of section 6, Schedule 7, O. Reg. 82/20, these markets must meet the following conditions:

    a) Products must only be provided to patrons,
        i. in a manner that allows members of the public to remain in an outdoor area at all times, or
        ii. through an alternative method of sale that does not require patrons to enter the indoor area, such as curbside pick-up or delivery.
    b) The outdoor market must open no earlier than 7:00 a.m. and close no later than 8:00 p.m. and must not deliver goods to patrons outside of the hours of 6:00 a.m. to 9:00 p.m.[16]

20. **Other businesses engaging in retail sales to the public.** In addition to the requirements of section 7, Schedule 7, O. Reg. 82/20, these businesses must meet the following conditions:

    a) Sales must be exclusively made using an alternative method of sale that does not require patrons to enter the indoor area of the business, including curbside pick-up or delivery.
    b) If the business allows patrons to pick up items, it must,
        i. have a public entrance that opens onto a street or exterior sidewalk, or
        ii. in the case of a business in a shopping mall, permit patrons to pick up the items at a designated location established by the shopping mall under subsection 8 (3) or (4).
    c) An item may only be provided for pick-up if the patron ordered the item before arriving at the business premises.
    d) Patrons may only pick up orders by making a prior appointment.
    e) They must open no earlier than 7:00 a.m. and close no later than 8:00 p.m. and must not deliver goods to patrons outside of the hours of 6:00 a.m. to 9:00 p.m.
    f) Despite anything else in the Step 1 Rules, any business that engages in retail sales to the public and that is not already described in sections 1 to 6 of Schedule 7, must comply with the conditions set out in subsection 7(1) as modified by these instructions.
    g) Cannabis retail stores operating under the authority of a retail store authorization issued under the *Cannabis Licence Act, 2018* may open if they comply with the conditions set out in subsection 7(1) as modified by these instructions.[17]

21. **Rental and leasing services.** Further to section 8, Schedule 7, O. Reg. 82/20, rental and leasing services including automobile, commercial and light industrial machinery and equipment rental must meet the following conditions:

    a) They only permit members of the public to enter the business premises by appointment.
    b) They limit the number of persons in the place of business so that the total number of persons in the place of business at any one time does not exceed 25 per cent capacity, as determined in accordance with subsection 3 (3) of Schedule 6.

[15] See Shutdown Rules, section 9, Schedule 2, O. Reg. 82/20
[16] See Shutdown Rules, section 10, Schedule 2, O. Reg. 82/20
[17] See Shutdown Rules, section 10.1, Schedule 2, O. Reg. 82/20

c) They must open no earlier than 7:00 a.m. and close no later than 8:00 p.m. and must not deliver goods to patrons outside of the hours of 6:00 a.m. to 9:00 p.m.[18]

22. **Vehicle and equipment repair, essential maintenance etc.** Further to section 15, Schedule 7, O. Reg. 82/20, vehicle and equipment repair and essential maintenance and vehicle and equipment rental services must meet the following conditions:

    a) They only permit members of the public to enter the business premises by appointment.
    b) They limit the number of persons in the place of business so that the total number of persons in the place of business at any one time does not exceed 25 per cent capacity, as determined in accordance with subsection 3 (3) of Schedule 6.
    c) They must open no earlier than 7:00 a.m. and close no later than 8:00 p.m. and must not deliver goods to patrons outside of the hours of 6:00 a.m. to 9:00 p.m.[19]

23. **Child care providers.** For greater certainty further to section 21, Schedule 7, O. Reg. 82/20, the term "child care providers" includes but is not limited to operators and providers of the following:

    a) Child care centres that meet the conditions set out in subsection 21(2) of Schedule 7.
    b) Home child care at a person's dwelling.
    c) Child care described in paragraph 2 of subsection 6 (3) of the *Child Care and Early Years Act, 2014* that is provided at a person's dwelling.
    d) Authorized recreational and skill building programs that meet the conditions set out in subsection 21(3) of Schedule 7.[20]

24. **Businesses providing short term rental accommodation.** In addition to the requirements of section 21.1, Schedule 7, O. Reg. 82/20, businesses providing short term rental accommodation (including cabins and cottages but excluding hotels, motels, lodges, resorts and other shared rental accommodation including student residences) shall ensure that any rentals are only provided to individuals who are in need of housing.[21]

25. **Campgrounds.** In addition to the requirements of section 23, Schedule 7, O. Reg. 82/20, campgrounds must meet the following conditions:

    a) Campsites must be made available only for trailers and recreational vehicles that,
        i. are used by individuals who are in need of housing, or
        ii. are permitted to be there by the terms of a full season contract.
    b) Only campsites with electricity, water service and facilities for sewage disposal may be provided for use.
    c) All recreational facilities in the campground and all other shared facilities in the campground, other than washrooms and showers, must be closed.
    d) Other areas of the seasonal campground must be closed to the general public and must only be opened for the purpose of preparing the seasonal campground for reopening.[22]

[18] See Shutdown Rules, section 11, Schedule 2, O. Reg. 82/20
[19] See Shutdown Rules, section 18, Schedule 2, O. Reg. 82/20
[20] See Shutdown Rules, section 24, Schedule 2, O. Reg. 82/20
[21] See Shutdown Rules, section 6, Schedule 2, O. Reg. 82/20
[22] See Shutdown Rules, section 26, Schedule 2, O. Reg. 82/20

26. **Day camps for children.** Further to section 15, Schedule 7, O. Reg. 82/20, day camps for children must not provide in-person activities or services.[23]

27. **Construction.** Further to section 40, Schedule 7, O. Reg. 82/20, construction activities or projects and related services, including land surveying and demolition services continue to be restricted to those that:

    a) are associated with the health care sector or long-term care, including new facilities, expansions, renovations and conversion of spaces that could be repurposed for health care space;
    b) ensure safe and reliable operations of, or provide new capacity in,
        i. municipal infrastructure, or
        ii. provincial infrastructure, including but not limited to, the transit, transportation, resource, energy and justice sectors;
    c) support the operations of, or provide new capacity in, electricity generation, transmission, distribution and storage, natural gas distribution, transmission and storage or in the supply of resources;
    d) support the operations of, or provide new capacity in, schools, colleges, universities or child care centres within the meaning of the Child Care and Early Years Act, 2014;
    e) are required for,
        i. the maintenance and operations of petrochemical plants and refineries,
        ii. significant industrial petrochemical projects where preliminary work commenced before April 17, 2021, or
        iii. industrial construction and modifications to existing industrial structures limited solely to work necessary for the production, maintenance or enhancement of personal protective equipment, medical devices such as ventilators and other identified products directly related to combatting the COVID-19 pandemic;
    f) would provide additional capacity in the production, processing, manufacturing or distribution of food, beverages or agricultural products;
    g) were commenced before April 17, 2021 and that would,
        i. provide additional capacity for businesses that provide logistical support, distribution services, warehousing, storage or shipping and delivery services,
        ii. provide additional capacity in the operation and delivery of Information Technology (IT) services or telecommunications services, or
        iii. provide additional capacity to, or enhance the efficiency or operations of, businesses that extract, manufacture, process and distribute goods, products, equipment and materials;
    h) support the operations of broadband internet and cellular technologies and services;
    i) are residential construction activities or projects and related services;
    j) prepare a site for an institutional, commercial, industrial or residential development, including any necessary excavation, grading, roads or utilities infrastructure;
    k) are necessary to temporarily close construction sites that have paused, or that are not active, to ensure ongoing public safety;
    l) are funded in whole or in part by,
        i. the Crown in right of Canada or in right of Ontario,
        ii. an agency of the Crown in right of Canada or in right of Ontario, or

[23] See Shutdown Rules, Schedule 2, O. Reg. 82/20

iii. a municipality;

m) are,

i. intended to provide shelter or supports for vulnerable persons or affordable housing, and

ii. being funded in whole or in part by, or are being undertaken by,
(A) the Crown in right of Canada or in right of Ontario,
(B) an agency of the Crown in right of Canada or in right of Ontario,
(C) a municipality,
(D) a service manager as defined the *Housing Services Act, 2011*,
(E) a registered charity within the meaning of the *Income Tax Act* (Canada), or
(F) a not-for-profit corporation; or

n) support the operations of, or provide new capacity for, veterinary facilities within the meaning of the *Veterinarians Act*.[24]

28. **Facilities for indoor or outdoor sports and recreational fitness activities.** In addition to the requirements of section 45, Schedule 7, O. Reg. 82/20, indoor or outdoor sports and recreational activities at indoor or outdoor sports and recreational fitness are restricted to those that meet the conditions set out in subsections 45(2), (3), (4) and (5) only. For greater certainty, no indoor or outdoor sports or recreational classes are permitted at any indoor or outdoor sport and recreational facilities.[25] See also paragraph 37 of these instructions, below.

29. **Personal physical fitness, etc.** Further to section 45.1, Schedule 7, O. Reg. 82/20, personal fitness and sports trainers must not provide in-person services.[26]

30. **Teaching and instruction.** Further to section 57.1, Schedule 7, O. Reg. 82/20, must not provide in-person services.[27]

31. **Commercial film and television production.** In addition to the requirements of section 63, Schedule 7, O. Reg. 82/20, commercial film and television production, including all supporting activities, must meet the following condition:

    a) Singers and players of brass or wind instruments must be separated from any other performers by plexiglass or some other impermeable barrier.[28]

32. **Commercial and industrial photography.** Further to section 63.1, Schedule 7, O. Reg. 82/20, retail photo studios must not provide in-person services.[29]

33. **Concert venues, theatres and cinemas.** Further to section 65, Schedule 7, O. Reg. 82/20, concert venues, theatres and cinemas must not engage in in-person activities for the purpose of rehearsing or performing a recorded or broadcasted concert, artistic event, theatrical performance or other performance. For

[24] See Shutdown Rules, section 43, Schedule 2, O. Reg. 82/20
[25] See Shutdown Rules, section 48, Schedule 2, O. Reg. 82/20
[26] See Shutdown Rules, Schedule 2, O. Reg. 82/20
[27] See Shutdown Rules, Schedule 2, O. Reg. 82/20
[28] See Shutdown Rules, section 63, Schedule 2, O. Reg. 82/20
[29] See Shutdown Rules, section 66, Schedule 2, O. Reg. 82/20

greater certainty, drive-in or drive-through format movies, concerts, artistic events, theatrical performances or other performances are not permitted.[30]

34. **Outdoor tour and guide services.** Further to section 66, Schedule 7, O. Reg. 82/20, outdoor tour and guide services are not permitted to provide in-person services.[31]

35. **Public libraries.** In addition to the requirements of section 1, Schedule 8, O. Reg. 82/20, public libraries must meet the following condition:

    a) Circulating materials returned to the library must be disinfected or quarantined for an appropriate period of time before they are recirculated.[32]

36. **Schools and private schools.** In addition to the requirements of section 3, Schedule 8, O. Reg. 82/20, schools and private schools within the meaning of the *Education Act* must meet the following condition:

    a) the in-person activities addressed in subsection 3(5) are not permitted.[33]

37. **Indoor and outdoor recreational amenities.** In addition to the requirements of section 4, Schedule 8, O. Reg. 82/20, an outdoor recreational amenity described in subsection 4(2) must meet the following conditions:

    a) Team sports must not be practised or played within the amenity.
    b) Any locker rooms, change rooms, showers, clubhouses, restaurants, pools, meeting rooms, fitness centres or other recreational facilities on the premises must remain closed, except to the extent they provide access to equipment storage, a washroom or a portion of the amenity that is used to provide first aid.[34]

38. **Museums etc.** Further to section 5, Schedule 8, O. Reg. 82/20, museums, galleries, aquariums, zoos, science centres, landmarks, historic sites, botanical gardens and similar attractions must not provide in-person services.[35]

39. **Organized public events, gatherings.** In addition to the requirements of section 1, Schedule 9, O. Reg. 82/20, all businesses and organizations that are open are subject to the following conditions:

    a) They must not host, organize or otherwise participate in an organized public event or social gathering that is held indoors, including a public event or social gathering associated with a wedding, a funeral or a religious service, rite or ceremony even if it is held at a private dwelling.
    b) They must not host, organize or otherwise participate in an organized public event or social gathering of more than 5 people that is held outdoors, including a public event or social gathering associated with a wedding, a funeral or a religious service, rite or ceremony even if it is held at a private dwelling.

[30] See Shutdown Rules, Schedule 2, O. Reg. 82/20
[31] See Shutdown Rules, Schedule 2, O. Reg. 82/20
[32] See Shutdown Rules, s.1, Schedule 3, O. Reg. 82/20
[33] See Shutdown Rules, s.3, Schedule 3, O. Reg. 82/20
[34] See Shutdown Rules, s.4, Schedule 3, O. Reg. 82/20
[35] See Shutdown Rules, s.5, Schedule 3, O. Reg. 82/20

c) They must not host, organize or otherwise participate in an indoor or outdoor gathering of more than 10 people for the purposes of a wedding, a funeral or a religious service, rite or ceremony even if it is held at a private dwelling.[36]

–

Lianne Catton, MD, CCFP-EM, MPH
Medical Officer of Health and Chief Executive Officer
Porcupine Health Unit
Postal Bag 2012
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Timmins, ON P4N 8B7

These instructions shall be posted at: https://www.porcupinehu.on.ca/en/your-health/infectious-diseases/novel-coronavirus/covid-orders/covid-moh-instructions/.
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[36] See Shutdown Rules, s.1, Schedule 4, O. Reg. 82/20

Instructions from the Medical Officer of Health for Businesses and Workplaces (Moosonee): 2021-06-25

DATE: Wednesday June 23, 2021

EFFECTIVE: Friday, June 25, 2021 at 12:01 a.m.

TO:

All persons responsible for a business or organization **(workplace)** in the Town of Moosonee within the Porcupine Health Unit **(PHU)** region, where workers (including employees, those hired under third party agencies, contractors, vendors, volunteers or students and any other such persons) are present at the workplace or the public are regularly present.

Once again, I thank you for your ongoing efforts to comply with public health requirements that aim to protect your staff, patrons and other members of our community. I also thank you for your strong commitment to encourage workers to receive their vaccinations against COVID-19.

As much as we have achieved by working together in the face of this pandemic, however, I must ask for your continued support in the interests of protecting the health of our community. While our vaccination rates are strong and growing daily, other trends in public health and health system indicators are very concerning:

- A total of 1,353 confirmed COVID-19 cases have been reported between May 1st and June 21, 2021. Of these, 437 cases were reported in the James and Hudson Bay region.
- In May, 72 cases were reported from the James and Hudson Bay region (average of 2.3 cases per day) and 155 cases were reported between June 11th and June 17th (average of 22.1 cases per day) and 41 cases were reported between June 18th and June 22nd (average of 8.2 cases per day).
- PHU's overall infection rate increased by 278% from 93.5 per 100,000 on May 1 to a high of 353.5 per 100,000 on May 25. Since then, the rate has decreased but remains high at 101.9 per 100,000 on June 21, 2021.
- More cases have been confirmed for the Delta variant. As of June 22, 2021, a total of 30 Delta VOCs has been detected to date in the PHU area.
  - Of these 30 Delta VOCs, 28 were from the Timmins area, 1 from Iroquois Falls and 1 from Smooth Rock Falls.
  - These 30 Delta variants likely reflect only a tip of the iceberg. Because it is highly transmissible, more cases are expected as further results from tests in progress are received.
- A total of 63 confirmed COVID-19 cases in the PHU area have been hospitalized in the period since May 1.

- Thirty-three outbreaks have been declared in different settings since March 27, 2021, twenty of which are in workplaces resulting in 238 cases and 786 close contacts.

These trends are worrisome and require extreme caution and enhanced diligence with the public health measures as we move to lift the current restrictions.

Ontario's new Step 1 Rules that apply in the PHU Region continue to require persons responsible for a business or organization that is open to operate the business or organization in compliance with the instructions of public health officials. This includes the following instructions issued by me in this document.

Ontario's Chief Medical Officer of Health has recognized the need for an approach tailored to the PHU's unique circumstances, requiring a more gradual approach to reopening beginning on June 11, 2021. The Town of Moosonee, in particular, faces special challenges given its important role and connections with many remote communities – including but not limited to Moose Factory and 6 unique First Nation communities.

With strong support from leadership within the town of Moosonee and region I have therefore determined that some continued restrictions – set out in the instructions below – are needed for Moosonee as we move to reopen under Ontario's Step 1 Rules.

These instructions will be enforced by provincial offences officers and public health officials under one or more of the *Health Protection and Promotion Act, Reopening Ontario (A Flexible Response to COVID-19) Act, 2020 and/or the Emergency Management and Civil Protection Act.* Failure to comply is a provincial offence. Among enforcement actions that may be taken, you may be charged and penalties imposed including fines, imprisonment and/or closure of premises.

Should you have any questions, please do not hesitate to contact the Porcupine Health Unit at 1-800-461-1818 or visit our website: www.porcupinehu.on.ca.

These instructions remain in effect

until amended or rescinded by me.

ENSURE STRICT COMPLIANCE WITH ALL STEP 1 RULES AND INSTRUCTIONS

1. You must familiarize yourself with all Step 1 Rules that apply to your workplace and ensure strict compliance with them, at all times, by workers and members of the public present at the workplace.
   Ontario's Step 1 Rules are contained at Schedules 6 through 10 of Ontario Regulation 82/20.[1] They may be accessed at: https://www.ontario.ca/page/emergency-information.

2. You must also familiarize yourself with all instructions issued by me that apply to your workplace and ensure strict compliance with their requirements.To date, these instructions include:

   a. The instructions set out in this document; and

b. The instructions for all workplaces across the PHU, also issued by me on June 23, 2021 and effective June 25, 2021 at 12:01 a.m. These may be accessed on the PHU website at phu.fyi/covid-step1.

3. Nothing in the Step 1 Rules or in these instructions prevents any business or organization from:
   a. providing goods by mail or other forms of delivery or making goods available for pick-up, e.g., "curbside"; and
   b. providing services online, by telephone or by other remote means.[2]

4. The following instructions are in addition to all relevant requirements of the Step 1 Rules.
5. The following businesses that engage in retail sales to the public must operate at no greater than 25% capacity:
   a. Supermarkets, grocery stores, convenience stores, indoor farmers' markets and other stores that primarily sell food (other than restaurants, bars, food trucks, concession stands and other food or drink establishments); and
   b. Stores that sell liquor, including beer, wine and spirits (again, other than restaurants, bars, food trucks, concession stands and other food or drink establishments).
   c. All other businesses that engage in retail sales to the public must limit the number of patrons in the place of business to one person at a time.
6. All other businesses that engage in retail sales to the public must limit the number of patrons in the place of business to one person at a time.

7. Restaurants, bars, food trucks, concession stands and other food or drink establishments may open only for the purpose of providing take-out, drive-through or delivery.

8. No indoor or outdoor sports or recreational classes are permitted at any indoor or outdoor sport and recreational facilities *other than*those permitted by subsections 45(2), (3), (4) and (5) of the Step 1 Rules (e.g., for identified sports teams, child care providers, mental health/addictions support services, social services or persons with disabilities).

Lianne Catton, MD, CCFP-EM, MPH
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[1] Formerly under the Emergency Management and Civil Protection Act and continued under the Reopening Ontario (A Flexible Response to COVID-19) Act, 2020.

[2] See Step 1 Rules, section 1(7), Schedule 6, O. Reg. 82/20.

Letter rescinding Medical Officer of Health instructions to persons responsible for businesses and organizations in Moosonee

DATE: June 29, 2021

EFFECTIVE: June 30, 2021 at 12:01 a.m.

TO:

All persons responsible for a business or organization **(workplace)** in the Town of Moosonee within the Porcupine Health Unit **(PHU)** region, where workers (including employees, those hired under third party agencies, contractors, vendors, volunteers or students and any other such persons) are present at the workplace or the public are regularly present.

Thanks to the efforts of our community members and strong support from leadership within the town of Moosonee and region, we have witnessed a steady downward trend of new COVID-19 cases, a decrease in new and active outbreaks, and a decrease in rates of hospitalizations in the Porcupine Health Unit (PHU) region including the town of Moosonee. There also continues to be good uptake of first and second doses of COVID-19 vaccines.

Effective June 30, 2021, at 12:01 a.m., I will therefore be rescinding my instructions issued June 23, 2021, and effective June 25, 2021, at 12:01 a.m. that required enhanced public health measures and restrictions in Moosonee.

While this is good news, we must not let our guard down and remember to stay committed to the public health measures to get us to the end of this pandemic.

I acknowledge and thank you for complying with provincial and local rules and requirements to protect your staff, patrons and the community at large as these have changed through the course of the pandemic and ask for your continued vigilance and commitment as we move forward.

Lianne Catton, MD, CCFP-EM, MPH
Medical Officer of Health and Chief Executive Officer
Porcupine Health Unit
Postal Bag 2012
(169 Pine Street South)
Timmins, ON P4N 8B7

Instructions from the Medical Officer of Health for Businesses and Workplaces (PHU): 2021-06-30

Date: **Tuesday, June 29, 2021**

Effective: **Wednesday, June 30, 2021 at 12:01 a.m.**

To:

All persons responsible for a business or organization **(workplace)** in the Porcupine Health Unit **(PHU)** region, where employees, those hired under third party agencies, contractors, vendors, volunteers or students and any other such persons **(workers)** are present at the workplace or the public are regularly present, with the exception of:

- A licensed child care program that is in compliance with guidance issued by the Ministry of Education;
- Health care providers and health care entities as defined in Section 77.7 of the Health Protection and Promotion Act (HPPA) who are subject to the Chief Medical Officer of Health's Directives issued under the HPPA, other than the portion of premises used for the sale of goods that are neither medication nor health related supplies in pharmacies;
- Schools and school boards licensed under the Education Act; and
- Schools and private schools within the meaning of the Education Act, that are operated in accordance with a return to school direction issued by the Ministry of Education and approved by the Office of the Chief Medical Officer of Health.

First of all, I would like to thank you for your ongoing efforts to comply with public health requirements that aim to protect your staff, patrons and other members of our community. I would also like to thank you for your continued strong commitment to encourage workers to receive their vaccinations against COVID-19.

As much as we have achieved by working together in the face of this pandemic, however, I must ask for your continued patience and support in the interests of protecting the health of our community. While our vaccination rates are strong and growing daily, continued diligence will limit the risk for all as the region moves forward.

With our enhanced measures in the PHU region, the cases, outbreaks and hospital admissions have stabilized. However confirmation of the continued presence of the Delta VOC requires continued caution and enhanced diligence as we move to lift further restrictions.

Ontario's rules for reopening under the Reopening Ontario (A Flexible Response to COVID-19) Act, 2020 that apply in the Porcupine region continue to require persons responsible for a business or organization that is open to operate the business or organization in compliance with the instructions of public health officials. This includes the following instructions issued by me in this document.

The only amendments to these instructions as originally issued effective June 25, 2021, at 12:01 a.m., is to replace references to the Step 1 Rules with more general references to Ontario's rules under the Reopening Ontario (A Flexible Response to COVID-19) Act, 2020 as these may change from time to time as we complete the steps to move to full reopening in Ontario and the Porcupine region.

Please note that these amended instructions, and the continued restrictions they impose, are temporary. They have been issued in response to the very high rates of COVID-19 transmission within the Porcupine region in this recent wave, reflecting the highly transmissible VOCs. Their sole intent is to protect the public in our communities – including workers – from the very real and ongoing threat of COVID-19 and from its related impacts on our health system. These instructions will be rescinded as soon as conditions in our region permit.

These instructions will be enforced by provincial offences officers and public health officials under one or more of the Health Protection and Promotion Act, Reopening Ontario (A Flexible Response to COVID-19) Act, 2020 and/or the Emergency Management and Civil Protection Act. Failure to comply is a provincial offence. Among enforcement actions that may be taken, you may be charged, and penalties imposed including fines, imprisonment and/or closure of premises.

Should you have any questions, please do not hesitate to contact the Porcupine Health Unit at 1-800-461-1818 or visit our website: www.porcupinehu.on.ca.

THESE INSTRUCTIONS REMAIN IN EFFECT
UNTIL AMENDED OR RESCINDED BY ME

1. **ENSURE STRICT COMPLIANCE WITH ALL STEP 1 RULES AND INSTRUCTIONS:**
    1. You must familiarize yourself with all rules under the *Reopening Ontario (A Flexible Response to COVID-19) Act, 2020* **(ROA Rules)** and instructions that apply to your workplace and ensure strict compliance with them, at all times, by workers and members of the public present at the workplace.
    2. Ontario's ROA Rules, which may change from time to time, may be accessed at: https://www.ontario.ca/page/emergency-information.
    3. Effective June 30, 2021 at 12:01 a.m., and until rescinded by me, all workplaces in the PHU region must also comply with these amended instructions issued to strengthen the implementation and monitoring of public health measures in the workplace. These additional measures are specific to the PHU region's unique circumstances, which are aimed at limiting the further spread of COVID-19 as we reopen. These additional instructions may be accessed at: phu.fyi/covid-orders
2. **PROTECT ALL YOUR WORKERS FROM COVID-19:**
    1. You must continue to implement all COVID-19 prevention measures for your sector outlined in provincial guidelines and PHU guidance (see section 2.6 below), including but not limited to screening, physical distancing, wearing of masks and eye protection, hand hygiene, infection prevention and control and a safety plan.

2. Without limiting the generality of section 2.1 above, these prevention measures must include policies and procedures implemented to ensure the following:
    i. Active verification of completed screening prior to arrival on site, equivalent to the Ontario COVID-19 self-assessment (https://covid-19.ontario.ca/screening/worker/) and immediate exclusion of all workers whose screening results require self-isolation and or testing for COVID-19;
    ii. Occupancy of the premises must be limited to only as many persons as can be accommodated such that 2m distancing between persons can be maintained;
    iii. Physical distancing of 2m between persons must be maintained in all work areas, lunchrooms, change rooms, washrooms, subject only to para iv. below;
    iv. If work arrangements or the workplace environment cannot be altered to allow the required 2m distancing at all times, the workers must be provided with appropriate personal protective equipment including procedural and medical-grade masks (3-ply) and eye protection;
    v. Signage regarding COVID-19 safety measures available from the PHU or other relevant authorities must be posted throughout the workplace premises;
    vi. Masks (and eye protection and other personal protective equipment (PPE) as appropriate) must be used correctly and consistently inside the workplace premises by all workers and visitors at all times;
    vii. Eye protection must be worn when work requires contact closer than 2m;
    viii. If workplace or some work activities are outside, ensure distancing 2m at all times when possible; masks and eye protection must be worn when within 2 metres of others;
    ix. If work involves car pooling or shared vehicles, people must sit as far apart as possible and windows should be opened for increased ventilation; masks must be worn and eye protection (where safe to do so) is recommended where distancing of 2m cannot be maintained;
    x. Train all workers, and monitor to ensure, proper donning and doffing of masks, eye protection and other PPE used in the workplace;
    xi. Availability of adequate hand hygiene supplies and;
    xii. Appropriate cleaning and disinfection of workspaces with the focus on high-touch surfaces;
3. You must support self-isolation for all workers diagnosed with COVID-19, with COVID-19 symptoms, and who are close contacts of a person with COVID-19 as determined by the PHU or another public health agency.
4. You must:
    i. Maintain current and complete records for all workers so as to be able to provide a log of all workers present at the workplace during the period directed by the PHU (including first name, last name, phone number, date and location worked and, if possible, email address);
    ii. Make this log available immediately upon request by the PHU for case and contact management purposes; and

iii. This log must be retained for a minimum of 30 days.

5. Implement workplace policies and procedures to ensure the following:
   i. Symptomatic workers should get tested as soon as possible from the date of onset of symptoms;
   ii. Workers who test positive for COVID-19 shall notify their employer immediately; and
   iii. Asymptomatic workers are encouraged to seek testing.
6. Comply with all relevant directives and guidance including those from:
   i. Porcupine Health Unit:
      - Class Order - Section 22
      - Instructions from the Medical Officer of Health
      - PHU Resources to prevent COVID-19 in the workplace
   ii. Ministry of Health
      - Sector-specific guidelines
   iii. Ministry of Labour, Training and Skills Development
      - Resources to prevent COVID-19 in the workplace
7. These requirements apply to all workplaces, including those not open to the public such as construction sites and private dwellings.

3. **COMMUNICATE TO ALL WORKERS:**
   1. That every worker symptomatic for COVID-19 should be tested as soon as possible from the date of onset of symptoms at an assessment centre approved for diagnostic testing, not at a workplace screening site; and
   2. That every worker who is COVID-19 positive, is or becomes symptomatic for COVID-19, or has been identified as a close contact (meaning high risk contact) for COVID-19 as determined by the PHU or another public health agency, is required to self-isolate by the s.22 class order issued by me under the HPPA on February 26, 2021 ("Class Order"); and
   3. Provide each worker with a copy of the Class Order.
4. **IMMEDIATELY EXCLUDE FROM THE WORKPLACE EVERY PERSON IDENTIFIED AS:**
   a. diagnosed with COVID-19; or
   b. having the signs and symptoms of COVID-19 and having been tested for COVID-19 and awaiting the results of their test; or
   c. otherwise having reasonable grounds to believe they have symptoms of COVID-19; or
   d. a close contact for COVID-19 as determined by the PHU or another public health agency.
5. **FOR EVERY PERSON IDENTIFIED IN 4. ABOVE:**
   1. Immediately reiterate the information set out in Part 3 above. The Class Order requires these persons to confine themselves to their home or isolation facility (i.e., to self-isolate) until they have fully complied with all requirements of the Class Order.
   2. The Class Order provides that persons who are advised by the PHU that they are permitted to leave their home/isolation facility or who require emergency medical attention may do so but only if and as required for those limited purposes.

3. Immediately send home the worker with COVID-19 if they are at work (workers must avoid public transportation) and support them to stay off work while they are self-isolating.
4. Clean and disinfect any surfaces the worker may have touched.
5. If the worker is already at home, direct them not to enter the workplace. The worker will be contacted by public health and will be advised when it is safe for them to return to work.

6. **IF YOU BECOME AWARE OF TWO OR MORE WORKERS WITH COVID-19 AT YOUR WORKPLACE WITHIN A 14-DAY INTERVAL:**
   1. Immediately notify the PHU at 1-800-461-1818.
7. **IF YOU BECOME AWARE OF TWO OR MORE WORKERS WITH COVID-19 AT YOUR WORKPLACE WITHIN A 14-DAY INTERVAL, OR UPON NOTIFICATION BY THE PHU:**
   1. Ensure that the following steps are taken immediately:
      i. Notify:
         - the Ontario Ministry of Labour, Training and Skills Development;
         - the workplace's joint health and safety committee or health and safety representative;
         - the worker's trade union (if applicable); and
         - any other relevant governmental or other bodies (for example, you must report any occupationally acquired illnesses to the Workplace Safety and Insurance Board within 3 days of receiving notification of the illness).
      ii. Provide contact details of the most responsible decision-maker at the workplace premises and ensure that person is immediately available to the PHU;
      iii. Be readily available for contact by the PHU to implement any additional measures immediately as required by the PHU;
      iv. Cooperate with infection prevention and control personnel and any other personnel from the PHU including allowing entry into the workplace premises for inspection and to support enhanced infection prevention and control and any other measures for public health management of the outbreak;
      v. Follow all PHU directions pertaining to case and contact management and identifying workers who need to isolate, including that all directions as specified by the PHU are communicated to workers; and
      vi. Workers of a closed workplace premises shall not work in another workplace during their period of isolation.
   2. Immediately communicate to all workers:
      i. Advise workers that two or more cases of COVID-19 at your workplace and that the PHU has been notified of the situation; include further information if and as directed by the PHU (including whether an outbreak has been declared); and
      ii. Reiterate the information set out in Part 3 above.
8. **IF YOU WISH TO IMPLEMENT WORKPLACE ANTIGEN POINT-OF-CARE TESTING FOR COVID-19:**
   1. Before initiating COVID-19 antigen point-of-care testing (antigen POCT), you must:

i. Review and familiarize yourself with the Ministry of Health's COVID-19 Guidance: Considerations for Antigen Point-of-Care Testing, as current, to ensure compliance with this document subject to para ii. below;
ii. Comply with all additional requirements set out in these instructions; and
iii. Advise the PHU of your intention to initiate antigen POCT at 1-800-461-1818.

2. Antigen POCT is no more than an additional screening tool. It must be used for screening purposes only:
   i. Antigen POCT does not prevent a person from getting COVID-19.
   ii. Antigen POCT does not replace public health measures such as vaccination, symptom screening, physical distancing, appropriate PPE (e.g., masking and eye protection) and hand hygiene. Antigen POCT is no more than an additional screening tool.
3. Antigen POCT must NOT be used for any persons (including but not limited to workers):
   i. With symptoms;
   ii. Who are close contact for COVID-19 as determined by PHU or other public health agency;
   iii. Who have previously been infected with and recovered from COVID-19;
   iv. To diagnose COVID-19 infection; or
   v. To investigate a workplace outbreak.
4. Specimen collection for all antigen POCT must be conducted in an appropriate room with adherence to all appropriate public health measures and infection prevention and control requirements including PPE.
5. All workplaces initiating antigen POCT testing must implement policies and procedures to:
   i. Inform each tested person of their results; and
   ii. Establish a process to follow if the person tests positive that includes communicating information to direct and enable the person to book a confirmatory PCR test at the local assessment centre and return-to-work requirements (for workers).
6. All positive antigen POCT test results for any person tested must be immediately reported by fax to the PHU at705-360-7324 (confidential fax number)
7. Every person who receives a positive antigen POCT result must:
   i. Self-isolate immediately;
   ii. Inform their family and household members to self-isolate immediately;
   iii. Inform their employer, if the employer is not aware of the positive result;
   iv. Immediately book an appointment at the local assessment centre to obtain laboratory-based PCR testing within 24 hours of the positive antigen POCT result;
   v. Remain in self-isolation until they receive their PCR test result:
      - Those who test negative with a PCR test obtained within 24 hours of the positive antigen POCT result and asymptomatic may come out of self-isolation and return to work;
      - Those who test negative with a PCR test obtained within 24 hours of the positive antigen POCT result but have symptoms (even mild symptoms) of COVID-19 must remain in

self-isolation in accordance with the Class Order described in section 3.2 above and follow any other public health guidance from the PHU; and

- Those who test positive with a PCR test must remain in self-isolation in accordance with the Class Order described in section 3.2 above and follow any other public health guidance from the PHU.

8. Anyone with a positive antigen POCT result who either refuses laboratory-based PCR testing, or who does not obtain testing laboratory-based PCR testing within 48 hours of the positive antigen POCT result, must not return to work and must self-isolate for 10 days from the date of the positive antigen test.

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These instructions shall be posted on the PHU website at https://phu.fyi/covid-orders.

This is **Exhibit "AA"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

INSTRUCTIONS FROM THE MEDICAL OFFICER OF HEALTH

DATE: June 29, 2021 **EFFECTIVE DATE:** June 30, 2021 at 12:01 a.m.

TO: All persons responsible for a business, organization or facility in the Region of Waterloo (ROW)

First of all, I would like to thank you for your ongoing efforts to comply with public health requirements that aim to protect your staff, patrons and other members of our community. I would like to thank you for your strong commitment to encourage workers to receive their vaccinations against COVID-19 and your efforts in facilitating their ability to do so.

We have achieved much by working together in the face of this pandemic; however, at this time I must ask for your continued patience and support in the interests of protecting the health of our community, and to give us the best chance to re-open and successfully stay open.

With strong support from Ontario's Chief Medical Officer of Health and local health care leadership including all hospital CEOs, we will be taking a more gradual approach to reopening.

We must maintain Step 1 - level restrictions for approximately two weeks to minimize increased person-to-person interactions that would grow significantly with a move to Step 2 for our community at this time.

While our vaccination rates are growing daily, other trends in public health and health system indicators are concerning:

- Our data shows that ROW has had one of the highest rates of COVID-19 transmission in the province in the month of June 2021. As of June 28, 2021, our weekly case rate per 100,000 residents is over 5 times the provincial rate;
- We have seen COVID-19 spread in multiple, different types of settings in Waterloo Region, and rising infection rates in the younger age groups, including those under 20. There are multiple COVID-19 outbreaks in workplaces across the ROW. In essence, the variant is prevalent throughout the region and is not limited to one demographic;
- The surge in cases in our community has significantly affected our local hospitals. As of June 25, 2021, 60 individuals considered infectious for COVID-19 were hospitalized (this does not count those who are no longer infectious but still require hospital care), with 27 in the intensive-care unit, and our local hospitals had begun to transfer patients out of region for care;
- We have evidence that the Delta variant, significantly more transmissible than the Alpha variant (the variant driving Ontario's third wave), is the predominant

circulating strain in RoW. Public Health Ontario has estimated that the percentage of N501Y- and E484K- cases (a proxy for the Delta variant) was 81.4% in ROW from June 8, 2021 to June 14, 2021, and 93.9% in ROW from June 15, 2021 to June 21, 2021 (https://www.publichealthontario.ca/-/media/documents/ncov/epi/covid-19-prevalence-growth-voc-mutation-epi-summary.pdf). The Province has identified the ROW as one of the delta variant hotspots in Ontario.

These trends are worrisome and require a more cautious approaching to lifting public health restrictions at this time.

At this time, I anticipate these continued Step 1 - level restrictions will remain necessary for two additional weeks after most of Ontario moves to Step 2 on June 30, 2021, remaining in place until approximately mid-July, 2021. I will regularly assess our progress against key public health and health system indicators and will report publicly on our progress.

Ontario's new Step 2 Rule continues to require persons responsible for a business or organization to operate the business or organization in compliance with the instructions of public health officials. This includes the following instructions issued by me in this document pursuant to Regulation 263/20, as amended, under the Reopening Ontario (A Flexible Response to COVID-19) Act, 2020.

These instructions will be enforced by provincial offences officers and public health officials under one or more of the *Health Protection and Promotion Act*, *Reopening Ontario (A Flexible Response to COVID-19) Act, 2020* and/or the *Emergency Management and Civil Protection Act*. Failure to comply is a provincial offence. Among enforcement actions that may be taken, you may be charged, and penalties imposed including fines, and/or closure of premises.

Should you have any questions, please do not hesitate to contact Region of Waterloo Public Health at 519-575-4400 or visit our website: www.regionofwaterloo.ca/Instructions

For additional resources for workplaces please visit our website at: https://www.regionofwaterloo.ca/en/health-and-wellness/coronavirus-resources-for-workplaces.aspx

These instructions remain in effect until amended or rescinded by me.

1. You must comply with the requirements and restrictions as set out in Appendix A herein - which are the Step 1 requirements and restrictions as set out in Ontario Regulation 82/20, Schedules 6, 7, 8, 9 and 10 - as applicable to your business, organization or facility and to the extent that they are more strict than the Step 2 requirements and restrictions as set out in Ontario Regulation 263/20, as amended.

2. (1) Without limiting section 1 and subject to sections 3 to 6 herein, no person who operates a business, organization or facility shall allow persons to attend any of the following at their business, organization or facility,

(a) an organized public event that is held indoors;

(b) a social gathering that is held indoors, including a social gathering associated with a gathering described in clause (d);

(c) an organized public event or social gathering of more than 10 people that is held outdoors, including a social gathering associated with a wedding, funeral or a religious service, rite or ceremony, but not including the wedding, funeral or a religious service, rite or ceremony itself;

(d) an indoor gathering for the purposes of a wedding, a funeral or a religious service, rite or ceremony where the number of persons occupying any particular room in a building or structure while attending the gathering exceeds 15 per cent of the capacity of the room; or

(e) an outdoor gathering for the purposes of a wedding, a funeral or a religious service, rite or ceremony where the number of persons attending the gathering exceeds the number that can maintain a physical distance of at least two metres from every other person in the space where the gathering is held.

(2) A person attending an organized public event, social gathering or a gathering for the purposes of a wedding, a funeral or a religious service, rite or ceremony shall comply with public health guidance on physical distancing.

(3) For greater certainty, subsections (1) and (2) apply with respect to an organized public event, social gathering or a gathering for the purposes of a wedding, a funeral or a religious service, rite or ceremony, even if it is held at a private dwelling.

(4) For greater certainty, the limits in clauses (1) (b) and (c) apply to a social gathering associated with a wedding, a funeral or a religious service, rite or ceremony, such as a wedding reception, while the limits that apply to the wedding, funeral or religious service, rite or ceremony itself are set out in clauses (1) (d) and (e).

(5) Clause (1) (c) does not apply with respect to an outdoor end-of-school-year celebration ceremony held by a school or private school within the meaning of the *Education Act* that is in compliance with a direction issued by the Ministry of Education and approved by the Office of the Chief Medical Officer of Health.

3. Section 2 does not apply with respect to,

(a) a gathering of members of a single household;

(b) a gathering that includes members of a household and one other person from another household who lives alone; or

(c) a gathering that includes persons described in clause (a) or (b), and a caregiver for any of those persons.

4. Section 2 does not apply with respect to a gathering in a retirement home within the meaning of the *Retirement Homes Act, 2010* if it is in compliance with the policies or guidance, if any, issued by the Retirement Homes Regulatory Authority.

5. The prohibitions on attendance at an organized public event in subsection 2 (1) do not apply with respect to attendance at a business for a purpose related to providing or receiving the goods or services provided by the business if the business is not required to close.

6. (1) This section applies with respect to gatherings for the purposes of a wedding, funeral, religious service, rite or ceremony if the persons attending the gathering, other than those conducting the service, rite or ceremony, do so in a motor vehicle.

(2) Clause 2 (1) (e) does not apply to a gathering to which this section applies if the person follows all of the following precautions that apply:

1. Each person attending the gathering, other than the persons conducting the service, rite or ceremony, must remain within a motor vehicle that is designed to be closed to the elements, except,
    i. where necessary to use a washroom, or
    ii. as may otherwise be necessary for the purposes of health and safety.
2. The driver of a motor vehicle must ensure that it is positioned at least two metres away from other motor vehicles.
3. A person who ordinarily uses a non-motorized vehicle because of their religious belief and who attends the gathering must remain within their non-motorized vehicle except where necessary to use a washroom or as may otherwise be required for the purposes of health and safety, and paragraph 2 applies with necessary modifications.

Dr. Hsiu-Li Wang, MD, FRCPC
Commissioner & Medical Officer of Health
Region of Waterloo Public Health & Emergency Services

These instructions shall be posted at:
https://www.regionofwaterloo.ca/en/health-and-wellness/orders-and-instructions.aspx

APPENDIX A TO INSTRUCTIONS ISSUED BY THE MEDICAL OFFICER OF HEALTH FOR THE REGIONAL MUNICIPALITY OF WATERLOO ON JUNE 29, 2021

STEP 1

SCHEDULE 6
GENERAL RULES AT STEP 1

Closures

1. (1) Each person responsible for a business, or a part of a business, that is not listed in Schedule 7 or 8 shall ensure that the business, or part of the business, is closed.

(2) Each person responsible for a business, or part of a business, that is listed in Schedule 7 or 8 subject to conditions shall ensure that the business, or part of the business, either meets those conditions or is closed.

(3) Each person responsible for a place, or a part of a place, that is required to be closed by Schedule 8 shall ensure that the place, or part of the place, is closed in accordance with that Schedule.

(4) Each person responsible for a place, or a part of a place, that is listed in Schedule 8 subject to conditions shall ensure that the place, or part of a place, either meets those conditions or is closed.

(5) Each person responsible for a business or place, or part of a business or place, that does not comply with sections 2 to 11 of this Schedule shall ensure that it is closed.

(6) Despite subsections (1) to (5), temporary access to a business or place, or part of a business or place, that is required to be closed is authorized, unless otherwise prohibited by any applicable law, for the purposes of,

(a) performing work at the business or place in order to comply with any applicable law;

(b) preparing the business or place to be reopened;

(c) allowing for inspections, maintenance or repairs to be carried out at the business or place;

(d) allowing for security services to be provided at the business or place; and

(e) attending at the business or place temporarily,

(i) to deal with other critical matters relating to the closure of the business or place, if the critical matters cannot be attended to remotely, or

(ii) to access materials, goods or supplies that may be necessary for the business or place to be operated remotely.

(7) Nothing in this Order precludes a business or organization from operating remotely for the purpose of,

(a) providing goods by mail or other forms of delivery or making goods available for pick-up; and

(b) providing services online, by telephone or by other remote means.

(8) Nothing in this Order precludes a business or place from providing access to an outdoor recreational amenity that is permitted to open under section 4 of Schedule 8, including by opening such limited areas of the business or place as are necessary to enable access.

(9) Nothing in this Order precludes operations or delivery of services by the following in Ontario:

1. Any government.
2. Any person or publicly-funded agency or organization that delivers or supports government operations and services, including operations and services of the health care sector.

General compliance

2. (1) The person responsible for a business or organization that is open shall ensure that the business or organization operates in accordance with all applicable laws, including the *Accessibility for Ontarians with Disabilities Act, 2005* and the *Occupational Health and Safety Act* and the regulations made under them.

(2) The person responsible for a business or organization that is open shall operate the business or organization in compliance with the advice, recommendations and instructions of public health officials, including any advice, recommendations or instructions on physical distancing, cleaning or disinfecting.

(3) The person responsible for a business or organization that is open shall operate the business or organization in compliance with any advice, recommendations and instructions issued by the Office of the Chief Medical Officer of Health or another public health official on screening individuals by, among other things,

(a) posting signs at all entrances to the premises of the business or organization, in a conspicuous location visible to the public, that inform individuals on how to screen themselves for COVID-19 prior to entering the premises; and

(b) actively screening every person who works at the business or organization before they enter the premises of the business or organization.

(4) REVOKED: O. Reg. 440/21, s. 10 (3).

(5) The person responsible for a business or organization that is open shall ensure that any person in the indoor area of the premises of the business or organization, or in a vehicle that is operating as part of the business or organization, wears a mask or face covering in a manner that covers their mouth, nose and chin during any period when they are in the indoor area unless the person in the indoor area,

(a) is a child who is younger than two years of age;

(b) is attending a school or private school within the meaning of the *Education Act* that is operated in accordance with a return to school direction issued by the Ministry of Education and approved by the Office of the Chief Medical Officer of Health;

(c) is attending a child care program at a place that is in compliance with the child care re-opening guidance issued by the Ministry of Education;

(c.1) is attending a day camp for children that is in compliance with section 24 of Schedule 7;

(d) is receiving residential services and supports in a residence listed in the definition of "residential services and supports" in subsection 4 (2) of the *Services and Supports to Promote the Social Inclusion of Persons with Developmental Disabilities Act, 2008*;

(e) is in a correctional institution or in a custody and detention program for young persons in conflict with the law;

(f) is performing or rehearsing in a film or television production or in a concert, artistic event, theatrical performance or other performance;

(g) has a medical condition that inhibits their ability to wear a mask or face covering;

(h) is unable to put on or remove their mask or face covering without the assistance of another person;

(i) needs to temporarily remove their mask or face covering while in the indoor area,

(i) to receive services that require the removal of their mask or face covering,

(ii) to engage in an athletic or fitness activity,

(iii) to consume food or drink, or

(iv) as may be necessary for the purposes of health and safety;

(j) is being accommodated in accordance with the *Accessibility for Ontarians with Disabilities Act, 2005*;

(k) is being reasonably accommodated in accordance with the *Human Rights Code*; or

(l) performs work for the business or organization, is in an area that is not accessible to members of the public and is able to maintain a physical distance of at least two metres from every other person while in the indoor area.

(6) Subsection (5) does not apply with respect to premises that are used as a dwelling if the person responsible for the business or organization ensures that persons in the premises who are not entitled to an exception set out in subsection (5) wear a mask or face covering in a manner that covers their mouth, nose and chin in any common areas of the premises in which persons are unable to maintain a physical distance of at least two metres from other persons.

(6.1) The person responsible for a business or organization shall ensure that every person who performs work for the business or organization and whose mask or face covering is temporarily removed to consume food or drink under subclause (5) (i) (iii) is separated from every other person by,

(a) a distance of at least two metres; or

(b) plexiglass or some other impermeable barrier.

(7) For greater certainty, it is not necessary for a person to present evidence to the person responsible for a business or place that they are entitled to any of the exceptions set out in subsection (5).

(8) A person shall wear appropriate personal protective equipment that provides protection of the person's eyes, nose and mouth if, in the course of providing services, the person,

(a) is required to come within two metres of another person who is not wearing a mask or face covering in a manner that covers that person's mouth, nose and chin during any period when that person is in an indoor area; and

(b) is not separated by plexiglass or some other impermeable barrier from a person described in clause (a).

Work from home except where necessary

2.1 (1) Each person responsible for a business or organization that is open shall ensure that any person who performs work for the business or organization conducts their work remotely, unless the nature of their work requires them to be on-site at the workplace.

(2) Subsection (1) does not apply to a business or organization described in subsection 1 (9).

Capacity limits for businesses or facilities open to the public

3. (1) Subject to any other provisions set out in this Order, the person responsible for a place of business or facility that is open to the public shall limit the number of members of the public in the place of business or facility so that,

(a) the members of the public are able to maintain a physical distance of at least two metres from every other person in the business or facility; and

(b) the total number of members of the public in the business or facility at any one time does not exceed 50 per cent capacity, as determined in accordance with subsection (2).

(2) For the purposes of this Order, the maximum number of members of the public permitted in a business or facility that is operating at 50 per cent capacity is determined by taking the total square metres of floor area accessible to the public in the business or facility, not including shelving and store fixtures, dividing that number by 8 and rounding the result down to the nearest whole number.

(3) For the purposes of this Order, the maximum number of members of the public permitted in a business or facility that is operating at 25 per cent capacity is determined by taking the total square metres of floor area accessible to the public in the business or facility, not including shelving and store fixtures, dividing that number by 16 and rounding the result down to the nearest whole number.

(3.1) For the purposes of this Order, the maximum number of members of the public permitted in a business or facility that is operating at 15 per cent capacity is determined by taking the total square metres of floor area accessible to the public in the business or facility, not including shelving and store fixtures, dividing that number by 26.67 and rounding the result down to the nearest whole number.

(4) For greater certainty, subsection (1) does not require persons who are in compliance with public health guidance on households to maintain a physical distance of at least two metres from each other while in a place of business or facility.

(5) The person responsible for a place of business or facility that engages in retail sales to the public must post a sign in a conspicuous location visible to the public that states the maximum capacity they are permitted to operate under.

(6) Subsection (1) does not apply to schools and private schools within the meaning of the *Education Act* that are,

(a) operating in accordance with a return to school direction issued by the Ministry of Education and approved by the Office of the Chief Medical Officer of Health; or

(b) operated by,

(i) a band, a council of a band or the Crown in right of Canada,

(ii) an education authority that is authorized by a band, a council of a band or the Crown in right of Canada, or

(iii) an entity that participates in the Anishinabek Education System.

Requirements that apply to individuals

4. (1) Every person on the premises of a business or organization that is open shall wear a mask or face covering in a manner that covers their mouth, nose and chin during any period in which they are in an indoor area of the premises.

(2) Every person shall wear a mask or face covering in a manner that covers their mouth, nose and chin during any period in which they are,

(a) in attendance at an organized public event or gathering permitted by this Order; and

(b) within two metres of another individual who is not part of their household.

(3) Subsections (1) and (2) do not require a person to wear a mask or face covering if they are subject to an exception set out in subsection 2 (5).

(4) Every member of the public in a place of business or facility that is open to the public, and every person in attendance at an organized public event or gathering permitted by this Order, shall maintain a physical distance of at least two metres from every other person, except from their caregiver or from members of the person's household.

(5) The physical distancing described in subsection (4) is not required,

(a) where necessary to complete a transaction or to receive a service, if the member of the public wears a mask or face covering in a manner that covers

their mouth, nose and chin or is subject to an exception set out in subsection 2 (5);

(a.1) when attending a day camp for children that is in compliance with section 24 of Schedule 7;

(b) when passing one another in a confined location, such as in a hallway or aisle, if the member of the public wears a mask or face covering in a manner that covers their mouth, nose and chin or is subject to an exception set out in subsection 2 (5); and

(c) in situations where another provision of this Order expressly authorizes persons to be closer than two metres from each other.

(6) For greater certainty, nothing in subsection (5) affects the obligation of persons who provide services to comply with subsection 2 (8).

(7) No person shall use an indoor or outdoor recreational amenity that is required to close under this Order.

Physical distancing and masks or face coverings in lines, etc.

5. (1) The person responsible for a business or place that is open must not permit patrons to line up or congregate outside of the business or place unless they are maintaining a physical distance of at least two metres from other groups of persons.

(2) The person responsible for a business or place that is open must not permit patrons to line up inside the business or place unless they are,

(a) maintaining a physical distance of at least two metres from other groups of persons; and

(b) wearing a mask or face covering in a manner that covers their mouth, nose and chin, unless they are entitled to any of the exceptions set out in subsection 2 (5).

(3) This section does not apply with respect to day camps for children that are in compliance with section 24 of Schedule 7.

Safety plan

6. (1) The person responsible for a business that is open shall prepare and make available a safety plan in accordance with this section, or ensure that one is prepared and made available.

(2) The safety plan shall describe the measures and procedures which have been implemented or will be implemented in the business to reduce the transmission risk of COVID-19.

(3) Without limiting the generality of subsection (2), the safety plan shall describe how the requirements of this Order will be implemented in the location including by screening, physical distancing, masks or face coverings, cleaning and disinfecting of surfaces and objects, and the wearing of personal protective equipment.

(4) The safety plan shall be in writing and shall be made available to any person for review on request.

(5) The person responsible for the business shall ensure that a copy of the safety plan is posted in a conspicuous place where it is most likely to come to the attention of individuals working in or attending the business.

7. REVOKED: O. Reg. 440/21, s. 10 (8).

Meeting or event space

8. (1) The person responsible for a business or place that is open may only rent out meeting or event space if the meeting or event space is only rented out,

(a) for a day camp for children described in section 24 of Schedule 7;

(b) to a provider of child care within the meaning of the *Child Care and Early Years Act, 2014*;

(c) for the purpose of the provision of social services;

(d) for the purpose of collective bargaining, so long as no more than ten people are permitted to occupy the rented space;

(e) for the purpose of delivering or supporting the delivery of court services;

(f) for operations by or on behalf of a government;

(g) for the purpose of delivering or supporting the delivery of government services;

(h) for the purpose of delivering or supporting mental health support services or addictions support services, so long as no more than ten people are permitted to occupy the rented space; or

(i) for the purpose of conducting in-person examinations for the registration, licensing or accreditation of persons in any of the fields or occupations described in subsection 2 (2) of Schedule 8, so long as no more than 50 students are permitted to occupy the rented space.

(1.1) The person responsible for a business or place that rents out meeting or event space must ensure that the business or place actively screens individuals in accordance with the advice, recommendations and instructions of the Office of the Chief Medical Officer of Health before they enter the indoor premises of the business or place.

(2) The person responsible for a business or place that is open shall,

(a) record the name and contact information of every member of the public who attends a meeting or event;

(b) maintain the records for a period of at least one month; and

(c) only disclose the records to a medical officer of health or an inspector under the *Health Protection and Promotion Act* on request for a purpose specified in section 2 of that Act or as otherwise required by law.

(3) Subsection (2) does not apply to the rental of meeting or event space for the purpose of delivering or supporting the delivery of court services.

9. REVOKED: O. Reg. 440/21, s. 10 (9).

Driving instruction

10. (1) The person responsible for a business or place shall ensure that no in-person driving instruction is provided by or at the business or place.

(2) Subsection (1) does not apply to in-person driving instruction for drivers of commercial motor vehicles,

(a) where the instruction is part of the Ontario Driver Certification Program administered by the Ministry of Transportation and involves the operation of motor vehicles for which,

(i) a class of driver's licence other than Class G, G1, G2, M, M1 or M2 is required, or

(ii) an air brake endorsement is required; or

(b) that is provided by a private career college that is in compliance with section 2 of Schedule 8.

(3) In this section,

"commercial motor vehicle" has the same meaning as in subsection 1 (1) of the *Highway Traffic Act*.

Cleaning requirements

11. (1) The person responsible for a business or place that is open shall ensure that,

(a) any washrooms, locker rooms, change rooms, showers or similar amenities made available to the public are cleaned and disinfected as frequently as is necessary to maintain a sanitary condition; and

(b) any equipment that is rented to, provided to or provided for the use of members of the public must be cleaned and disinfected as frequently as is necessary to maintain a sanitary condition.

(2) For greater certainty, clause (1) (b) applies to computers, electronics and other machines or devices that members of the public are permitted to operate.

Professional and elite amateur sports

12. (1) In this section,

"Framework" means the document titled "Return-to-Play Framework for Professional and Elite Amateur Sport Leagues and Events" approved by the Office of the Chief Medical Officer of Health under subsection (2), as amended from time to time; ("cadre")

"International Single Sport Event" means an international single sport event hosted by a national sport organization that is either funded by Sport Canada or recognized by the Canadian Olympic Committee or the Canadian Paralympic Committee; ("Manifestation internationale unisport")

"participant" means a person who is a member of a specified participant group in a return-to-play plan; ("participant")

"return-to-play plan" means a return-to-play plan for,

(a) a sport league or association listed in the Tables to subsection (3), or

(b) an International Single Sport Event. ("plan de retour au jeu")

(2) The Office of the Chief Medical Officer of Health may approve the Framework.

(3) The person responsible for a sport league or association in the Tables to this subsection shall ensure that a return-to-play plan that is consistent with the Framework has been established before that sport league or association can, in accordance with this section, return to play the sport referred to in Column 3:

TABLE 1
PROFESSIONAL SPORT LEAGUES OR ASSOCIATIONS

Column 1	Column 2 Professional Sport Leagues or Associations	Column 3 Sport
1.	American Hockey League	Hockey

2.	Canadian Elite Basketball League	Basketball
3.	Canadian Football League	Football
4.	Canadian Premier League	Soccer
5.	Major League Baseball	Baseball
6.	Major League Soccer	Soccer
7.	NBA G League	Basketball
8.	National Basketball Association	Basketball
9.	National Hockey League	Hockey
10.	National Lacrosse League	Lacrosse
11.	National Women's Hockey League	Hockey
12.	Professional Women's Hockey Players Association	Hockey
13.	USL League 1	Soccer

Column 1	Column 2 Elite Amateur Sport Leagues or Associations	Column 3 Sport
1.	Canadian Hockey League	Hockey
2.	Elite Baseball League of Ontario U 18 Division	Baseball
3.	League 1 Ontario	Soccer
4.	Ontario Junior "A" Lacrosse League	Lacrosse
5.	Ontario Scholastic Basketball Association	Basketball
6.	Ontario Women's Field Lacrosse U 19 "A" League	Lacrosse
7.	Provincial Women's Hockey League	Hockey

TABLE 2
ELITE AMATEUR SPORT LEAGUES OR ASSOCIATIONS

(4) Before an International Single Sport Event can return to play in accordance with this section, the person responsible for that International Single Sport Event must ensure that a return-to-play plan has been established that is,

(a) consistent with the Framework; and

(b) approved by a national sport organization that is either funded by Sport Canada or recognized by the Canadian Olympic Committee or the Canadian Paralympic Committee.

(5) The person responsible for an International Single Sport Event or a sport league or association listed in the Tables to subsection (3) must provide notice of its intent to return to play to the local Medical Officer of Health for each Public Health Unit region in which the International Single Sport Event or the sport league or association, as the case may be, intends to operate before returning to play.

(6) The return-to-play plan shall,

(a) list the businesses and places that may be used by the participants, which may include,

(i) hotels,

(ii) facilities for indoor or outdoor sports and recreational fitness activities,

(iii) businesses or places that are in hotels or facilities mentioned in subclause (i) or (ii), and

(iv) restaurants or bars;

(b) list specified groups of persons who are participants; and

(c) describe the measures and procedures which have been implemented or will be implemented in the businesses or places referred to in clause (a) to reduce the transmission risk of COVID-19.

(7) A business or place that is listed in the return-to-play plan as being available for the use of participants may open for use by participants if the business or place complies with the following conditions:

1. The business or place must operate in accordance with the return-to-play plan.
2. No spectators may be permitted at the business or place.
3. The business or place must ensure that any other conditions or requirements set out in this section are complied with on the premises of the business or place.

(8) The return-to-play plan shall be in writing and shall be made available by the person responsible for the International Single Sport Event or the sport league or association listed in the Tables to subsection (3), as the case may be, to any provincial offences officer upon request.

(9) The following provisions do not apply to the provision of goods or services to a participant by a business or place listed, in accordance with clause (6) (a), in the return-to-play plan when they are provided in accordance with the return-to-play plan:

1. Subsection 2 (5) of this Schedule, but only in respect of players and coaches in an International Single Sport Event or a sport league or association listed in the Tables to subsection (3).

2. Sections 3, 6 and 8 of this Schedule.
3. Section 45 of Schedule 7.
4. Clauses 1 (1) (a) and (b) of Schedule 9.

(10) Businesses and places listed in the return-to-play plan may provide in-person dining for participants if they meet the following conditions:

1. Participants must be seated at all times in any area of the establishment in which food or drink is permitted except,

i. while entering the area and while moving to their table,

ii. while placing or picking up an order,

iii. while paying for an order,

iv. while exiting the area,

v. while going to or returning from a washroom,

vi. while lining up to do anything described in subparagraphs i to v, or

vii. where necessary for the purposes of health and safety.

2. The person responsible for the establishment must,

i. record the name and contact information of every participant that enters an area of the establishment, unless the participant temporarily enters the area to place, pick up or pay for a takeout order,

ii. maintain the records for a period of at least one month, and

iii. only disclose the records to a medical officer of health or an inspector under the *Health Protection and Promotion Act* on request for a purpose specified in section 2 of that Act or as otherwise required by law.

3. No participant may be permitted to line up or congregate outside of the establishment unless they are maintaining a physical distance of at least two metres from other groups of persons inside or outside the establishment.
4. No participant may be permitted to line up or congregate inside the establishment unless they are,

i. maintaining a physical distance of at least two metres from other groups of persons inside or outside the establishment, and

ii. wearing a mask or face covering in a manner that covers their mouth, nose and chin, unless they are entitled to any of the exceptions set out in subsection 2 (5) of Schedule 6.

5. No participant shall dance, sing or perform music at the establishment.

(11) Hotels listed in the return-to-play plan may open meeting and event spaces and indoor pools, indoor fitness centres or other indoor recreational facilities that are part of the operation of the hotels, other than communal steam rooms, saunas and whirlpools, if the following conditions are met:

1. The hotels must ensure that the facilities are open only for the use of participants.
2. The hotels must ensure that the facilities are used in accordance with the return-to-play plan.

(12) Therapists referred to in the return-to-play plan may open for the sole purpose of providing services to players in an International Single Sport Event or in a sport league or association listed in the Tables to subsection (3), as the case may be, and shall provide such services in accordance with the return-to-play plan.

(13) Television productions relating to an International Single Sport Event or a game of a sport league or association listed in the Tables to subsection (3), as the case may be, that are in compliance with the return-to-play plan may open, and the conditions set out in paragraphs 1 to 5 of subsection 60 (1) of Schedule 7 do not apply to such television productions.

13. REVOKED: O. Reg. 440/21, s. 10 (10).

O. Reg. 96/21, s. 10; O. Reg. 117/21, s. 2; O. Reg. 126/21, s. 3; O. Reg. 144/21, s. 3; O. Reg. 162/21, s. 3; O. Reg. 216/21, s. 2; O. Reg. 313/21, s. 1; O. Reg. 440/21, s. 10; O. Reg. 482/21, s. 1; O. Reg. 489/21, s. 1.

SCHEDULE 7
BUSINESSES THAT MAY OPEN AT STEP 1

Supply chains

1. Businesses that supply businesses or places that are permitted to open within Ontario, or that supply businesses or services that have been declared essential in a jurisdiction outside of Ontario, with the support, products, supplies, systems, or services, including processing, packaging, warehousing, distribution, delivery, and maintenance necessary to operate.

Retailers

2. (1) The following businesses that engage in retail sales to the public and that meet the conditions set out in subsection (2):

1. Supermarkets, grocery stores, convenience stores, indoor farmers' markets and other stores that primarily sell food, other than establishments described in section 3.
2. Pharmacies.
3. Discount and big box retailers selling groceries.
4. Safety supply stores.
5. Businesses that primarily sell, rent or repair assistive devices, aids or supplies, mobility devices, aids or supplies or medical devices, aids or supplies.
6. Optical stores that sell prescription eyewear to the public.
7. Retail stores operated by telecommunications providers.
8. Stores, other than establishments described in section 3, that sell liquor, including beer, wine and spirits.
9. Outdoor garden centres and plant nurseries.
10. Indoor greenhouses.

(2) The business must comply with the following conditions:

1. They must limit the total number of members of the public in the place of business so that the total number of members of the public in the place of business at any one time does not exceed 25 per cent capacity, as determined in accordance with subsection 3 (3) of Schedule 6.
2. They must ensure that any music played at the place of business is not at a decibel level that exceeds the level at which normal conversation is possible.

(3) For greater certainty, paragraph 1 of subsection (1) includes stores that predominately sell one category of food.

(4) Nothing in this section permits a business located within an indoor farmer's market to exceed 15 per cent capacity for in-store shopping unless it is a business that primarily sells food.

3. (1) Restaurants, bars, food trucks, concession stands and other food or drink establishments that meet the conditions set out in subsection (2).

(2) A business described in subsection (1) may open only if it complies with the following conditions:

1. No indoor dining or buffet-style service may be provided.

2. Patrons must be seated at all times in any outdoor dining area of the establishment except,

i. while entering the area and while moving to their table,

ii. while placing or picking up an order,

iii. while paying for an order,

iv. while exiting the area,

v. while going to or returning from a washroom,

vi. while lining up to do anything described in subparagraphs i to v, or

vii. where necessary for the purposes of health and safety.

3. The outdoor dining area must be configured so that patrons seated at different tables are separated by,

i. a distance of at least two metres, or

ii. plexiglass or some other impermeable barrier.

4. The person responsible for the establishment must,

i. record the name and contact information of every patron that enters an area of the establishment, unless the patron temporarily enters the area to place, pick up or pay for a takeout order,

ii. maintain the records for a period of at least one month, and

iii. only disclose the records to a medical officer of health or an inspector under the *Health Protection and Promotion Act* on request for a purpose specified in section 2 of that Act or as otherwise required by law.

5. REVOKED: O. Reg. 440/21, s. 11 (3).

6. No patron may be permitted to line up or congregate outside of the establishment unless they are maintaining a physical distance of at least two metres from other groups of persons inside or outside the establishment.

6.1 No patron may be permitted to line up inside the establishment unless they are,

i. maintaining a physical distance of at least two metres from other groups of persons inside or outside the establishment, and

ii. wearing a mask or face covering in a manner that covers their mouth, nose and chin, unless they are entitled to any of the exceptions set out in subsection 2 (5) of Schedule 6.

7. No more than four people may be seated together at an outdoor table at the establishment unless everyone seated at the table is,

i. a member of the same household,

ii. a member of up to one other household who lives alone, or

iii. a caregiver for any member of either household.

8. The total number of patrons permitted to be seated outdoors at the establishment must be limited to the number that can maintain a physical distance of at least two metres from every other person at the establishment.

9. The person responsible for the establishment must post a sign in a conspicuous location visible to the public that states the maximum capacity they are permitted to operate under.

10. Music must not be played at a decibel level that exceeds the level at which normal conversation is possible.

11. No person shall dance, sing or perform music at the establishment.

12. If an outdoor dining area at the establishment is covered by a roof, canopy, tent, awning or other element, at least two full sides of the entire outdoor dining area must be open to the outdoors and must not be substantially blocked by any walls or other impermeable physical barriers.

13. If an outdoor dining area at the establishment is equipped with a retractable roof and the roof is retracted, at least one full side of the outdoor dining area must be open to the outdoors and must not be substantially blocked by any walls or other impermeable physical barriers.

14. The establishment must actively screen any dine-in patrons in accordance with the advice, recommendations and instructions of the Office of the Chief Medical Officer of Health before they enter the premises of the establishment.

(3) Despite subsection (2), the following establishments may provide indoor dining if they meet the conditions set out in paragraphs 1, 2, 3, 4, 6, 8.1, 9, 10, 12, and 13 of subsection 1 (1) of Schedule 2 to Ontario Regulation 263/20 made under the Act:

1. Establishments on hospital premises.

2. Establishments in airports.

3. Establishments located within a business or place where the only patrons permitted at the establishment are persons who perform work for the business or place in which the establishment is located.

(4) The physical distancing described in subsections 3 (1) and 4 (4) of Schedule 6 is not required when patrons are seated together at a table in an establishment.

(5) The capacity limits set out in clause 3 (1) (b) of Schedule 6 do not apply to outdoor dining areas in an establishment.

4. Nightclubs and strip clubs that open solely as food or drink establishments and that comply with the conditions set out in section 3.

5. (1) Shopping malls that comply with the following conditions:

1. Despite section 7, the only businesses in the shopping mall that may open for in-person retail sales to the public are,

i. businesses described in section 2, and

ii. any other businesses that have a public entrance that opens onto a street or exterior sidewalk.

2. Members of the public must only be permitted to enter the shopping mall,

i. for the purpose of accessing a business or place that is permitted to be open under this Order,

ii. for the purpose of accessing a designated location described in subsection (4) or (5),

iii. for the purpose of delivering or supporting the delivery of court services,

iv. for operations by or on behalf of a government, or

v. for the purpose of delivering or supporting the delivery of government services.

3. Members of the public who enter the shopping mall for a reason described in paragraph 2 must not be permitted to loiter in any area of the shopping mall that is not related to the purpose of their visit.

4. If a business or place in the shopping mall has a public entrance that opens onto a street or exterior sidewalk,

i. members of the public may only be permitted to enter and exit the business or place through a public entrance that opens onto a street or exterior sidewalk, and

ii. members of the public must be prohibited from entering or exiting the business or place through any entrance that opens directly into the shopping mall.

5. Any interior dining spaces inside the shopping mall, including any tables and seating in food courts, must be closed.
6. The shopping mall must ensure that any music played at the shopping mall is not at a decibel level that exceeds the level at which normal conversation is possible.
7. If the shopping mall is an indoor shopping mall, the shopping mall must actively screen individuals in accordance with the advice, recommendations and instructions of the Office of the Chief Medical Officer of Health before they enter the indoor premises of the mall.

(2) Any business in the shopping mall that is not permitted to open for in-person retail sales to the public may open for the purpose of,

(a) making sales using an alternative method of sale that does not require patrons to enter the shopping mall, including curbside pick-up or delivery; or

(b) permitting patrons to pick up items at a designated location established by the shopping mall under subsection (4) or (5).

(3) For greater certainty, paragraph 5 of subsection (1) does not prevent a restaurant, bar or other food or drink establishment within a shopping mall from opening and operating in compliance with section 3.

(4) A shopping mall may establish a single designated location inside the shopping mall for the purpose of allowing patrons to pick up an order from a business or place inside the shopping mall. Patrons may only pick up orders from the indoor designated location by making a prior appointment, and an item may only be provided for pick-up if the patron ordered the item before arriving at the business premises.

(5) A shopping mall may establish any number of designated locations outside the shopping mall for the purpose of allowing patrons to pick up an order from a business or place inside the shopping mall. Patrons may only pick up orders from the outdoor designated location by making a prior appointment, and an item may only be provided for pick-up if the patron ordered the item before arriving at the business premises.

5.1 REVOKED: O. Reg. 440/21, s. 11 (8).

5.2 (1) Businesses that meet the conditions set out in subsection (2) and that sell,

(a) motor vehicles, including cars, trucks and motorcycles;

(b) recreational vehicles, including motor homes;

(c) trailers and travel trailers;

(d) boats and other watercraft; or

(e) other motorized vehicles, including power-assisted bicycles, golf carts, scooters, snowmobiles and all-terrain vehicles.

(2) A business described in subsection (1) may only open if they meet the following conditions:

1. Members of the public must not be permitted in areas where the products described in subsection (1) are neither sold nor displayed for sale.
2. If members of the public are permitted to test drive any of the vehicles, boats or watercraft,

i. the test drive must be limited to no more than 10 minutes,

ii. a maximum of two people, including up to one sales representative, may be present in the vehicle, boat or watercraft during the test drive, and

iii. if two people who are not members of the same household are present in the vehicle during the test drive, any windows in the vehicle, boat or watercraft must be opened at all times.

6. Outdoor markets, including farmer's markets and holiday markets, that meet the following conditions:

1. They primarily sell food to the public.
2. If an area at the market is covered by a roof, canopy, tent, awning or other element, at least two full sides of the entire area must be open to the outdoors and must not be substantially blocked by any walls or other impermeable physical barriers.
3. If an area at the market is equipped with a retractable roof and the roof is retracted, at least one full side of the area must be open to the outdoors and must not be substantially blocked by any walls or other impermeable physical barriers.
4. The market must limit the number of members of the public in the place of business so that the total number of members of the public in the place of business at any one time does not exceed 25 per cent capacity, as determined in accordance with subsection 3 (3) of Schedule 6.

7. (1) Businesses not already described in sections 2 to 6 that engage in retail sales to the public and that comply with the following conditions:

1. They must limit the number of members of the public in the place of business so that the total number of members of the public in the place of business at any

one time does not exceed 15 per cent capacity, as determined in accordance with subsection 3 (3.1) of Schedule 6.

2. They must ensure that any music played at the place of business is not at a decibel level that exceeds the level at which normal conversation is possible.

(2) Despite anything else in this Order, any business that engages in retail sales to the public and that is not already described in sections 1 to 6 must comply with the conditions set out in subsection (1).

(3) Cannabis retail stores operating under the authority of a retail store authorization issued under the *Cannabis Licence Act, 2018* may open if they comply with the conditions set out in subsection (1) and provide products to patrons through in-person sales or through an alternative method of sale, such as curbside pick-up or delivery.

(4) A business that, as of December 26, 2020, was permitted to be open only in accordance with the conditions described in subsection (1) as it read on that date may only continue to be open in accordance with the conditions under that subsection as amended whether or not, after that date, it modified its operations or the type of products it sells.

(5) Despite subsection 32 (2) of Ontario Regulation 268/18 (General) made under the *Smoke-Free Ontario Act, 2017*, a person responsible for a specialty vape store as defined in that Regulation that is permitted to be open in accordance with the conditions described in subsection (1) shall not permit an electronic cigarette to be used for the purpose of sampling a vapour product in the specialty vape store.

Services

8. Rental and leasing services, including automobile, commercial and light industrial machinery and equipment rental.

9. Gas stations and other fuel suppliers.

10. Automated and self-service car washes.

11. Laundromats and drycleaners.

12. Lawn care services, snow clearing and landscaping services.

13. Security services for residences, businesses and other properties.

14. Domestic services that support children, seniors or vulnerable persons, including housekeeping, cooking, indoor and outdoor cleaning and maintenance services.

15. Vehicle and equipment repair and essential maintenance and vehicle and equipment rental services.

16. Courier, postal, shipping, moving and delivery services.

17. Funeral and related services.

18. Staffing services including providing temporary help.

19. (1) Veterinary services and other businesses that provide for the health and welfare of animals, including farms, boarding kennels, stables, animal shelters, and research facilities.

(2) For greater certainty, nothing in this Order precludes a person responsible for a boarding kennel or stable from allowing an animal's owner or their representative to visit the animal, assist in the care or feeding of the animal or, as applicable, ride the animal.

20. Businesses that provide pet services, including pet grooming services, pet sitting services, pet walking services and pet training services, including services for the training and provision of service animals.

21. (1) Child care providers, subject to subsections (2) and (3).

(2) A child care centre may open if it meets the following conditions:

1. The centre shall not operate a before or after school program on any school day for a child unless the child's school is permitted under this Order to provide in-person teaching or instruction to the child on that day.
2. The centre shall not provide child care on school days during typical school hours for a child whose school is not permitted under this Order to provide in-person teaching or instruction to the child on that day and who, immediately before April 12, 2021,

i. was enrolled in school, and

ii. was not registered to attend the centre on those days and during those hours.

3. If the Minister of Education designates a child care centre as an emergency child care centre that provides care for children of individuals listed in Schedule 10, paragraph 2 does not apply with respect to the provision of child care by the centre to the children of those individuals.

(3) A provider of authorized recreational and skill building programs shall not provide such a program to a child on a school day unless the child is enrolled in a school that is permitted under this Order to provide in-person teaching or instruction on that day.

(4) In this section,

"authorized recreational and skill building programs", "child care", "child care centre" and "child care provider" have the same meaning as in the *Child Care and Early Years Act, 2014*; ("programme autorisé de loisirs et de développement des compétences", "garde d'enfants", "centre de garde", "fournisseur de services de garde")

"school day" has the same meaning as in the *Education Act*. ("jour d'école")

21.1 Businesses providing short term rental accommodation that meet the following condition:

1. Any indoor pools, communal steam rooms, saunas or indoor whirlpools, indoor fitness centres, or other indoor recreational facilities that are part of the operation of these businesses, are closed.

22. Hotels, motels, lodges, cabins, cottages, resorts and other shared rental accommodation, including student residences, that meet the following condition:

1. Any indoor pools, communal steam rooms, saunas or indoor whirlpools, indoor fitness centres, or other indoor recreational facilities that are part of the operation of these businesses, are closed.

22.1 (1) Establishments that operate for the purposes of providing access to sensory deprivation pods that are being used for a therapeutic purpose prescribed by, or administered by, a regulated health professional and that comply with the following conditions:

1. Persons who provide services in the business must wear appropriate personal protective equipment.
2. No member of the public may be permitted to enter the premises except by appointment.
3. No member of the public may be permitted to be in the premises except for the period of time during which they are receiving sensory deprivation pod services.
4. The total number of patrons permitted indoors in the establishment must be limited to the number that can maintain a physical distance of at least two metres from every other person in the establishment, and in any event cannot exceed the lesser of,

i. five patrons, and

ii. 25 per cent capacity as determined in accordance with subsection 3 (3) of Schedule 6.

(2) Paragraph 3 of subsection (1) does not apply to a single caregiver accompanying an individual receiving the sensory deprivation pod service or to a single child of such individual.

23. Campgrounds that meet the following condition:

1. Any restaurant, indoor pool, communal steam room, sauna or indoor whirlpool, meeting room, indoor fitness centre or other indoor recreational facility on the premises must be closed to the public, except for any portion of those areas that,

i. is used to provide first aid services,

ii. is used to provide take-out or delivery service or outdoor dining in accordance with section 3,

iii. contains a washroom, or

iv. provides access to an area described in subparagraph i, ii or iii.

24. (1) Day camps for children that are operated in a manner consistent with the safety guidelines for COVID-19 for day camps produced by the Office of the Chief Medical Officer of Health.

(2) REVOKED: 345/21, s. 1 (1).

24.1 REVOKED: O. Reg. 440/21, s. 11 (17).

25. (1) Community centres and multi-purpose facilities that open to provide space for any, some or all of the following and that meet the requirements set out in subsection (2):

1. A day camp for children described in section 24.
2. A provider of child care within the meaning of the *Child Care and Early Years Act, 2014*.
3. Mental health support services or addictions support services, so long as no more than ten people are permitted to occupy the space.
4. The provision of social services.

(2) The person responsible for a community centre or multi-purpose facility that is open shall,

(a) record the name and contact information of every member of the public who attends the community centre or multi-purpose facility;

(b) maintain the records for a period of at least one month; and

(c) only disclose the records to a medical officer of health or an inspector under the *Health Protection and Promotion Act* on request for a purpose specified in section 2 of that Act or as otherwise required by law.

26. Cheque cashing services.

Financial services

27. Businesses that provide the following financial services:

1. Capital markets and related securities trading and advisory services.
2. Banking/credit union activities including credit intermediation.
3. Insurance.
4. Land registration services.
5. Pension and benefits payment services.
6. Financial services including payroll and payment processing and accounting and tax services.

28. (1) Real estate agent services that do not host, provide or support any open house events.

(2) Nothing in subsection (1) prevents a real estate agency from showing a property by appointment.

Telecommunications and IT infrastructure/service providers

29. Information Technology (IT) services, including online services, software products and the facilities necessary for their operation and delivery.

30. (1) Telecommunications providers and services (phone, internet, radio, cell phones etc.) and facilities necessary for their operation and delivery.

(2) For greater certainty, retail stores operated by telecommunications providers are required to comply with the rules set out in section 2.

31. Newspapers, radio and television broadcasting.

Maintenance

32. Maintenance, repair and property management services that manage and maintain the safety, security, sanitation and operation of institutional, commercial, industrial and residential properties and buildings.

Transportation services

33. Businesses and facilities that provide transportation services, including,

(a) transportation services provided by air, water, road and rail, including taxis and other private transportation providers; and

(b) support services for transportation services, including,

(i) logistical support, distribution services, warehousing and storage, truck stops and tow operators, and

(ii) services that support the operations and safety of transportation systems including maintenance and repairs.

34. (1) Marinas, boating clubs and other organizations that maintain docking facilities for members or patrons that meet the following condition:

1. Any clubhouse, restaurant, indoor pool, communal steam room, sauna or indoor whirlpool, meeting room, indoor fitness centre or other indoor recreational facility on the premises must be closed to the public, except for any portion of those areas that,

i. is used to provide first aid services,

ii. is used to provide take-out or delivery service or outdoor dining in accordance with section 3,

iii. contains a washroom, or

iv. provides access to an area described in subparagraph i, ii or iii.

(2) For greater certainty, nothing in this Order precludes a person responsible for a marina, boating club or other organization that maintains docking facilities for members or patrons from operating a grocery or convenience store on the premises or from providing fuel supply, watercraft repair and servicing, watercraft docking and watercraft launching services.

35. Businesses that provide and support online retail, including by providing warehousing, storage and distribution of goods that are ordered online.

Manufacturing

36. Businesses that extract, manufacture, process and distribute goods, products, equipment and materials, including businesses that manufacture inputs to other manufacturers (e.g. primary metal/steel, blow molding, component manufacturers, chemicals, etc. that feed the end-product manufacturer), regardless of whether those other manufacturers are inside or outside of Ontario, together with businesses that support and facilitate the movement of goods within integrated North American and global supply chains.

Agriculture and food production

37. Businesses that produce food and beverages, and agricultural products including plants, including by farming, harvesting, aquaculture, hunting and fishing.

38. Businesses that process, manufacture or distribute food, beverages, crops, agricultural products, animal products and by-products.

39. Businesses that support the food or agricultural products supply chains and the health and safety of food, animals and plants.

Construction

40. Construction activities or projects and related services that support construction activities or projects, including demolition services.

41. Land surveyors.

Resources and energy

42. Businesses that provide and ensure the domestic and global continuity of supply of resources, including, resource exploration, mining, forestry, aggregates, petroleum, petroleum by-products and chemicals.

43. Electricity generation, transmission, distribution and storage and natural gas distribution, transmission and storage.

Community services

44. Businesses that deliver or support the delivery of community services including,

(a) sewage treatment and disposal;

(b) collecting, transporting, storing, processing, disposing or recycling of any type of waste;

(c) potable drinking water;

(d) critical infrastructure repair and maintenance including roads, dams, bridges, etc.;

(e) environmental rehabilitation, management and monitoring, and spill clean-up and response;

(f) administrative authorities that regulate and inspect businesses;

(g) professional and social services that support the legal and justice system;

(h) government services including but not limited to policing and law enforcement, fire and emergency services, paramedics, coroner and pathology services, corrections and court services, licences and permits; and

(i) allotment gardens or community gardens.

Facilities for indoor or outdoor sports and recreational fitness activities

45. (1) Facilities for indoor or outdoor sports and recreational fitness activities that meet the conditions set out in subsection (2), (3), (4) or (7), as applicable.

(2) A facility for indoor or outdoor sports and recreational fitness activities may open if it meets the following conditions:

1. The facility is,

i. operated by, or for the sole use of, persons who are athletes, coaches or officials training or competing to be a part of Team Canada at the next summer or winter Olympic Games or Paralympic Games, if the persons are,

A. identified by a national sport organization that is either funded by Sport Canada or recognized by the Canadian Olympic Committee or the Canadian Paralympic Committee, and

B. permitted to train, compete, coach or officiate under the safety protocols put in place by a national sport organization mentioned in sub-subparagraph A, or

ii. REVOKED: O. Reg. 489/21, s. 2 (1).

2. REVOKED: O. Reg. 489/21, s. 2 (2).

If the facility is operated by a sports team, the team's league must have established a health and safety protocol for the use of training facilities, and the facility must be operated in compliance with the health and safety protocol.

3. The only persons permitted to enter and use the facility must be,

i. players, athletes, coaches or officials who are using the facility for the purposes of training or conditioning, and

ii. such staff as are strictly necessary to operate the facility and support the training or conditioning of the players.

(3) A facility for indoor or outdoor sports and recreational fitness activities may open if it meets the following conditions:

1. The facility must open solely for the purpose of providing space for any, some or all of the following:

i. A day camp for children described in section 24.

ii. A provider of child care within the meaning of the *Child Care and Early Years Act, 2014*.

iii. Mental health support services or addictions support services, so long as no more than ten people are permitted to occupy the space.

iv. The provision of social services.

2. The person responsible for the facility must,

i. record the name and contact information of every member of the public who attends the space described in paragraph 1,

ii. maintain the records for a period of at least one month, and

iii. only disclose the records to a medical officer of health or an inspector under the *Health Protection and Promotion Act* on request for a purpose specified in section 2 of that Act or as otherwise required by law.

(4) A facility for indoor or outdoor sports and recreational fitness activities may, but is not required to, open if it meets the following conditions:

1. The facility must be open solely for the purpose of allowing use of the facility by,

i. persons with a disability, within the meaning of the *Accessibility for Ontarians with Disabilities Act, 2005*, who,

A. have received a written instruction for physical therapy from a regulated health professional who is qualified to provide the instruction, and

B. are not able to engage in the physical therapy elsewhere,

ii. such staff as are strictly necessary to operate the facility and support the provision of the physical therapy, and

iii. such support persons or service animals as may be necessary for the person with a disability.

2. The facility must have established a health and safety protocol for the use of the facility that is consistent with sections 2, 3, 4, 5, 6 and 11 of Schedule 6, and the facility must be operated in compliance with the health and safety protocol.
3. The person responsible for the facility must,

i. record the name and contact information of every person described in paragraph 1 who enters and uses the facility,

ii. maintain the records for a period of at least one month, and

iii. only disclose the records to a medical officer of health or an inspector under the *Health Protection and Promotion Act* on request for a purpose specified in section 2 of that Act or as otherwise required by law.

(5) Despite paragraph 1 of subsection (3) and paragraph 1 of subsection (4), a facility may be open for both purposes described subsections (3) and (4) if the facility meets the conditions in both subsections.

(6) For greater certainty, no indoor or outdoor sports or recreational classes are permitted at any indoor or outdoor sport and recreational facilities, except as permitted under subsection (7).

(7) A facility for outdoor sports and recreational fitness activities, including a facility for indoor sports and recreational fitness activities that has such outdoor facilities, may be open if it complies with the following conditions:

1. The only activities permitted on the premises are outdoor fitness classes, personal training and training for team and individual sports.
2. No patrons are permitted to be in the indoor areas of the facility, except as may be necessary,

i. to access a washroom,

ii. to access an outdoor area that can only be accessed through an indoor route, or

iii. as may be necessary for the purposes of health and safety.

3. No more than 10 patrons may participate,

i. in an outdoor fitness class at any one time, or

ii. as a group in personal training or in training for team or individual sports.

4. No spectators are permitted to be at the facility. However, a person under the age of 18 years who is engaged in activities in the facility may be accompanied by one parent or guardian.
5. Any person who enters or uses the facility must maintain a physical distance of at least three metres from any other person who is using the facility.
6. For greater certainty, team sports must not be practised or played at the facility, with the exception of training sessions for members of a sports team that do not include games or scrimmage games.
7. Activities that are likely to result in individuals coming within three metres of each other must not be practised or played at the facility.
8. The person responsible for the facility must,

i. record the name and contact information of every member of the public who enters the facility,

ii. maintain the records for a period of at least one month, and

iii. only disclose the records to a medical officer of health or an inspector under the *Health Protection and Promotion Act* on request for a purpose specified in section 2 of that Act or as otherwise required by law.

9. The facility must actively screen individuals in accordance with the advice, recommendations and instructions of the Office of the Chief Medical Officer of Health before they enter the facility.

(8) Despite paragraph 1 of subsection (2) , paragraph 1 of subsection (3) and paragraph 1 of subsection (4), a facility may be open for both a purpose described in subsection (2), (3) or (4) as applicable and a purpose described in subsection (7) if the facility meets the conditions in both subsections.

(9) REVOKED: O. Reg. 440/21, s. 11 (21).

Personal physical fitness, etc.

45.1 Personal physical fitness and sports trainers that meet the following conditions:

1. Any services must be provided outside.
2. Services may not be provided to more than 10 patrons at one time.

3. No spectators are permitted. However, a person under the age of 18 years who is engaged in physical fitness or sports training activities may be accompanied by one parent or guardian.
4. Any person who is engaged in physical fitness or sports training activities must maintain a physical distance of at least three metres from any other person.
5. Training sessions for members of a sports team cannot include games or scrimmage games.
6. Activities that are likely to result in individuals coming within three metres of each other must not be practised or played.
7. The personal trainer or sports trainer must,

i. record the name and contact information of every member of the public who they are providing services to,

ii. maintain the records for a period of at least one month, and

iii. only disclose the records to a medical officer of health or an inspector under the *Health Protection and Promotion Act* on request for a purpose specified in section 2 of that Act or as otherwise required by law.

8. The personal trainer or sports trainer must actively screen individuals in accordance with the advice, recommendations and instructions of the Office of the Chief Medical Officer of Health before they engage in personal physical fitness or sports training activities.

Recreation

46. (1) Subject to subsection (2), businesses whose primary purpose is to operate an outdoor recreational amenity that is permitted to open under section 4 of Schedule 8.

(2) Amusement parks and water parks must be closed.

47. Outdoor horse racing tracks, car racing tracks and other similar venues may open for training and races if they comply with the following conditions:

1. No members of the public are permitted at the venue.
2. Only persons who are essential to the training, race or operation of the venue are permitted to be on the premises of the venue.

Research

48. Businesses and organizations that maintain research facilities and engage in research, including medical research and other research and development activities.

Health care and social services

49. Organizations and providers that deliver home care services or personal support services to seniors and persons with disabilities.

50. Regulated health professionals.

50.1 Osteopathic manual practitioners.

51. Professionals or organizations that provide in-person counselling services.

52. Organizations that provide health care including retirement homes, hospitals, clinics, long-term care facilities, independent health facilities and mental health and addictions counselling supports.

53. Laboratories and specimen collection centres.

54. Manufacturers, wholesalers, distributors and retailers of pharmaceutical products and medical supplies, including medications, medical isotopes, vaccines and antivirals, medical devices and medical supplies.

55. Manufacturers, distributors and businesses that provide logistical support of or for products and/or services that support the delivery of health care in all locations.

56. Organizations that provide critical personal support services in home or residential services for individuals with physical disabilities.

57. Organizations that support the provision of food, shelter, safety or protection, and/or social services and other necessities of life to economically disadvantaged and other vulnerable individuals.

Teaching and instruction

57.1 Businesses that open to provide in-person teaching and instruction and that meet the following conditions:

1. The instructional space for the in-person teaching and instruction must be outdoors.
2. The students must maintain a physical distance of at least two metres from every other person in the instructional space, except where necessary for teaching and instruction that cannot be effectively provided if physical distancing is maintained.
3. The total number of students permitted to be in each instructional space at any one time must be limited to 10 persons.

4. If the in-person teaching or instruction involves singing or the playing of brass or wind instruments,

i. every person who is singing or playing must be separated from every other person by plexiglass or some other impermeable barrier, or

ii. every person in the instructional space must remain at least three metres apart from every other person in the instructional space.

5. Students must be actively screened in accordance with the advice, recommendations and instructions of the Office of the Chief Medical Officer of Health before they enter the business.

6. The person responsible for the business shall,

i. record the name and contact information of every student who attends the in-person teaching and instruction,

ii. maintain the records for a period of at least one month, and

iii. only disclose the records to a medical officer of health or an inspector under the *Health Protection and Promotion Act* on request for a purpose specified in section 2 of that Act or as otherwise required by law.

58. Businesses that are primarily engaged in the provision of health and safety training and that meet the following conditions:

1. The instructional space for any in-person training must be operated to enable students to maintain a physical distance of at least two metres from every other person in the instructional space, except where necessary for teaching and instruction that cannot be effectively provided if physical distancing is maintained.
2. The total number of students permitted to be in each instructional space at any one time must be limited to the number that can maintain a physical distance of at least two metres from every other person in the business or place, and in any event cannot exceed 10 persons.

Media industries

59. Sound recording, production, publishing and distribution businesses.

60. (1) Commercial film and television production, including all supporting activities such as hair, makeup and wardrobe, that meet the following conditions:

1. No studio audiences may be permitted to be on the film or television set.

1.1 No more than 50 performers may be permitted to be on the film or television set.

2. The set must be configured and operated in such a way as to enable persons on the set to maintain a physical distance of at least two metres from other persons, except where necessary for the filming of the film or television production.
3. Persons who provide hair or makeup services must wear appropriate personal protective equipment.
4. REVOKED: O. Reg. 440/21, s. 11 (28).
5. The person responsible for the film or television production must ensure that the production operates in accordance with the guidance document titled “Film and television industry health and safety during COVID-19” issued by the Film and Television Health and Safety Advisory Committee of the Ministry of Labour, Training and Skills Development, as amended from time to time.

(2) For greater certainty, for the purposes of this section, the film or television set may be located in any business or place, including any business or place that is otherwise required to be closed under this Order.

61. Film and television post-production, visual effects and animation studios.

62. Book and periodical production, publishing and distribution businesses.

63. Commercial and industrial photography.

63.1 Photography studios and services that meet the following conditions:

1. Photography may only be provided by appointment.
2. Any in-person services provided to patrons, including the taking of photographs, must be provided outdoors.
3. Patrons must be actively screened in accordance with the advice, recommendations and instructions of the Office of the Chief Medical Officer of Health before photography is provided.

64. Interactive digital media businesses, including,

(a) computer system software or application developers and publishers; and

(b) video game developers and publishers.

Entertainment

65. (1) Concert venues, theatres and cinemas that meet the conditions set out in subsection (2) or (3).

(2) Concert venues, theatres and cinemas may open for the purpose of rehearsing or performing a recorded or broadcasted concert, artistic event, theatrical performance or other performance on outdoor premises if they comply with the following conditions:

1. No spectators may be permitted anywhere on the premises.
2. Only persons who are essential to the rehearsal or performance are permitted anywhere on the premises.
3. No more than 10 performers may be permitted to participate in the rehearsal or performance.
4. Every performer and other person who performs work for the concert venue, theatre or cinema must maintain a physical distance of at least three metres from every other person.
5. No performer or other person who performs work for the concert venue, theatre or cinema may be permitted in an indoor area of the concert venue, theatre or cinema, except,

i. where necessary to use a washroom,

ii. where necessary to access an outdoor area that can only be accessed through an indoor route, or

iii. as may otherwise be required for the purposes of health and safety.

6. The person responsible for the concert venue, theatre or cinema must,

i. record the name and contact information of every performer or other person who is present at the rehearsal or performance,

ii. maintain the records for a period of at least one month, and

iii. only disclose the records to a medical officer of health or an inspector under the *Health Protection and Promotion Act* on request for a purpose specified in section 2 of that Act or as otherwise required by law.

7. The person responsible for the concert venue, theatre or cinema must ensure that individuals are actively screened in accordance with the advice, recommendations and instructions of the Office of the Chief Medical Officer of Health before they enter the premises.

(3) Concert venues, theatres and cinemas may open if they comply with the following conditions:

1. The movie, concert, artistic event, theatrical performance or other performance must be provided in a drive-in or drive-through format.
2. Each person in attendance at the drive-in cinema or the drive-in or drive-through concert, event or performance, other than persons who perform work for the drive-in cinema or the drive-in or drive-through concert, event or performance, must remain within a motor vehicle designed to be closed to the elements except,

i. where necessary to purchase admission,

ii. where necessary to use a washroom, or

iii. as may otherwise be required for the purposes of health and safety.

3. Every motor vehicle at the drive-in cinema or the drive-in or drive-through concert, event or performance may only contain members of a single household plus a maximum of one additional person from outside that household who lives alone.
4. The driver of a motor vehicle at the drive-in cinema or the drive-in or drive-through concert, event or performance must ensure that it is positioned at least two metres away from other motor vehicles.

66. Businesses that provide outdoor tour and guide services, including guided fishing and hunting trips, tastings and tours for wineries, breweries and distilleries, trail riding tours, walking tours and bicycle tours, but not motor vehicle tours or boat tours other than boat tours for guided fishing trips, may open if they comply with the following conditions:

1. The tour must be operated to enable every person on the tour, including tour guides, to maintain a physical distance of at least two metres from every other person, except where necessary,

i. to facilitate payment, or

ii. for the purposes of health and safety.

2. Every person on the tour must wear a mask or face covering in a manner that covers their mouth, nose and chin during any period in which they come within two metres of another person, unless they are entitled to any of the exceptions set out in subsection 2 (5) of Schedule 6.
3. The number of members of the public on the tour must not exceed the number of persons that would permit compliance with paragraph 1 while on the tour, and in any event cannot exceed 10 persons.

4. Every member of the public who intends to participate in the tour must be actively screened in accordance with the advice, recommendations and instructions of the Office of the Chief Medical Officer of Health before they participate in the tour.
5. The persons on the tour must remain outdoors at all times, except where necessary to use a washroom or as may otherwise be required for the purposes of health and safety.
6. The tour or guide service must,

i. record the name and contact information of every patron that participates in the tour,

ii. maintain the records for a period of at least one month, and

iii. only disclose the records to a medical officer of health or an inspector under the *Health Protection and Promotion Act* on request for a purpose specified in section 2 of that Act or as otherwise required by law.

O. Reg. 96/21, s. 10; O. Reg. 103/21, s. 2; O. Reg. 126/21, s. 4; O. Reg. 144/21, s. 4; O. Reg. 162/21, s. 4; O. Reg. 216/21, s. 3; O. Reg. 221/21, s. 5; O. Reg. 239/21, s. 4; O. Reg. 345/21, s. 1; O. Reg. 440/21, s. 11; O. Reg. 481/21, s. 1; O. Reg. 489/21, s. 2.

SCHEDULE 8
PLACES THAT MUST CLOSE OR THAT ARE SUBJECT TO CONDITIONS AT STEP 1

Public libraries

1. (1) Public libraries may only open if they comply with the following conditions:

1. Circulating materials must be reserved over the telephone or online.
2. Circulating materials may only be exchanged with members of the public through contactless drop-off, pick-up or delivery.
3. Patrons must only be permitted to enter the premises to facilitate contactless drop-off and pick-up or to access computers, photocopiers or similar services.
4. Patrons must not be permitted to be in the book stacks, or to handle circulating materials that are shelved, or in other areas of library storage.
5. REVOKED: O. Reg. 440/21, s. 12 (2).
6. The person responsible for the public library must comply with subsection (3), if applicable.

(2) The conditions set out in paragraphs 3 and 4 of subsection (1) do not apply with respect to any space the library provides for,

(a) a day camp for children described in section 24 of Schedule 7;

(b) a provider of child care within the meaning of the *Child Care and Early Years Act, 2014*;

(c) mental health support services or addictions support services, so long as no more than ten people are permitted to occupy the space; or

(d) the provision of social services.

(3) The person responsible for a public library shall,

(a) record the name and contact information of every member of the public who attends the space described in subsection (2);

(b) maintain the records for a period of at least one month; and

(c) only disclose the records to a medical officer of health or an inspector under the *Health Protection and Promotion Act* on request for a purpose specified in section 2 of that Act or as otherwise required by law.

Post-secondary institutions

2. (1) Post-secondary institutions may only open if they meet the following conditions:

1. In-person teaching or instruction may only be provided if the following conditions are met:

i. The subject matter of the teaching or instruction requires that it be taught in-person, such as clinical training or training related to a trade.

ii. The instructional space must be operated to enable students to maintain a physical distance of at least two metres from every other person in the instructional space, except where necessary for teaching and instruction that cannot be effectively provided if physical distancing is maintained.

iii. The total number of students permitted to be in each instructional space at the institution at any one time must be limited to the number that can maintain a physical distance of at least two metres from every other person in the business or place, and in any event cannot exceed,

A. 50 persons, in the case of an instructional program described in subsection (2), and

B. 10 persons, in any other case.

2. If in-person teaching or instruction at the institution involves singing or the playing of brass or wind instruments,

i. every person who is singing or playing must be separated from every other person by plexiglass or some other impermeable barrier, or

ii. every person in the instructional space must remain at least three metres apart from every other person in the instructional space.

3. Any in-person examinations must be provided in accordance with the following rules:

i. Every person in the examination room must remain at least two metres apart from every other person in the examination room.

ii. The total number of persons who may take the examination in the same room at the same time cannot exceed,

A. 50 persons, in the case of an examination for an instructional program described in subsection (2), and

B. 10 persons, in any other case.

(2) An instructional program referred to in sub-subparagraphs 1 iii A and 3 ii A of subsection (1) is an instructional program in any of the following fields or an instructional program to train an individual for any of the following occupations, as the case may be:

0.1 Dental hygiene.

0.2 Dentistry.

1. Diagnostic cardiac sonography.

2. Diagnostic medical sonography.

3. Diagnostic ultrasound.

4. Medical imaging.

5. Medical laboratory assistant.

6. Medical laboratory technician.

6.1 Medical laboratory technologist.

7. Medical radiation technology.

8. Medicine.

9. Mental health and addictions services, including psychology services, social work services and counselling services.

9.1 Midwifery.

10. Nursing.

10.1 Optometry.

11. Paramedic.

12. Personal support worker, supportive care worker, home care worker or a similar occupation.

13. Pharmacy/pharmacy technician.

13.1 Physician assistant.

14. Public health inspector, if the program is accredited by the Canadian Institute of Public Health Inspectors.

15. Rehabilitation sciences (nutrition, speech language pathology, occupational science, and physiotherapy).

16. Respiratory therapy.

17. Veterinary medicine.

(3) In this section,

"post-secondary institution" means,

(a) a university,

(b) a college of applied arts and technology,

(c) a private career college,

(d) an Indigenous Institute prescribed for the purposes of section 6 of the *Indigenous Institutes Act, 2017*,

(e) an institution that is authorized to grant a degree by an act of the Legislature,

(f) a person who is delivering in-person teaching or instruction in accordance with a consent given under section 4 of the *Post-secondary Education Choice and Excellence Act, 2000*,

(g) a person approved to provide training for apprenticeship programs under paragraph 5 of section 64 of the *Ontario College of Trades and Apprenticeship Act, 2009*, or

(h) any other institution that is a designated learning institution within the meaning of section 211.1 of the *Immigration and Refugee Protection Regulations* (Canada), other than a school or private school within the meaning of the *Education Act*.

Schools and private schools

3. (1) Schools and private schools within the meaning of the *Education Act* shall not provide in-person teaching or instruction.

(2) Despite subsection (1), schools and private schools within the meaning of the *Education Act* may open,

(a) to the extent necessary to facilitate the operation of a child care centre within the meaning of the *Child Care and Early Years Act, 2014*;

(b) if approved by the Minister of Education, to the extent necessary to facilitate the operation of an extended day program, as defined in the *Education Act*, for the provision of emergency child care for the children of individuals listed in Schedule 10 during the period when schools are not permitted to provide in-person teaching or instruction;

(c) to allow staff of the school or private school to provide remote teaching, instruction or support to pupils, so long as the school or private school operates in accordance with a return to school direction issued by the Ministry of Education and approved by the Office of the Chief Medical Officer of Health;

(d) to the extent necessary to provide in-person instruction to pupils with special education needs who cannot be accommodated through remote learning and who wish to attend a school or their private school for in-person instruction, so long as the school or private school operates in accordance with a return to school direction issued by the Ministry of Education and approved by the Office of the Chief Medical Officer of Health; or

(e) to facilitate the operation of a day camp for children described in section 24 of Schedule 7.

(3) Subsections (1) and (2) do not apply to schools that meet the condition set out in subsection (4) and that are operated by,

(a) a band, a council of a band or the Crown in right of Canada;

(b) an education authority that is authorized by a band, a council of a band or the Crown in right of Canada; or

(c) an entity that participates in the Anishinabek Education System.

(4) A school described in subsection (3) may open if it meets the following condition:

1. If a person who holds a study permit issued under the *Immigration and Refugee Protection Act* (Canada) and who entered Canada on or after November 17, 2020 attends the school, in-person teaching or instruction may only be provided to that person if the school or private school,

i. has a plan respecting COVID-19 that has been approved by the Minister of Education, and

ii. operates in accordance with the approved plan.

(5) A school or private school may allow persons, other than persons allowed to be at the school or private school under subsection (2), to enter the school or private school temporarily, as necessary,

(a) to prepare for an end-of-school-year celebration ceremony described in subsection 1 (5) of Schedule 9, if the person is a staff member or student at the school or private school and is required to be indoors for such preparation;

(b) to use a washroom or as may otherwise be required for the purposes of health and safety while attending the end-of-school-year celebration; or

(c) to return goods or supplies or retrieve personal belongings.

Recreational amenities

4. (1) Each person responsible for an indoor or outdoor recreational amenity that is not in compliance with this section, and that is not a facility for indoor or outdoor sports and recreational fitness activities that is permitted to open under section 45 of Schedule 7, must ensure that it is closed.

(2) The following outdoor recreational amenities may open if they are in compliance with subsection (3):

1. Parks and recreational areas.
2. Baseball diamonds.
3. Batting cages.
4. Soccer, football and sports fields.
5. Tennis, platform tennis, table tennis and pickleball courts.
6. Basketball courts.
7. BMX parks.
8. Skate parks.
9. Golf courses and driving ranges.
10. Frisbee golf locations.
11. Cycling tracks.
12. Trails.
13. Horse riding facilities.
14. Shooting ranges, including those operated by rod and gun clubs.
15. Playgrounds.
16. Portions of parks or recreational areas containing outdoor fitness equipment.

17. Archery ranges.
18. Boat and watercraft launches.
19. Lawn game courts, including lawn bowling, bocce and croquet courts.
20. Horseshoe pits.
21. Outdoor pools, splash pads, spray pads, whirlpools, wading pools and water slides.

(3) An outdoor recreational amenity described in subsection (2) may only open if the following conditions are met:

1. Subject to paragraph 2, any person who enters or uses the amenity must maintain a physical distance of at least two metres from any other person who is using the amenity.
2. Any person who engages in physical exercise in the amenity, including by engaging in a training session, sport or game, must maintain a physical distance of at least three metres from any other person who is using the amenity.
3. Team sports must not be practised or played within the amenity, with the exception of training sessions for members of a sports team that do not include games or scrimmage games.
4. Other sports or games that are likely to result in individuals coming within three metres of each other must not be played within the amenity.
5. Clubhouses on the premises must be closed, except to the extent that they,

i. are used in conjunction with an outdoor pool, splash pad, spray pad, whirlpool, wading pool or water slide, or

ii. provide access to equipment storage, a washroom or a portion of the amenity that is used to provide first aid.

(4) Paragraphs 1 and 2 of subsection (3) do not apply in respect of the following persons who enter or use an outdoor recreational amenity:

1. Parasport participants and their attendants or guides.
2. Members of a single household.

(5) Paragraphs 1 to 4 of subsection (3) do not apply with respect to an amenity, or a particular area of an amenity, during periods when the amenity or the particular area is exclusively being used by persons who are athletes, coaches and officials training or competing to be a part of Team Canada at the next summer or winter Olympic Games or Paralympic Games if the persons are,

(a) identified by a national sport organization that is either funded by Sport Canada or recognized by the Canadian Olympic Committee or the Canadian Paralympic Committee; and

(b) permitted to train, compete, coach or officiate under the safety protocols put in place by a national sport organization mentioned in clause (a).

(6) Each person responsible for a boat or watercraft shall ensure that if a group of persons uses that boat or watercraft together for recreational purposes, the members of the group are all members of the same household or one other person from outside that household who lives alone or a caregiver for any member of the household.

Museums, etc.

5. (1) Subject to subsections (2) and (3), museums, galleries, aquariums, zoos, science centres, landmarks, historic sites, botanical gardens and similar attractions must be closed to members of the public.

(2) An attraction described in subsection (1) may open to provide drive-in or drive-through access to the public if it complies with the conditions set out in section 65 of Schedule 7, subject to any necessary modifications.

(3) An outdoor attraction described in subsection (1) may open if it complies with the following conditions:

1. The number of members of the public in the attraction must be limited so that the total number of members of the public in the outdoor ticketed area of the attraction at any one time does not exceed 15 per cent capacity, determined by taking the total square metres of outdoor ticketed area accessible to the public in the attraction, dividing that number by 26.67 and rounding the result down to the nearest whole number.
2. The person responsible for the attraction must post a sign in a conspicuous location visible to the public that states the maximum capacity they are permitted to operate under.
3. No member of the public may enter a ticketed area of the attraction unless they have made a reservation to do so.
4. No member of the public may be permitted access to interactive exhibits or exhibits that would create a high risk of personal contact.
5. No member of the public may be permitted to enter any indoor area of the premises, except,

i. to access a washroom,

ii. to access an outdoor area that can only be accessed through an indoor route, or

iii. as may be necessary for the purposes of health and safety.

6. No amusement rides or tour vehicles may be operated by the attraction.

O. Reg. 96/21, s. 10; O. Reg. 348/21, s. 2; O. Reg. 440/21, s. 12.

SCHEDULE 9
ORGANIZED PUBLIC EVENTS, CERTAIN GATHERINGS AT STEP 1

Gatherings

1. (1) Subject to sections 2 to 4, no person shall attend,

(a) an organized public event that is held indoors;

(b) a social gathering that is held indoors, including a social gathering associated with a gathering described in clause (d);

(c) an organized public event or social gathering of more than 10 people that is held outdoors, including a social gathering associated with a wedding, funeral or a religious service, rite or ceremony, but not including the wedding, funeral or a religious service, rite or ceremony itself;

(d) an indoor gathering for the purposes of a wedding, a funeral or a religious service, rite or ceremony where the number of persons occupying any particular room in a building or structure while attending the gathering exceeds 15 per cent of the capacity of the room; or

(e) an outdoor gathering for the purposes of a wedding, a funeral or a religious service, rite or ceremony where the number of persons attending the gathering exceeds the number that can maintain a physical distance of at least two metres from every other person in the space where the gathering is held.

(2) A person attending an organized public event, social gathering or a gathering for the purposes of a wedding, a funeral or a religious service, rite or ceremony shall comply with public health guidance on physical distancing.

(3) For greater certainty, subsections (1) and (2) apply with respect to an organized public event, social gathering or a gathering for the purposes of a wedding, a funeral or a religious service, rite or ceremony, even if it is held at a private dwelling.

(4) For greater certainty, the limits in clauses (1) (b) and (c) apply to a social gathering associated with a wedding, a funeral or a religious service, rite or ceremony, such as a wedding reception, while the limits that apply to the wedding, funeral or religious service, rite or ceremony itself are set out in clauses (1) (d) and (e).

(5) Clause (1) (c) does not apply with respect to an outdoor end-of-school-year celebration ceremony held by a school or private school within the meaning of

the *Education Act* that is in compliance with a direction issued by the Ministry of Education and approved by the Office of the Chief Medical Officer of Health.

(6) All persons participating in an end-of-school-year celebration ceremony described in subsection (5) must remain outdoors at all times, except as permitted under subsection 3 (5) of Schedule 8.

(7) Clauses 1 (a) and (c) do not apply with respect to day camps for children that are in compliance with section 24 of Schedule 7.

Exception, single household, etc.

2. Section 1 does not apply with respect to,

(a) a gathering of members of a single household;

(b) a gathering that includes members of a household and one other person from another household who lives alone; or

(c) a gathering that includes persons described in clause (a) or (b), and a caregiver for any of those persons.

Exception, retirement homes

2.1 Section 1 does not apply with respect to a gathering in a retirement home within the meaning of the *Retirement Homes Act, 2010* if it is in compliance with the policies or guidance, if any, issued by the Retirement Homes Regulatory Authority.

Exception, attendance at business

3. The prohibitions on attendance at an organized public event in subsection 1 (1) do not apply with respect to attendance at a business for a purpose related to providing or receiving the goods or services provided by the business if the business is not required to close under this Order.

Gathering in motor vehicles for religious service, rite or ceremony

4. (1) This section applies with respect to gatherings for the purposes of a wedding, funeral, religious service, rite or ceremony if the persons attending the gathering, other than those conducting the service, rite or ceremony, do so in a motor vehicle.

(2) Clause 1 (1) (e) does not apply to a person who attends a gathering to which this section applies if the person follows all of the following precautions that apply to the person:

1. Each person attending the gathering, other than the persons conducting the service, rite or ceremony, must remain within a motor vehicle that is designed to be closed to the elements, except,

i. where necessary to use a washroom, or

ii. as may otherwise be necessary for the purposes of health and safety.

2. The driver of a motor vehicle must ensure that it is positioned at least two metres away from other motor vehicles.

3. A person who ordinarily uses a non-motorized vehicle because of their religious belief and who attends the gathering must remain within their non-motorized vehicle except where necessary to use a washroom or as may otherwise be required for the purposes of health and safety, and paragraph 2 applies with necessary modifications.

O. Reg. 96/21, s. 10; O. Reg. 189/21, s. 1; O. Reg. 221/21, s. 6; O. Reg. 440/21, s. 13; O. Reg. 482/21, s. 2.

This is **Exhibit "BB"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

Public Health Ontario | Santé publique Ontario

SYNTHESIS

12/01/2020

COVID-19 Routes of Transmission – What We Know So Far

Introduction

Public Health Ontario (PHO) is actively monitoring, reviewing and assessing relevant information related to Coronavirus Disease 2019 (COVID-19). "What We Know So Far" documents provide a rapid review of the evidence related to a specific aspect or emerging issue related to COVID-19.

The development of these documents includes a systematic search of the published literature as well as scientific grey literature (e.g., ProMED, CIDRAP, Johns Hopkins Situation Reports) and media reports, where appropriate. Relevant results are reviewed and data extracted for synthesis. All "What We Know So Far" documents are reviewed by PHO subject matter experts before posting.

As the COVID-19 outbreak continues to evolve and the scientific evidence rapidly expands, the information provided in these documents is only current as of the date of posting.

See Appendix A for Glossary of Terms for COVID-19 Routes of Transmission.

Updates in Latest Version

Since the last version (July 16, 2020), multiple new studies and systematic reviews have been published with evidence on the potential for transmission via several routes including respiratory droplet and close-contact, vertical, conjunctival and fomite transmission. There was more evidence against several modes of transmission, including sexual and transmission through breast milk.

Importantly, there are now experimental studies and outbreak case studies that support severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) transmission through small particle respiratory droplets or aerosols during prolonged exposure in a poorly ventilated space. The primary mode of SARS-CoV-2 transmission; however, remains through respiratory droplets and unprotected close contact.

New modes of transmission addressed in this update include potential transmission from wastewater, food, urine and zoonotic transmission (through animals).

Key Points

- Overall, the evidence for various transmission routes relies heavily on the detection of viral RNA in clinical and environmental samples, rather than the detection of viable, infectious virus. Further, the quantity of viral RNA that is representative of an infectious dose is unclear.

- Transmission of SARS-CoV-2 occurs predominantly through close (<2 m), unprotected contact with an infected individual(s). Based on the epidemiology of COVID-19, transmission predominantly occurs via respiratory droplets from symptomatic, presymptomatic or less commonly, asymptomatic individuals.
- Transmission over longer distances (>2 m) is less common, but possible under certain conditions such as prolonged exposure in a poorly ventilated space. Under these conditions, inhalation of small particle respiratory droplets and aerosols can occur. SARS-CoV-2 is likely an *opportunistic* airborne pathogen, as non-airborne transmission is most common, but aerosols may result in transmission under favourable conditions.
- Relatively uncommon routes of transmission of SARS-CoV-2 include conjunctival, vertical (intrauterine), fecal-oral, fomite and zoonotic. While these routes of transmission are possible, their contribution to the epidemiology of COVID-19 is unclear.
- Routes of transmission that are theoretically possible due to the detection of viral RNA, but that are very unlikely, are sexual transmission (via semen and vaginal secretions); bloodborne transmission (blood products, organ transplant); transmission through breast milk; transmission through urine; food-borne transmission; and transmission through contaminated wastewater.

Background

The purpose of this document is to outline the evidence for various SARS-CoV-2 transmission routes, based on a review of the scientific literature. SARS-CoV-2 is genetically similar to other coronaviruses and shares a high degree of genetic similarity (79%) with the coronavirus (SARS-CoV-1) responsible for Severe Acute Respiratory Syndrome (SARS).[1] Therefore, in instances of limited evidence for COVID-19, we have extrapolated existing data from other coronaviruses, in particular SARS-CoV-1.

During the COVID-19 pandemic, evidence for and against potential routes of transmission has evolved. In some instances, there is no consensus on the contribution from certain modes of transmission. A number of reports postulate transmission routes; however, in many it is challenging to determine the precise mode of transmission where there are multiple opportunities for transmission to occur (i.e. through direct contact, fomites, or inhalation). In addition, the strength of evidence by transmission route has changed. In contrast to the July 16, 2020 version of this document, there have been several systematic reviews published on the subject that are included. The systematic reviews contribute to bringing the evidence base closer to a consensus. Within this document, we underpin our findings with systematic reviews and meta-analyses where available, supporting findings with case series and cohort studies.

Methods

In considering feasibility, scope and the need for responsiveness, a rapid review was chosen as an appropriate approach to determining the routes of transmission for SARS-CoV-2. A rapid review is a type of knowledge synthesis wherein certain steps of the systematic review process are compromised in order to be timely.[2]

PHO is actively monitoring, reviewing and assessing relevant information related to COVID-19. This document provides a rapid review of the evidence related to transmission routes of SARS-CoV-2.

On October 14, 2020, PHO Library Services developed and conducted a search in MEDLINE (Appendix B). English language peer-reviewed and grey literature records that describe transmission of SARS-CoV-2

were included. We did not restrict year of publication. We reviewed references of included studies for additional articles.

Two reviewers screened titles and abstracts, and the senior author reviewed the application of the eligibility criteria. The senior author synthesized relevant data. We did not perform a critical appraisal of the methodological quality of studies due to time constraints. PHO subject matter experts reviewed this rapid review before posting.

Results

Droplet and Contact Transmission

Current evidence suggests that the primary mode of transmission of COVID-19 is through direct contact from respiratory droplets that have the potential to be propelled for varying distances.[3-5]

Household secondary attack rates are indicative of predominantly droplet and close-contact transmission:

In household settings, people are in close proximity to one another, thereby increasing the risk of infection. The consensus among systematic reviews is that most infections are occurring in household settings where physical distancing is not feasible and household secondary attack rates are higher than in casual-contact settings (e.g., shopping).

In a systematic review and meta-analysis, Lei et al. reported the secondary attack rate in households was 27% (95% confidence interval [CI]: 21−32); the risk of secondary infection was 10 times higher in households compared to non-household settings (odds ration [OR]: 10.72; 95% CI: 5.70–20.17; p<0.001).[7] In another systematic review and meta-analysis by Madewell et al., the household secondary attack rate was 18.8% (95% CI: 15.4–22.2).[8] Koh et al, in a meta-analysis, reported that the household secondary attack rate was 18.1% (95% CI: 15.7–20.6), much higher than the secondary attack rate in health care settings (0.7%; 95% CI: 0.4–1.0).[9] Further, these findings do not support predominant airborne transmission. If SARS-CoV-2 was predominantly and efficiently spread through an airborne route (i.e., through aerosols), household secondary attack rates would be expected to be substantially higher (e.g., >90% in measles).[6]

Contact tracing studies also show higher secondary attack rates in households, compared to other settings. The limited transmission to contacts outside the household setting suggests that the mode of SARS-CoV-2 transmission is predominantly from close contact. Luo et al. studied 3,410 close contacts of 391 index cases in Guangzhou, China and found that the secondary attack rate was lower when people were exposed in health care settings (1.0%; OR: 0.09; 95% CI: 0.04–0.20) and on public transportation (0.1%; OR: 0.01; 95% CI: 0.00–0.08), compared to the household secondary attack rate (10.3%).[10] In a retrospective cohort study in Guangzhou, China, Jing et al. reported the household secondary attack rate (among close relatives) was 12.4% (95% CI: 9.8–15.4).[11] In most studies, non-household close contacts have secondary attack rates less than 1% (Bi et al., Chaw et al., Cheng et al., Li et al.).[12-15]

Evidence for SARS-CoV-2 droplet and contact transmission:

The majority of COVID-19 cases have been linked to person-to-person transmission through close, direct contact with symptomatic patients,[16-18] or through close contact with a pre-symptomatic patient.[19-21] In addition, high viral loads have been identified in individuals who were asymptomatic or pre-

symptomatic .[22-24] In a case-control study of patients 18 years old and older in the United States (US), Fisher et al. reported that close contact with a person with COVID-19 was reported more often among cases (42%) than controls (14%).[25] A study modelling the transmission risk from epidemiological data among train passengers revealed that travellers directly adjacent to the index patient had a much higher infection risk (relative risk [RR]: 18.0; 95% CI: 13.9–23.4), and the attack rate decreased with increasing distance.[26] Furthermore, the attack rate increased by 0.15% (p=0.005) per hour of co-travel time.

Using whole-genome sequencing of SARS-CoV-2 clinical samples during a nosocomial outbreak of COVID-19 in Dublin, Ireland, Lucey et al. reported that the majority of infections were among patients who required extensive and prolonged care by health care providers.[27] The authors concluded that the likely mode of transmission from health care workers to patients was through respiratory droplets and close contact, rather than airborne transmission.

The reproductive number (R_0) is less suggestive of airborne spread, as airborne infections tend to have a higher R_0. For example, in a systematic review by Guerra et al., the R_0 for measles in the pre-vaccine era was 6.1–27.0;[28] compared to the range of R_0 (2–3) reported for COVID-19.[29]

Evidence for distance travelled by respiratory droplets:

Researchers have demonstrated the propulsion of respiratory droplets up to 2 m, and in a study by Guo et al., respiratory droplets were found on the floor up to 4 m away from a patient.[30] A systematic review of studies assessing the horizontal distance travelled by respiratory droplets found that droplets could travel up to 8 m.[31]

Airborne Transmission

Respiratory virus transmission occurs on a spectrum from larger droplets that spread at close range to smaller droplets (or aerosols) that have the potential to be infectious over longer distances (i.e. >2 m) and may be suspended for longer periods of time (typically hours). As summarized above, current evidence supports that SARS-CoV-2 transmission is predominantly through close, unprotected contact, which supports larger droplet spread. However, under conditions of poor ventilation or with recirculation of unfiltered and untreated air, aerosols may accumulate in sufficient quantities to become infectious and transmission via inhalation is plausible based on the emerging literature.[32] Further evidence regarding the quantity of viral particles required to cause infection is needed. There is no evidence at this time of transmission over long distances through the air (such as through air ducts). The term “airborne transmission” has special meaning in public health, for infection prevention and control purposes, and in health care settings. This term is typically reserved to describe infections efficiently transmitted by small droplets and particles suspended in the air over long distances and persisting in the air for long periods (see Appendix for size designations). Airborne pathogens typically require specialized engineering controls to prevent spread (e.g. negative-pressure isolation rooms and specific personal protective equipment (PPE) such as respirators). However, the historical dichotomy of airborne vs non-airborne pathogens used in health care settings is likely imprecise. Infectious pathogens can be considered on a spectrum of efficiency for airborne transmission classified as *obligate* (infection only occurs via aerosols), *preferential* (aerosols predominate), or *opportunistic* (non-airborne transmission is most common but aerosols may transmit under favorable conditions). Current evidence supports SARS-CoV-2 as an *opportunistic* airborne pathogen.[33]

A commentary by Morawska and Milton appealed to the medical community to recognize the potential for airborne transmission, based on experimental evidence that small respiratory droplets (or aerosols)

could be inhaled.[34] Another commentary by Klompas et al. discussed how the balance of currently available evidence does not support long-range aerosol transmission as the dominant mode of COVID-19 transmission. While aerosols are reported by Stadnytskyi et al. to be produced during activities such as speaking, breathing and coughing,[35] it is not clear what role aerosols have in transmission for distances greater than 2 m, as viable SARS-CoV-2 has only once been detected during air sampling. The role of these aerosols has been suggested in a modelling study by Chen et al. to be most important for transmission in close proximity (<2 m).[36]

As discussed in the Droplet and Contact Transmission section, household secondary attack rates are more consistent with primary transmission through respiratory droplets when people are in close contact with one another, rather than airborne transmission. There is emerging evidence that *opportunistic* aerosol transmission occurs under the right combination of conditions (i.e. poorly ventilated space with sufficient quantity of infectious virus produced). However, as discussed above, this appears to be less frequent, and less efficient, when compared with direct close contact.

Environmental exposures, such as sunlight, may have significant effects on viability of SARS-CoV-2. Using a rotating drum experiment similar to other studies for viability of SARS-CoV-2, simulated sunlight (UVA/UVB) was applied to aerosolized virus through a window on the drum.[37] Results indicated 90% inactivation of virus within 20 minutes.

Experimental evidence of aerosol generation of SARS-CoV-2:

In a study comparing SARS-CoV-2 and SARS-CoV-1, van Doremalen et al. reported that SARS-CoV-2 could be artificially aerosolized with a jet nebulizer and detectable for up to 3 h in a rotating metal drum.[38] The half-lives of SARS-CoV-2 and SARS-CoV-1 were similar in aerosols with median estimates of the half-life of 1.1–1.2 h. While the van Doremalen et al. study concluded that aerosol transmission was possible, they did not demonstrate that it occurred (refer to the PHO Synopsis on this study for further details). Fears et al. drew similar conclusions through conducting a similar experiment.[39]

Lee modelled the minimum sizes of aerosols emitted from an infected individual that could be expected to contain viral particles.[40] Under certain assumptions, Lee estimated that the minimum sizes theoretically ranged from 0.4–42 μm; by using experimental data of virus in oral fluid, they estimated a range of 4.7–32 μm. Studies discussed by Lee detected virus by polymerase chain reaction (PCR) in much smaller aerosol sizes (<0.25–4 μm). The author reconciled differences in the modelled sizes and air-sampled sizes by acknowledging that aerosols evaporate to smaller sizes (which may take only seconds) and/or the possible range of virus in oral fluid can be higher than reported by the previous experiment used to inform this model. Lee also noted that the virus particles captured in those experiments may not be viable.

Studies have not consistently detected viable SARS-CoV-2 in air samples:

Multiple air sampling studies performed in proximity to confirmed COVID-19 cases were unable to detect any virus by PCR.[41-47] Santarpia et al. was unable to culture virus from air samples collected outside of patient rooms.[48] Similarly, Binder et al. reported that 3 PCR-positive air samples, collected at distances of 1–3.2 m from patients, were culture negative.[49] Cheng V et al. sampled air at a high flow rate 10 cm from the chin of symptomatic and asymptomatic patients (n=6), with no viable virus detected by culture from collected air samples.[44] One PCR-positive air sample was obtained during an endotracheal intubation within 10 cm of the patient's head in a naturally ventilated room (window open

with fan attached); eleven other air samples near patients and 17 samples outside patient rooms and at nursing stations were PCR-negative.[50]

Lednicky et al. used a prototype and commercial version of an air sampler and custom PCR probes for detection of SARS-CoV-2 in a patient room with two patients. One patient was discharged soon after sampling periods began and after receiving a negative PCR test.[51] The remaining patient began experiencing respiratory illness two days prior to admission to the room. The results of the study include PCR-positive air samples following 3 h of sampling as well attempting viral cultures. Researchers positioned samplers 2–4.8 m from the recently symptomatic patient's head. The ventilation unit provided 6 air changes/h, filtering air and treating air with UV irradiation before recycling the air. Estimates of virus per volume of air ranged from 6–74 tissue culture infective dose $(TCID)_{50}$ units/L of air. More studies quantifying viable virus, with details of the type of ventilation and patient characteristics as reported in this study, are needed to inform the gaps in understanding aerosol transmission.

Another study detected SARS-CoV-2 by PCR in 38.7% (14/31) of air samples from a London hospital in the United Kingdom (UK) during the first peak of their epidemic. However, Zhou et al. did not detect virus by culture, suggesting there may not be adequate virus present in air samples to cause transmission.[52] Another study by Guo et al. detected SARS-CoV-2 by PCR in 35% (14/40) of air samples in an intensive care unit (ICU) and 12.5% (2/16) of air samples in the general ward that manages patients with COVID-19. 15 of 16 PCR-positive air samples were from within 2 m of patients, with 1/8 samples positive at 4 m away.[30] Ben-Shmuel et al. conducted limited sampling (generally one air sample per area) in rooms with ventilated and non-ventilated patients, at a nursing station, and in private and public areas of a quarantine hotel.[53] Positive air samples were detected in a room with a ventilated patient (n=1/1), at a nursing station (n=1/1), and in a quarantine hotel room (n=1/1). However, there were no positive air samples in rooms of non-ventilated patients (n=0/3), a doffing area (n=0/1), and a public area of a quarantine hotel (n=0/1).

Kenarkoohi et al. detected SARS-CoV-2 in 1/5 samples from a ward containing intubated, severely ill patients, but did not find any positive air samples in other areas of the hospital such as wards with suspected, confirmed and mild patients.[54] In a series of distinct room types (two airborne infection isolation rooms [AIIR] with 15+ air changes per hour, an isolation room without negative pressure, and a shared cohort room) for patients admitted within 7 days of symptom onset, Kim et al. reported that 32 air samples were negative and 20 air samples from anterooms were also negative.[55]

Chia et al., in an extended study of Ong et al., detected SARS-CoV-2 RNA by PCR in air samples collected within 1 m of patients in two of three AIIRs.[56] Lei et al. reported limited detection of SARS-CoV-2 virus by air sampling in open wards, private isolation rooms and bathrooms.[57]

Further research is needed to reconcile differences in viral RNA detection and viral viability in air samples, despite positive samples found on the surfaces of ventilation units. Differences may be due to several factors, including: 1) air sampling devices were potentially not capable of maintaining viability of captured virus; 2) timing of air sampling varies by time since onset of symptoms, severity of disease, or viral load; and, 3) the conditions of ventilation (engineering controls) reducing concentrations of viral aerosols to undetectable levels.[49,51,53]

Evidence for long distance spread of SARS-CoV-2 is uncommon:

There were few reports that have identified long distance transmission of SARS-CoV-2. The minimal transmission to fellow passengers seated near individuals with COVID-19 on airplanes does not support an airborne transmission route.[58-60] The airflows in an airplane cabin were modelled in a study

demonstrating how risk of infection may be restricted to certain areas in front and behind an infected passenger.[61]

In one case study, worshippers who were not wearing masks were exposed to a presymptomatic index patient for 100 minutes while on a bus.[62] Twenty-four of 67 worshippers became infected, including several passengers seated beyond 2 m distance. Seven of 172 other worshippers attending the same event were positive for SARS-CoV-2. The bus containing the index patient was heated and air was recirculated without filtration. Infections occurred in individuals at either end of the bus and the index case was located roughly in the middle. Risk of infection was only moderately higher for individuals sitting closer to the index patient. The authors of this study postulate that the poor ventilation in the bus supports aerosols in this large transmission cluster; however, other routes of transmission such as close contact from movement within the bus or fomites could not be excluded.

An investigation by Lu et al. into a COVID-19 outbreak in a restaurant in Guangzhou, China involving three families sitting in close proximity for more than 1 hour concluded that the air conditioning (AC) ventilation likely contributed to transmission.[63] In this scenario, there was between 53–73 min of contact between the presymptomatic index case and secondary cases. The location of a consistently running AC unit (the outlet and exhaust flanked the table of the index case) was in the airflow path of the secondary cases and was in an enclosed environment. No secondary cases occurred at adjacent tables that were outside of the likely "air column." The furthest distance between index and secondary cases was approximately 3 m.

Recent outbreaks with detailed reporting are less likely to be explained completely by droplet or contact routes (Miller et al., Brlek et al.).[64,65] In a choir group, 53 of 60 individuals (excluding the index patient) were confirmed or strongly suspected to have been infected during a 2.5 hour rehearsal in a main hall. Individuals who moved to another area of the building from the index case to practice for 45 min were less likely to have become infected than those who remained in the main hall for the full duration of the rehearsal.[64,65] In another study, infection was documented from exposure in a squash court used by patrons after a recently symptomatic index patient had played for 1 hour. Two sets of patrons using the court after the index patient were also infected (up to 90 min later). Aerosol persistence in a poorly ventilated squash court, re-aerosolization of virus from the squash court floor due to rapid movement of players, or fomite transmission were possible routes of transmission. However, this case investigation strongly supports indirect transmission of SARS-CoV-2, most likely through persistence of aerosols in a poorly ventilated space.

In an outbreak in a nursing home, de Man et al. reported that the outbreak involved 81% (n=17) of residents and 50% (n=17) of health care workers. The authors concluded that AC units and a ventilation system that did not provide adequate air exchanges contributed to the outbreak.[66] However, it should be noted that health care workers did not wear masks during non-patient care activities and the mobility and interaction between residents was not considered.

In a call center in South Korea, half of one floor of the office building experienced an outbreak in 94/216 employees.[67] The outbreak description is limited in providing further detail because the index patient was not known, ventilation parameters were not reported (especially whether air circulation was shared on both sides of the building), and daily mingling habits were not described. A handful of infected individuals were detected on two other floors, but no outbreaks occurred in those areas and the infected individuals could not be linked to the outbreak.

The importance of ventilation is described in a modeling study by Jones, who suggested that exposure to inhalable particles are mostly (80%) experienced within close proximity to the patient.[68] Even in rooms with high air exchanges, Tang et al.'s review of SARS-CoV-2 aerosols indicates that viral RNA copies can still be detected in air samples from patient rooms (1.8–3.4 viral RNA copies/m^3), toilet rooms (19 copies/m^3), and PPE doffing rooms (18–42 copies/m^3).[69]

Airborne Transmission during AGMPs

There were no documented cases of airborne transmission of SARS-CoV-2 during AGMPs in the peer-reviewed literature we examined. We note the lack of transmission in these settings may be due to the appropriate use PPE during AGMPs, with few unprotected close-contact exposures.

Evidence for transmission of SARS-CoV-2 during AGMPs:

There is little evidence demonstrating AGMPs as a contributor to health care worker transmission. In a case-control study involving health care workers, Lentz et al. reported that while AGMPs were not associated with an increased risk of SARS-CoV-2 infection, respirator use during AGMPs lowered the risk of infection (adjusted OR: 0.4; 95% CI: 0.2–0.8; p=0.005).[70]

While airborne transmission does not appear to be the predominant mode of transmission (i.e., such as in households and in routine patient care), medical procedures that generate aerosols may be associated with an increased risk of transmission.[71] During the SARS outbreak in 2003, infections disproportionately occurred among healthcare workers, with those involved in AGMPs and manipulation of the airway (i.e., at the time of intubation) at greatest risk.[72] An investigation into a nosocomial outbreak of SARS in Toronto concluded that the epidemiological links described in their investigation support the hypothesis that SARS-CoV-1 was transmitted primarily through respiratory droplets and direct contact, noting that transmission occurred during high-risk procedures (i.e. intubation) when only a surgical mask was utilized, in the absence of protective eyewear.[73] Infected healthcare workers were no less likely to contract SARS-CoV-1 while wearing an N95 respirator (vs. surgical mask), suggesting that it may have been doffing (taking off) of PPE where transmission occurred.[74] AGMPs do not appear to be a significant risk factor for SARS-CoV-2 transmission among health care workers, potentially related to improved health care worker precautions for AGMPs and/or the lower infectiousness of SARS-CoV-2 in the second week of illness (in contrast to SARS-CoV-1).[70,75-78]

Fecal-oral (Feces, Wastewater) Transmission

While fecal-oral transmission of SARS-CoV-2 is possible, it is unclear the extent to which this transmission route plays in the epidemiology of COVID-19. The evidence supporting fecal-oral transmission was limited.

Researchers have documented angiotensin-converting enzyme 2 (ACE-2; proposed receptor used by SARS-CoV-2 to enter cells) receptor expression in gastrointestinal epithelial cells; SARS-CoV-2 infects these glandular cells, as evidenced by RNA detection and intracellular staining of viral nucleocapsid protein in gastric, duodenal and rectal epithelia.[79] Gastrointestinal symptoms occur in about 9.5% of adults and children with COVID-19.[80] Tissues in the oral cavity express ACE-2 receptors.[81] SARS-CoV-2 RNA and live virus have been detected in the stool of patients with COVID-19. Given detection of infectious virus in stool and that virus can infect via the oral mucosa, fecal-oral transmission is possible.

Evidence for SARS-CoV-2 RNA detection and shedding in feces:

In systematic reviews, the mean prevalence of SARS-CoV-2-RNA-positive stool in patients with COVID-19 ranged from approximately 40% to 50% and viral RNA shedding in stool lasted longer than in nasopharyngeal (NP) swabs. In a systematic review and meta-analysis of 4,243 patients, Cheung et al. reported the prevalence of viral RNA in stool was 48.1% (95% CI: 38.3–57.9).[82] In a meta-analysis by van Doorn et al., the pooled prevalence of viral RNA in stool or anal swabs was 51.8% (95% CI: 43.8%–59.7%); and fecal samples remained positive for a mean duration of 12.5 days after negative NP swabs in 282/433 (64%) of patients who had serial test results for both respiratory and GI specimens.[83] A systematic review by Gupta et al. noted that 53.9% (291/540) of COVID-19 patients had viral RNA-positive fecal samples; duration of fecal shedding ranged from 1 to 33 days after negative NP swabs.[84] Parasa et al. reported on a meta-analysis of 407 patients with COVID-19, where the prevalence of viral RNA-positive stool was 40.5% (95% CI: 27.4–55.1).[85] In a meta-analysis, Wong MC et al. reported a pooled detection rate of viral RNA in fecal samples among patients was 43.7% (95% CI: 32.6–55.0).[86]

In studies detecting viral RNA in various clinical samples other than NP swabs, researchers more commonly detect viral RNA in stool of patients with COVID-19. In a systematic review of 569 patients by Roshandel et al., prevalence of viral RNA was higher in stool (39.5%) than blood (21.3%) and urine (8%).[87] In another systematic review, Morone et al. reported the prevalence of viral RNA-positive stool (48.8%) was higher than positive blood (17.5%) and urine (16.4%) samples; median duration of viral shedding in stool was significantly longer than shedding in respiratory samples (19 days vs. 14 days; $p<0.001$).[88] Comparing viral RNA detection in serum, urine and stool in 74 patients, Kim et al. reported a detection rate of 2.8% (9/323 samples), 0.8% (2/247) and 10.1% (13/129), respectively.[89] The mean viral load was 1,210 ± 1,861, 79 ± 30 and 3,176 ± 7,208 copies/µL, respectively, and no viable virus was detected in cell cultures. In a review, Jones et al. noted that the abundance of viral RNA in urine (10^2–10^5 genome copies [gc]/ml) and feces (10^2–10^7 gc/ml) was lower than in NP swabs (10^5–10^{11} gc/ml).[90]

In a study of 69 children, 86% had viral RNA-positive stool/rectal/anal swabs and the mean duration of viral shedding was 23.6 ± 8.8 days from symptom-onset.[91] In a study of 69 patients with COVID-19, patients with positive fecal samples were significantly younger compared to patients with negative fecal samples (mean age: 43 vs. 52 years; $p=0.003$).[92] Viral shedding in stool persisted for over 3 weeks since symptom-onset and the severity of COVID-19 was not associated with duration of viral shedding in stool.[93,94]

Kang et al. reported on an outbreak of COVID-19 in a high-rise apartment building in Guangzhou, China, where the proposed mode of transmission was through fecal aerosols via the pipes in the building.[95] However, the authors did not demonstrate the exact mode of transmission; i.e., through direct contact or indirectly through inhalation of aerosolized virus or touching contaminated surfaces.

Environmental sampling in health care and non-health care settings detected viral RNA on toilets and other bathroom surfaces.[43,55,96-99] While readily detected, it is not clear if the source of viral RNA in bathrooms was the result of respiratory droplets or from fecal contamination.

Evidence for live SARS-CoV-2 detection in feces:

Live virus has been cultured in stool samples of patients with COVID-19.[100,101] In a systematic review, viable virus was detected in the stool of six out of 17 patients, where culturing of virus was attempted.[83] It is important to note that the authors did not define positive and negative controls in these studies. While researchers detect live virus in feces, the extent of fecal-oral transmission in COVID-19 epidemiology is unclear.

Evidence for SARS-CoV-2 RNA in wastewater:

Viral RNA detection in wastewater systems in areas experiencing outbreaks; however, the risk of transmission through contaminated wastewater is low.[102,103] In a study of treated and raw sewage in Germany, the authors detected viral RNA, but not viable virus.[104] Where wastewater contaminates recreational or drinking water (especially in resource-limited countries), there is a theoretical risk of transmission; however, there is no documented transmission in these settings.[105]

In a study of eight patients with COVID-19 in a densely populated area of Guangzhou, China, the postulated mode of transmission was through the fecal-oral route, initiated from contaminated sewage in street puddles (viral RNA-positive).[106] In this study, there was an increased risk of infection when patients worked as cleaners/waste pickers, wore outdoor shoes inside their homes and cleaned dirty shoes. The authors did not confirm transmission via sewage in this study, as the authors did not detect viable virus from samples and they did not rule out other modes of transmission.

Conjunctival Transmission

To date, there is a low risk of COVID-19 infection through the conjunctiva.

Transmission through the ocular surface is a possible route of transmission of SARS-CoV-2 based on the detection of viral RNA in ocular samples of patients with COVID-19 and indirect evidence that eye protection decreases the risk of infection.[107] The risk of tears or ocular secretions acting as a source of infection is low, given that only one study has successfully cultured viable virus in these samples.

Several studies have demonstrated the expression of ACE-2 and transmembrane serine protease 2 (TMPRSS2) receptors in the eye's surface epithelium (i.e., conjunctiva, limbus and cornea) and corneal endothelium, indicating a potential entry point for SARS-CoV-2.[108-111] The conjunctiva has been proposed as a possible site of initial infection, where it can spread to the upper respiratory tract via the nasolacrimal system.[112] Deng et al. demonstrated that rhesus macaques developed mild disease after inoculation of the conjunctiva, providing further animal-study evidence of conjunctival transmission.[113]

Evidence for conjunctival transmission:

In a case report, Lu et al. described a healthcare worker who became infected after caring for a patient with COVID-19; the health care worker was wearing an N95 respirator, but no eye protection.[114] The health care worker developed eye redness and then pneumonia.

In a study of an ophthalmologist with COVID-19, 142 patients were exposed; however, only a single patient developed symptoms (but PCR negative), indicating the use of face shields, masks and performing hand hygiene prevented infection.[115] In the meta-analysis by Chu et al., eye protection provided significant protection against coronavirus infections (unadjusted RR: 0.34; 95% CI: 0.22–0.52), suggesting that transmission through the conjunctiva was possible.[116]

Fomite (Surfaces, Objects, Food) Transmission

SARS-CoV-2 can survive on a variety of surfaces, potentially leading to transmission via fomites; however, the evidence supporting fomite transmission of COVID-19 was limited and based primarily on studies of virus stability under laboratory-controlled conditions.

Evidence for fomite transmission of SARS-CoV-2:

From a detailed investigation, including whole genome sequencing, into an inter-facility outbreak of up to 135 nosocomial COVID-19 cases (including 88 staff and 47 patients) in South Africa, Lessells et al. concluded that a patient in the emergency department likely spread the infection to at least five hospital units, a local nursing home and an outpatient dialysis unit on campus.[117] Based on the pattern of transmissions, the authors concluded that indirect contact and fomite transmission were the predominant modes of transmission, facilitated by frequent patient movement between wards.

In an epidemiological and environmental study of two family clusters (n=5 patients) of COVID-19 in Guangzhou, China, Xie et al. reported potential transmission via contaminated surfaces.[118] In this case, the proposed link between the two families was through nasal secretions, in which a patient had touched a contaminated elevator button. In this study, other modes of transmission cannot be ruled out and no viable virus was detected on surfaces (only viral RNA detection).

As mentioned previously, transmission in a squash court occurred in players that used the space after it was occupied by the index case for one hour.[65] In this case, there is a possibility of aerosol persistence; however, transmission via fomites is possible (e.g., on high-touch surfaces).

Evidence for SARS-CoV-2 RNA detection on surfaces:

In health care settings, studies documented the presence of viral RNA on high-touch surfaces in the environment of symptomatic and asymptomatic patients with COVID-19 (especially medical equipment, phones, bed rails, door handles and toilets).[41,42,46,47,56,96,119-121] In a hospital in Wuhan, China, Ye et al. reported that the most contaminated surfaces were self-service printers for patient use, keyboards and doorknobs.[122] In Italy, researchers detected viral RNA on the external surface of Continuous Positive Airway Pressure (CPAP) helmets worn by COVID-19 patients; however, samples did not grow in viral culture.[123] A study reported viral RNA on surfaces (keyboards, telephones and scanners) in a clinical microbiology laboratory testing COVID-19-patient respiratory samples.[124] In a multicenter study in South Korea, contamination of surfaces was common, especially in places not adequately sanitized.[55]

Cheng et al. reported that the median load of viral RNA on surfaces was 9.2×10^2 copies/mL (range: 1.1×10^2 to 9.4×10^4 copies/mL) and positivity rates on surfaces increased with increasing viral loads in clinical samples.[96]

In non-healthcare settings (patient homes, work places), viral RNA has also been detected on surfaces (especially in bathrooms and bedrooms).[95,98,125] In a study of 39 patients and 259 environmental samples from their homes (Guangzhou, China), surfaces most commonly contaminated with viral RNA were in the bathroom on high touch surfaces (toilets, door knobs, faucets).[43]

Evidence for the detection of live SARS-CoV-2 on surfaces:

In most of the studies we examined, researchers failed to detect viable virus on surfaces or detection of viable virus was inconsistent.[41,49] Ben-Shmuel et al. investigated the viability of SARS-CoV-2 from 97 samples from surfaces of patients.[53] None of the samples grew in viral culture. In controlled experiments, virus viability on plastic and metal ceased after 4 days at ambient temperature (22°C) and decreases in virus viability negatively correlated with increasing temperature. Nonetheless, some studies indicate that under ideal conditions, SARS-CoV-2 remains viable on surfaces for several days.

Van Doremalen et al. compared surface stability of SARS-CoV-2 and SARS-CoV-1.[38] The authors noted an exponential decay in virus titre for both viruses in all experimental conditions. At 40% relative humidity and 21°C–23°C, both SARS-CoV-2 and SARS-CoV-1 were detectable for up to 24 h on cardboard and up to 2–3 d on plastic and stainless steel. On copper, the authors did not find live SARS-CoV-2 and SARS-CoV-1 after 4 h and 8 h, respectively. The estimated median half-lives for SARS-CoV-2 on these surfaces were 0.7 h for copper, 3.5 h for cardboard, 5.6 h for stainless steel, and 6.8 h for plastic. While the van Doremalen et al. study concluded that fomite transmission is possible given detection of SARS-CoV-2 on a number of surfaces, they did not demonstrate that it occurs.

Riddell et al. tested the stability of SARS-CoV-2 under controlled conditions on seven surface types (stainless steel, plastic, paper bank notes, polymer bank notes, vinyl, cotton and glass).[126] The authors concluded that infectious virus survived on non-porous surfaces for at least 28 d at 20°C and 50% relative humidity in the dark. In addition, virus titres decreased by 90% by 10 d post-inoculation at 20°C on all surfaces.

Chan et al. reported that at room temperature (20°C–25°C), SARS-CoV-2 in dried form or solution remained viable 3–5 d and 7 d, respectively; virus remained viable in solution or dried for 14 d at 4°C and about 1 d at 37°C.[127] SARS-CoV-2 was detected at pH 4 to pH 11 for several days.

Chin et al. investigated the surface stability of SARS-CoV-2 at 22°C and 65% relative humidity.[128] the authors did not detect infectious virus on printing and tissue paper 3 h after inoculation. Infectious virus was no longer present on glass or paper money by day 4 and on day 7 for plastic and stainless steel. The authors state, “The virus is highly stable at 4°C, but sensitive to heat. At 4°C, there was about a 0.7 log-unit reduction of infectious titre on day 14. With the incubation temperature increased to 70°C, the time for virus inactivation was reduced to 5 min. SARS-CoV-2 can be highly stable in favourable environments, but it is also susceptible to standard disinfection methods.”

Evidence for food-borne transmission of SARS-CoV-2:

To date, there is no evidence for food-borne transmission of SARS-CoV-2. No peer-reviewed studies investigated SARS-CoV-2 survival or detection on food and no peer-reviewed studies reported on infection through eating contaminated food. There is likely a risk of transmission from droplet or close contact during eating (from an infectious person); in addition, there is a possibility of fecal-oral transmission during eating with contaminated utensils.

Several studies have identified viral RNA on food preparation surfaces and utensils, which could potentially be a source of infection through the oral mucosa; however, the contribution of this mode of transmission is unknown. In a study of surfaces in health care settings, researchers have detected viral RNA on food preparation areas.[129] Liu et al. reported the detection of viral RNA on wooden chopsticks handled by asymptomatic and presymptomatic patients with COVID-19.[130]

Vertical (Intrauterine) Transmission

To date, there is growing evidence supporting vertical transmission, specifically intrauterine transmission, of SARS-CoV-2; however, the degree to which this mode of transmission occurs is unclear.

In a commentary, Schwartz et al. proposed that confirming vertical, intrauterine transmission requires detection of SARS-CoV-2 in chorionic villous cells using immunohistochemistry or *in situ* hybridization.[131] Early onset of COVID-19 or detection of viral RNA soon after birth in neonates, along with immunological response in neonates and RNA-positive swabs of whole placenta are not sufficient to confirm

intrauterine transmission. In addition, vertical transmission would require the detection of viral RNA in umbilical cord tissue or blood.

Evidence against vertical transmission of SARS-CoV-2:

In five systematic reviews and meta-analyses, ranging from 87 to 1,316 births, there were SARS-CoV-2 RNA-positive newborns but no evidence of vertical transmission.[132-136] In a systematic review of 1,125 mothers and 1,141 newborns, Dhir et al. concluded that the majority of infections in newborns occurred in the post-partum period (41/45; 4 infections were reported as congenital).[137]

In a multicenter observational cohort study of 242 pregnant women in Spain, Marin Gabriel et al. found no evidence of vertical transmission in newborns.[138] Yan et al. reported no vertical transmission in a series of 99 mothers with COVID-19, in which no children (n=100) tested positive.[139] Liu et al. reported no vertical transmission after delivery in 19 mothers with COVID-19; neonates tested negative by PCR (throat swab, urine, feces); amniotic fluid and breast milk also tested negative by PCR.[140]

Evidence for post-partum infection (SARS-CoV-2 RNA not detected in placenta or umbilical cord):

There are several studies where newborns tested positive (viral RNA, antibodies) soon after birth under strict infection control and prevention precautions; however, testing of chorionic villous cells or umbilical cord were negative or not performed.[141-148] In a systematic review of 275 pregnant women with COVID-19 and 246 neonates, the testing of additional samples for viral RNA did not produce positive samples (cord blood, n=30; amniotic fluid, n=24; cervical/vaginal fluids, n=7; placenta, n=6).[149]

Kirtsman et al. reported a case of probable vertical transmission of SARS-CoV-2 in a neonate born to a mother who tested positive for viral RNA by PCR on NP swab and put on airborne, droplet and contact precautions.[150] The baby was born by semi-urgent Caesarean section and placed in a resuscitator 2 m away from the mother. The NP swab was positive for viral RNA at birth and on day 2 and 7. Neonatal plasma was viral RNA-positive on day 4 and on day 7 in stool. However, viral RNA was not detected by PCR on the umbilical cord tissue and cord blood was not available for testing.

Knight et al. report the results from a prospective national population-based cohort study using the UK Obstetric Surveillance System, which included 427 pregnant women admitted to hospital with COVID-19.[151] Twelve (5%) of 265 infants tested positive by PCR for viral RNA, six within 12 h of birth. The authors did not attempt viral detection on the umbilical cord blood, placenta or vaginal secretions and did not describe infection prevention and control practices after birth.

Evidence for vertical transmission of SARS-CoV-2:

Using immunofluorescence, Taglauer et al. examined the location of SARS-CoV-2 spike glycoprotein (CoV2 SP) and two viral entry proteins (ACE-2, TMPRSS2) in placentas of 15 COVID-19-positive mothers and 10 COVID-19-negative mothers.[152] CoV2 SP and ACE-2 were localized in the outer syncytiotrophoblast layer placental villi. However, several other studies report that the expression of ACE-2 and TMPRSSR in the placenta is low.[153,154]

In a systematic review and meta-analysis of 122 neonates, Raschetti et al. reported that 5.7% of infections were confirmed as congenital, 4.9% were probable congenital infections and 1.6% were possible congenital infections.[155]

Patanè et al. found viral RNA on the fetal side of the placenta in two mothers infected with COVID-19.[156] Both children were also positive by PCR from NP swabs taken at birth. Hosier et al. analyzed the

placenta from a woman in her second trimester with symptomatic COVID-19 infection, complicated by preeclampsia and placental abruption.[157] Hosier et al. detected viral RNA predominantly in the syncytiotrophoblast cells at the maternal-fetal interface of the placenta. Additionally, Zhang et al. reported virus in syncytiotrophoblast cells, atrophic endometrial glandular epithelium and subchorionic plate (Langhan's fibrinoid) through *in situ* hybridization (2/53 placentas).[158]

Breastfeeding (Breast Milk) Transmission

Currently, there is no evidence to support mother-to-child transmission of COVID-19 through breast milk. Researchers inconsistently detect SARS-CoV-2 RNA in breast milk, with no evidence of live virus in breast milk. There have been no documented cases where breast milk is the suggested mode of transmission to an infant.

During breastfeeding, an infected mother can transmit COVID-19 to the child through respiratory droplets and close-contact transmission. In a systematic review and meta-analysis, Raschetti et al. reported that close contact of mother and child in the first 72 hours of life increased the risk of infection in the child (aOR: 6.6; 95% CI: 2.6–16.0; p<0.0001), while breastfeeding did not (aOR: 2.2; 95% CI: 0.09–1.18; p=0.15).[155]

In experiments that inoculated breast milk with live SARS-CoV-2, Holder pasteurization inactivated the virus; therefore, suggesting donated breast milk that is pasteurized may be safe for recipient children and care providers.[159]

Evidence for SARS-CoV-2 RNA detection in breast milk:

The majority of the literature agrees that there is no transmission of SARS-CoV-2 through breast milk and the benefits of breastfeeding newborns far outweigh any risks of infection.[160-163] In most studies of mothers with COVID-19, breast milk was negative for viral RNA by PCR.[140,144,164,165] While uncommon, there are case reports of mothers with viral RNA-positive breast milk; however, there were no detections of viable virus from breast milk.[166-168] In a living systematic review, Centeno-Tablante et al. reported that 9 of 68 breast milk samples were viral RNA-positive, but concluded that COVID-19 transmission did not occur through breast milk.[169]

A case report detected viral RNA in the breast milk of a breastfeeding mother with COVID-19.[170] The breastfed child developed symptoms one day after his mother, at which time he tested positive by NP swab. The transmission route in this case could not be established.

Groß et al. report on a study of two women who tested positive for viral RNA by PCR after birth and were breastfeeding.[171] Breast milk was viral RNA-positive in one of the two women at 10–13 days after birth. The authors did not attempt to culture the virus. Both infants tested positive for viral RNA (at day 8 and 11), but it is unknown if breastfeeding led to the infection in one of the infants, as the two women and infants had shared a room for some time after delivery.

Evidence for SARS-CoV-2 antibodies in breast milk:

Antibodies to SARS-CoV-2 have been detected from breast milk. In a study of 14 mothers with COVID-19, Gao et al. did not detect viral RNA in breast milk; however, three out of four mothers had breast milk with IgG and IgM antibodies.[172] In another immunological study of 18 women with COVID-19, both IgG and IgA were detected in all 37 of breast milk samples.[173]

Bloodborne (Blood, Blood Products, Organs) Transmission

While SARS-CoV-2 RNA has been detected in the blood of patients with COVID-19, all systematic reviews and studies indicated that the risk of bloodborne or organ transplant transmission is exceedingly low. Compared to upper respiratory samples, the detection of viral RNA in blood and blood products is relatively uncommon and, to our knowledge, there has been no detection of viable virus from these sources.

Evidence for SARS-CoV-2 RNA detection in blood:

Several studies have reported detection of viral RNA, in either the plasma or serum of patients with COVID-19.[18,93,100,174] In Germany, viral RNA was not detected in whole blood or serum of 18 asymptomatic and symptomatic patients; however, viral RNA (low-level RNA: 179 copies/mL) was detected in the plasma of one patient.[175] In a systematic review including 1,348 recovered patients, 17.5% of blood samples were positive for viral RNA; however, no viable virus was cultured.[88]

Evidence against blood-borne transmission:

Several case reports and case series indicate the risk of SARS-CoV-2 transmission in blood products is exceedingly low.[176,177] In a review, Kiely et al. noted that bloodborne transmission is only a theoretical possibility and that a blood phase for COVID-19 infection is brief, uncommon and usually associated with severe disease.[178] In an immunocompromised child, COVID-19 did not develop after platelet transfusion from an asymptomatic donor with COVID-19.[179] In France, low levels of viral RNA were detected in three blood products (pathogen-reduced platelet concentrate, plasma, red blood cell units) from asymptomatic COVID-19-positive donors; none of the four recipients developed disease even though they all had immune system compromise.[180] In the French study, positive plasma samples did not grow virus in culture attempts. Dres et al. reported no transmission of SARS-CoV-2 through extracorporeal membrane oxygenation and dialysis membranes.[181]

No studies have documented transmission of SARS-CoV-2 through organ transplantation. While research has not demonstrated permanent damage to non-lung organs, the consensus is that active COVID-19 infection in donors (living or deceased) is a contraindication for organ donation.[182,183] Hong et al. reported a possible infection in a liver donor recipient, in which the donor was infected at time of donation; however, transmission may have been through direct close contact.[184]

Sexual (Semen, Vaginal Secretions, Urine) Transmission

Sexual transmission may occur through direct contact and through respiratory droplets. The risk of transmission via semen or vaginal secretions is low and the evidence supporting transmission via semen or vaginal secretions was limited.

Based on viral detection in feces, some have proposed possible transmission of SARS-CoV-2 through certain sexual behaviours involving oral-anal contact.[185] In addition, the detection of viral RNA and live virus detected in the saliva of COVID-19 patients represents a potential mode of transmission during sex or intimate contact.[186,187] Jing et al. reviewed the literature on ACE-2 expression in the female reproductive system and noted expression of ACE-2 receptors in the vagina.[188] ACE-2 receptors are also present in testes (i.e., spermatogonia, Leydig and Sertoli cells).[189] While receptors for SARS-CoV-2 are present in reproductive organs, currently there is no evidence for sexual transmission. There was no evidence for the detection of live virus in semen or vaginal secretions.

Evidence for SARS-CoV-2 RNA detection in semen and vaginal secretions:

To date, most studies have failed to detect viral RNA in semen or vaginal secretions in patients with COVID-19 patients.[166,172,190] In a study of 23 male patients with active infection or recovering from infection, Guo et al. did not detect viral RNA in semen samples.[191] Similarly, a study of nine males recovering from mild COVID-19 infection did not show evidence of viral shedding in semen.[192]

Li et al. reported that 15.8% (6/38) of male COVID-19 patients had viral RNA present in their semen. The authors collected semen samples from two clinically recovered patients and four patients at the acute stage of infection.[193] In the Li et al. study, the authors detected viral RNA up to 16 d after the onset of symptoms. Massarotti et al. hypothesized that viral RNA detections in semen are due to viral RNA-contamination by patient urine.[194]

Evidence for SARS-CoV-2 RNA detection in urine:

Researchers report detection of viral RNA in urine; however, the risk of transmission via urine is low. We are only aware of one instance where infectious virus was isolated from the urine of a patient with COVID-19.[195]

In a systematic review and meta-analysis, Roshandel et al. reported that 8.1% of (46/569; see Table 3 in paper) patients showed viral RNA shedding in urine (compared to 42.1% [210/499] for stool and 21.3% [100/469] for stool; see Figure 2 in paper) and viral RNA shedding in urine increases with disease severity.[87] In a systematic review, 16.4% (60/366) of patients were positive for viral RNA in urine.[88] In another systematic review of 549 patients, 6.9% showed evidence of viral RNA in their urine; however, culturing attempts were not successful.[196] In a study of 74 patients hospitalized with COVID-19, Kim et al. found that 0.8% (2/247) of urine samples were positive for viral RNA (viral load: 79 ± 30 copy/µL; compared to 3,176 ± 7,208 copy/µL in stool); however, no viable virus was cultured.[197]

Zoonotic transmission

Evidence for zoonotic transmission from companion, domestic and wild animals to humans was limited. Most of the evidence to date indicated that non-human animals are more at risk of infection from humans, especially companion and domestic animals.[198] Further research is needed to identify potential reservoirs of SARS-CoV-2 and what risk they pose to humans and animals.

Early research revealed SARS-CoV-2 is a close relative of SARS-CoV-1 and MERS-CoV, and all are βCoVs that originated from bats (*Rhinolophus* species).[199,200] Natural infection of animals with SARS-CoV-2, were all exposed to symptomatic humans. Infected animals include companion animals (domestic dogs [*Canis lupus*], domestic cats [*Felis catus*], farmed animals (American mink [*Neovison vison*], and zoo animals (lions [*Panthera leo*], tigers [*Panthera tigris*]).[201-203]

Evidence for animal-to-human and animal-to-animal transmission:

Currently, the intermediate source of the initial COVID-19 infections in humans is unknown and the risk of transmission from animals to humans is low.

Malayan pangolins (*Manis javanica*) have been postulated as the intermediate host based on the presence of viruses closely related to SARS-CoV-2; however, this hypothesis has not been confirmed.[204-206] Recently, Freuling et al. reported that raccoon dogs (*Nyctereutes procyonoides*) are susceptible to SARS-CoV-2 infection and may represent an important intermediate and reservoir host.[207] Authors in

this study infected raccoon dogs through the intranasal route, which led to animal-to-animal transmission through direct contact, with high-level viral shedding with mild disease. Raccoon dogs are widespread in China and raised for their fur. It is important to note that there are no reports of SARS-CoV-2 natural infection in raccoon dogs.

In the Netherlands, there was evidence that COVID-19 transmission occurred from an infectious American mink to human.[208] It should be noted that in most circumstances, transmission of SARS-CoV-2 involving animals is human-to-animal or animal-to-animal.[203] In a laboratory experiment, ferrets can transmit the virus to other ferrets through respiratory droplets and direct contact,[209] and potentially via small aerosols.[210]

In a laboratory experiment, dogs and cats were susceptible to COVID-19; however, neither developed clinical disease.[203,211] Cats transmitted the virus to other cats through close contact. Cats shed virus for 5 days post infection; however, there was no viral shedding in dogs. Authors noted oral and nasal viral shedding 7 days after exposure in two in-contact cats. Therefore, there is a possibility that transmission could occur from cats to humans. In addition, Shi et al. reported that experimental exposure in cats resulted in subclinical and symptomatic infections, and juvenile cats were at a higher risk of severe infection or death.[212]

Evidence for human-to-animal transmission (reverse zoonosis):

The first documented instance of human-to-animal transmission occurred between an infected person in Hong Kong and their companion dog, soon after there was a report of human-to-cat transmission in Hong Kong.[205] There is evidence that human-to-dog transmission may be limited due to cross-reaction of SARS-CoV-2 and canine respiratory coronavirus (CRCoV), providing some immunological cross-protection.[213] The most commonly reported human-to-animal transmission has involved domestic cats, where most cats have a reported close contact with a confirmed human case of COVID-19.[203,214] In Wuhan, China, 14.7% (15/102) of cats seroconverted to SARS-CoV-2 early during the pandemic.[215]

Several researchers have highlighted the need to monitor wild animals, to ensure that reverse zoonosis does not occur (human-to-animal transmission). Olival et al. reported that there is a risk of immunologically naïve North American bats acquiring SARS-CoV-2.[216] Researchers also demonstrated that deer mice (*Peromyscus maniculatus*) are susceptible to infection and are potential reservoirs of SARS-CoV-2 in North America.[217]

To date, laboratory studies indicate that domestic ducks (*Anas platyrhynchos domesticus*), chickens (*Gallus gallus domesticus*) and pigs (*Sus scrofa*) were not susceptible to SARS-CoV-2.[212,218]

Other susceptible animals, used in laboratory experiments or as animal models, include ferrets (*Mustela putorius*), fruit bats (*Rousettus aegyptiacus*), rhesus monkeys (*Macaca mulatta*) and Syrian hamsters (*Mesocricetus auratus*).[212,219]

Conclusions

Transmission of SARS-CoV-2 occurs predominantly through respiratory droplets during close (<2 m), unprotected contact. Airborne transmission over longer distances (>2 m) through the inhalation of small respiratory droplets or aerosols is less common, but possible under certain conditions such as prolonged exposure in a poorly ventilated space.

Relatively uncommon routes of transmission of SARS-CoV-2 include conjunctival, vertical, fecal-oral, fomite and zoonotic. These routes of transmission are possible; however, their contribution to COVID-19 epidemiology is unclear. While modes of transmission such as through semen, breast milk or urine are theoretically possible, the probability of these occurring is exceedingly low.

PHO will continue to monitor the scientific evidence on transmission routes of COVID-19, updating this document as necessary.

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Appendix A. Glossary of Terms for COVID-19 Routes of Transmission

Advisory

The glossary below contains definitions that may be changing with the understanding of evidence. Definitions may be different from how the same terms are used in other contexts or even seen as controversial due to different use within the same context by different organizations. Therefore, these definitions are provided to support the understanding of the COVID-19 – What We Know So Far About… Routes of Transmission document. This glossary is not exhaustive and may be updated with new terms or revised at any time.

Key Terms

Airborne transmission: Transmission of infection occurring due to the inhalation of aerosols that have remained suspended for a long period of time or have been suspended on air currents over long distances.

Air sampling for virus: Collection of volumes of air by a device to determine if aerosols may contain virus. Collection can vary by aerodynamic size captured, duration of collection, volume per second collected, and media on which samples deposit. Air samples can then be tested by molecular methods and/or viral culture.

Aerosol: Aerosols are defined by National Institute for Occupational Safety and Health (NIOSH) as a suspension of particles (solids) or droplets (liquids) in the air.[1] The diameter of microorganism-containing aerosols relevant to inhalation ranges from 0.01 to 100 µm. Discussion of respiratory infections focus on droplets rather than particles because the sources of infectious aerosols are assumed to be from respiratory mucosa or epithelium, which will be droplets (liquids) that contain infectious biological material. Droplets >100um are too large to be suspended in the air, and are therefore not considered aerosols.[2] Droplets generally lose mass while suspended in air as aerosols due to evaporation of volatile components or water. The droplets that result from the process of evaporation are often referred to as droplet nuclei. The final size of a droplet will depend on a variety of environmental factors.

Aerosol generating medical procedures: Aerosol generating medical procedures (AGMPs) are defined as medical procedures that result in the production of aerosols that create the potential for airborne transmission of infections that may otherwise only be transmissible by the droplet route, and are epidemiologically associated with an increased risk of acquisition of infection.[3]

Contact transmission: Transmission of infection through direct contact.

Direct transmission: Transmission of infection through contact or droplet transmission.

Droplet transmission: Transmission of infection occurring due to impaction of large droplets (usually >100 um) that are too large to be suspended in air for long durations. Infection may follow by direct impaction onto mucosal surfaces (mouth, eyes, nose), or contaminate a person's body/clothing which then makes direct or indirect contact with susceptible surfaces (e.g., mucosal surfaces for COVID-19).

Indirect transmission: Includes any mode of transmission where direct contact or droplet transmission is not involved (e.g., fomite transmission, airborne transmission, and vectors).

Fomite/Fomite transmission: Objects that may become contaminated with microorganisms and serve as vehicles of transmission.[4]

Polymerase Chain Reaction (PCR): A molecular method used to amplify nucleic acids. If nucleic acids of the microorganism of interest is present in a sample, then PCR can be used for the identification of that microorganism. This method cannot determine whether or not the microorganisms detected are viable.

Viral culture: Viral culture is used to determine whether a sample containing virus is capable of replication. Replication is a surrogate measure for inducing infection. Other methods to detect virus in a sample such as PCR cannot determine the viability of the organism in the sample. A sample is applied to a susceptible culture of cells and incubated up to a few weeks to detect morphological changes such as plaques that would indicate the presence of a viable virus.

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Appendix B. MEDLINE Search Strategy

Search results reporting

DATABASES SEARCHED

Database	Date searched	Records	Duplicates removed by database	Remaining
MEDLINE	10/14/2020	2641	330	2311

RECORDS TOTALS

Records source	Records
Records identified through database searching	2641
Duplicates removed by database	330
Duplicates removed by bibliographic management software	11
Total records after duplicates removed	2300

Search strategies

MEDLINE

Ovid MEDLINE(R) ALL <1946 to May 29, 2020>

#	Searches	Results	Concept
1	("2019 corona virus" or "2019 coronavirus" or "2019 ncov" or "corona virus 19" or "corona virus 2019" or "corona virus 2019" or "corona virus disease 19" or "corona virus disease 2019" or "corona virus epidemic*" or "corona virus outbreak*" or "corona virus pandemic*" or "coronavirus 19" or "coronavirus 2019" or "coronavirus 2019" or "coronavirus disease 19" or "coronavirus disease 2019" or "coronavirus epidemic*" or "coronavirus outbreak*" or "coronavirus pandemic*" or "covid 19" or "covid 2019" or "new corona virus" or "new coronavirus" or "novel corona virus" or "novel coronavirus" or "novel human coronavirus" or "sars coronavirus 2" or "sars cov 2" or "sars cov2" or "sars like coronavirus" or "severe acute respiratory syndrome corona virus 2" or "severe acute respiratory syndrome coronavirus 2" or "severe specific contagious pneumonia" or "wuhan corona virus" or "wuhan coronavirus" or 2019ncov or covid19 or covid2019 or ncov or sarscov2 or ((novel or Wuhan or China or Chinese or "seafood	69649	COVID-19

#	Searches	Results	Concept
	market" or "2019" or outbreak* or epidemic* or pandemic*) adj5 (coronavirus* or "corona virus*" or betacoronavirus* or "beta coronavirus*" or "beta corona virus*" or pneumonia* or SARS or "severe acute respiratory syndrome")) or ((coronavirus* or "corona virus*" or betacoronavirus* or "beta coronavirus*" or "beta corona virus*" or SARS or "severe acute respiratory syndrome") adj5 pneumonia*) or "coronavirus response" or "corona virus response").kf,kw,ti.		
2	Disease Transmission, Infectious/ or Virus Shedding/ or tm.fs. or (transmi* or spread* or infectivity or (infect* adj3 route*) or excret* or shed*).kf,kw,ti. or (transmi* or spread* or infectivity or (infect* adj3 route*) or excret* or shed*).ab. /freq=2	493440	Transmission
3	(route* or mode or modes or "non-respiratory" or nonrespiratory or (transmission adj3 (dynamics or risk or potential))).kf,kw,ti.	92893	Route
4	Bodily Secretions/ or Body Fluids/ or Sneezing/ or Cough/ or (droplet* or ((body or bodies or lung* or mouth* or nose*) adj3 (fluid* or secretion* or secrete or discharge*)) or cough* or sneez*).kf,kw,ti.	74516	Droplet
5	exp Parents/ or Family/ or Grandparents/ or Housing/ or Public Housing/ or Siblings/ or Spouses/ or ("close contact*" or "communal living" or "direct contact*" or "flat mate*" or "personal residence*" or "physical contact*" or accommodation* or apartment* or brother* or cohabit* or "co-habit*" or coliving or "co-living" or commune or communes or condo* or contacts or domicile* or dwelling* or familial or family or families or father* or flatmate* or grandparent* or ((home or homes) not "stay at home order*") or hous* or husband* or intrafamilial or mother* or parent or parents or relatives or roommate* or "room mate*" or sibling* or sister* or spouse* or wife or wives).kf,kw,ti.	688458	Contact
6	Conjunctiva/ or Conjunctivitis, Viral/ or Conjunctivitis/ or Eye/ or Tears/ or (conjunctiv* or eye or eyes or ocular or tear or tears).kf,kw,ti.	212437	Conjunctiva
7	Air/ or Air Microbiology/ or Air Pollution, Indoor/ or Inhalation Exposure/ or Exhalation/ or Air Ambulances/ or Aircraft/ or Ventilation/ or (air or airborne* or aircraft* or airplane* or ((building* or room* or office*) adj3 circulat*) or exhal* or flight or flights or HVAC or inhal* or plane or planes or vent or vents or "ventilation system*" or duct*).kf,kw,ti.	282916	Airborne
8	Aerosols/ or ((Disease Transmission, Infectious/ or Coronavirus Infections/tm or Pneumonia, Viral/tm) and (Intubation/ or Intubation, Intratracheal/ or Cardiopulmonary Resuscitation/ or Suction/ or Bronchoscopy/ or exp Surgical Procedures, Operative/ or surgery.fs. or Autopsy/ or Sputum/ or exp Positive-Pressure Respiration/ or Oxygen Inhalation Therapy/)) or aerosol*.kf,kw,ti. or ((transmi* or spread* or infect*) and (nebuliz* or nebulis* or intubat* or ((cardiopulmonary or "cardio-pulmonary") adj3	59726	Aerosol-Generating Procedures

#	Searches	Results	Concept
	resuscitation) or bronchoscopy or surgery or surgical or autops* or (sputum adj3 induc*) or (high adj3 oxygen adj3 therapy) or "positive pressure ventilation" or "positive pressure respiration")).kf,kw,ti.		
9	Fomites/ or Health Facility Environment/ or Patients' Rooms/ or Disease Reservoirs/ or exp Textiles/ or Clothing/ or Glass/ or Plastics/ or Metals/ or Cell Phone/ or Computers, Handheld/ or Smartphone/ or fomite*.kf,kw,ti. or (surface or surfaces).ti. or ((clean* or colonis* or coloniz* or contamina* or decay* or decontaminat* or detect* or disinfect* or distribut* or expos* or grow* or harbor* or harbour* or inactivat* or "infection control" or persist* or sanit* or stabilit* or surviv* or viab*) adj15 (bathroom* or bed* or carpet* or chair* or cloth* or counter or counters or curtain* or "door handle*" or "door knob*" or doorknob* or environment* or equipment or fabric* or faucet* or fixture* or floor* or furnish* or furniture* or glass* or gown* or handrail* or "hand rail*" or ipad* or iphone* or keyboard* or keypad* or "key pad*" or "light switch*" or linen* or material* or mattress* or metal* or phone* or plastic* or railing or railings or reservoir* or sink* or smartphone* or surface or surfaces or telephone* or textile* or tile* or toilet* or "touch screen*" or upholster* or wall* or washroom*)).kf,kw,ti.	400853	Fomites
10	Feces/ or Diarrhea/ or exp Gastrointestinal Diseases/ or (fecal or faecal or feces or stool or stools or diarrhea or diarrhoea or enterocolitis or gastrointestin* or gastroenter*).kf,kw,ti.	1125779	Fecal-Oral
11	Blood-Borne Pathogens/ or Blood Safety/ or bl.fs. or (bloodborne or blood or BBI).kf,kw,ti.	2190148	Bloodborne
12	Sexually Transmitted Diseases/ or Sexually Transmitted Diseases, Viral/ or Semen/ or Semen Analysis/ or Vaginal Discharge/ or Vaginal Smears/ or (sexual* or semen or vagina*).kf,kw,ti.	213704	Sexual Transmission
13	Amniotic Fluid/ or Breast Feeding/ or exp Delivery, Obstetric/ or exp Parturition/ or exp Pregnancy/ or Fetal Blood/ or Fetus/ or Infant, Newborn/ or Infectious Disease Transmission, Vertical/ or Maternal Exposure/ or Maternal-Fetal Exchange/ or Milk, Human/ or Peripartum Period/ or Postpartum Period/ or Pregnancy Complications, Infectious/ or Pregnancy Complications/ or Pregnancy Outcome/ or Pregnancy, High-Risk/ or Pregnant Women/ or ("amniotic fluid" or "breast feeding" or "breast milk" or "cord blood" or "fetal blood" or "human milk" or "in utero" or ((infant* or baby or babies) and mother*) or birth* or breastfeeding or breastmilk or fetal or fetus or foetal or foetus or gestation* or gestation* or infant* or intrapartum or intrauterine or maternal* or mother* or natal* or neonat* or newborn* or obstetric* or parturition or perinatal* or placenta* or placenta* or postnatal* or postpartum* or pregnan* or prenatal* or puerperal*	1928571	Vertical Transmission

#	Searches	Results	Concept
	or reproductive or transplacental or trans-placental or transuterine or trans-uterine or uter* or vertical).kf,kw,ti.		
14	1 and 2 and 3	296	
15	1 and 2 and 4	165	
16	1 and 2 and 5	356	
17	1 and 2 and 6	123	
18	1 and 2 and 7	318	
19	1 and 2 and 8	886	
20	1 and 9	550	
21	1 and 2 and 10	285	
22	1 and 2 and 11	141	
23	1 and 2 and 12	60	
24	1 and 2 and 13	590	
25	14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24	3063	
26	("2019 corona virus" or "2019 coronavirus" or "2019 ncov" or "corona virus 19" or "corona virus 2019" or "corona virus 2019" or "corona virus disease 19" or "corona virus disease 2019" or "corona virus epidemic*" or "corona virus outbreak*" or "corona virus pandemic*" or "coronavirus 19" or "coronavirus 2019" or "coronavirus 2019" or "coronavirus disease 19" or "coronavirus disease 2019" or "coronavirus epidemic*" or "coronavirus outbreak*" or "coronavirus pandemic*" or "covid 19" or "covid 2019" or "new corona virus" or "new coronavirus" or "novel corona virus" or "novel coronavirus" or "novel human coronavirus" or "sars coronavirus 2" or "sars cov 2" or "sars cov2" or "sars like coronavirus" or "severe acute respiratory syndrome corona virus 2" or "severe acute respiratory syndrome coronavirus 2" or "severe specific contagious pneumonia" or "wuhan corona virus" or "wuhan coronavirus" or 2019ncov or covid19 or covid2019 or ncov or sarscov2 or ((novel or Wuhan or China or Chinese or "seafood market" or "2019" or outbreak* or epidemic* or pandemic*) adj5 (coronavirus* or "corona virus*" or betacoronavirus* or "beta coronavirus*" or "beta corona virus*" or pneumonia* or SARS or "severe acute respiratory syndrome")) or ((coronavirus* or "corona virus*" or betacoronavirus* or "beta coronavirus*" or "beta corona virus*" or SARS or "severe acute respiratory syndrome") adj5 pneumonia*) or "coronavirus response" or "corona virus response").ti.	66947	COVID-19 (focused, title only)
27	*Disease Transmission, Infectious/ or *Virus Shedding/ or *Coronavirus Infections/tm or *Pneumonia, Viral/tm or (transmi* or spread* or (infect* and route*) or excret* or shed*).ti.	183017	Transmission (focused, title only)
28	26 and 27	2994	
29	25 or 28	4832	
30	limit 29 to yr="2020 -Current"	4642	
31	limit 30 to English	4539	
32	(202006* or 202007* or 202008* or 202009* or 202010*).ez.	585088	

#	Searches	Results	Concept
33	31 and 32	2802	
34	limit 33 to (comment or editorial or news)	161	
35	33 not 34	2641	
36	remove duplicates from 35	2311	

Citation

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Ontario

This is **Exhibit "CC"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

Public Health Ontario | Santé publique Ontario

SYNTHESIS

20/05/21

COVID-19 Transmission Through Large Respiratory Droplets and Aerosols… What We Know So Far

Introduction

Public Health Ontario (PHO) is actively monitoring, reviewing and assessing relevant information related to Coronavirus Disease 2019 (COVID-19). "What We Know So Far" documents provide a rapid review of the evidence on a specific aspect or emerging issue related to COVID-19. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is transmitted in different ways; however, this document will focus on transmission by respiratory droplets and aerosols.

Key Findings

- The historical dichotomy of droplet versus airborne transmission, while useful in implementing infection prevention and control (IPAC) strategies, does not accurately recognize the complexity of viral respiratory transmission, including for SARS-CoV-2.
- SARS-CoV-2 is transmitted most frequently and easily at short range through exposure to respiratory particles that range in size from large droplets which fall quickly to the ground to smaller droplets, known as aerosols, which can remain suspended in the air.
- There is evidence to suggest long-range transmission can occur under the right set of favourable conditions, implicating aerosols in transmission.
- The relative role of large respiratory droplets versus smaller droplet particles in short-range transmission is challenging to quantify. Their contributions to a specific case-contact interaction vary based on contextual factors including source/receptor characteristics (e.g., forceful expulsions such as singing, coughing, sneezing; viral load) and pathway characteristics (e.g., duration of exposure; environmental conditions such as ventilation, temperature, humidity, ultraviolet light; source control; and use of personal protective equipment).
- Translation of this summary into control measures needs to take into consideration other information, such as evidence around the effectiveness of control measures to date. Several control measures applied together in a layered approach are likely to be effective irrespective of the relative contribution of droplets or aerosols, including achieving high vaccination coverage and avoiding the "3 C's" (closed spaces, crowded places and close contact).

Background

The diameter of microorganism-containing respiratory particles relevant for respiratory infections ranges from approximately 0.01 micrometres (µm) to greater than 100 µm.[1] Particles larger than about 100 µm play a role in respiratory infection transmission by impacting on mucosal surfaces, such as the nostrils, mouth and eyes. Particles smaller than 100 µm can be inhaled or impact on mucosal surfaces. Some particles are small enough that they can be suspended in the air for various periods of time (known as aerosols).[2] Environmental factors such as local air currents and humidity affect these particles, e.g., how they move, evaporate, and how long they remain in air.[3] Therefore, the mode of transmission is influenced by three key elements: the source, the pathway, and the receptor. Depending on the unique characteristics of each element, certain modes may be more likely than others.

Traditionally, respiratory particles >5 or 10 µm have been termed droplets and were thought to impact directly on mucous membranes, while smaller particles were thought to be inhaled. This dichotomy of transmission routes has been applied to infection prevention controls within health care settings worldwide. However, these transmission routes are not mutually exclusive as droplets well over 5 µm are capable of remaining suspended in air for some time and can be inhaled. At short range within about 2 metres (m), infection can occur from inhaled aerosols as well as droplets landing on mucous membranes (short-range transmission). Herein, we refer to what was traditionally called airborne transmission via inhalation of aerosols that have remained suspended over long distances and periods of time[4,5] as long-range transmission.

We describe transmission through epidemiological studies, experimental or simulation of transmission studies, and statistical or mathematical modelling. Modelling shows what is possible, experimental studies what is plausible, and epidemiologic studies observe what is actually occurring, and each type of evidence is subject to limitations. However, exact routes of SARS-CoV-2 transmission in real-life scenarios can only be inferred based on the available data.

The purpose of this rapid review is to outline the evidence for droplets and aerosols in SARS-CoV-2 transmission. We have summarized the evidence as either short-range transmission from large respiratory droplets and small droplets or aerosols, or long-range transmission from aerosols.

Methods and Scope

In considering feasibility, scope and timelines, we undertook a rapid review to update our summary of SARS-CoV-2 transmission from large respiratory droplets and aerosols. A rapid review is a knowledge synthesis where certain steps of the systematic review process are omitted in order to be timely (e.g., duplicate screening).[6]

We conducted literature searches in MEDLINE (April 22, 2021) and National Institutes of Health COVID-19 Portfolio (Preprints) (April 27, 2021), search strategies are available upon request. We searched PubMed and Google Scholar on April 28, 2021 for additional articles of interest.

English-language peer-reviewed and non-peer-reviewed records that described large respiratory droplet and aerosol routes of transmission of COVID-19 were included. We restricted the search to articles published after January 1, 2020. This rapid review concentrated on evidence from systematic reviews and meta-analyses, supplemented by primary literature where appropriate. We reviewed citations from included articles to identify additional research.

Prior to publishing, PHO subject-matter experts review all What We Know So Far documents. As the scientific evidence is expanding rapidly, the information provided in this document is only current as of the date of respective literature searches.

Out-of-scope for this document was a review of IPAC practices appropriate for individual transmission scenarios and settings. Application of a hierarchy of control measures for non-health care settings is briefly discussed in the conclusions. For additional information related to IPAC in health care settings, please see PHO's technical briefing *IPAC Recommendations for Use of Personal Protective Equipment for Care of Individuals with Suspect or Confirmed COVID-19* and *Interim Guidance for Infection Prevention and Control of SARS-CoV-2 Variants of Concern for Health Care Settings*.[7,8] Please note that the *Ministry of Health's Directive 1* is the provincial baseline standard for provision of personal protective equipment for hospitals, long-term care homes and retirement homes and that the *Ministry of Health's Directive 5* provides agency to health care workers to make professional decisions regarding the appropriate personal protective equipment when dealing with suspected, probable or confirmed COVID-19 patients or residents.[9,10] Evidence for contact/fomite transmission, and virus and host (source/receptor) factors were not reviewed in this document, but are acknowledged as contributors to short- and long-range transmission. Other routes of transmission are reviewed in PHO's synthesis *COVID-19 Routes of Transmission – What We Know So Far*.[11]

Short-range Transmission

Main Findings

SARS-CoV-2 is transmitted most frequently and easily at short range. Short-range transmission generally occurs within 2 m of an infectious individual (e.g., during a conversation with inadequate distancing, no barriers, no personal protective equipment). Theoretically, short-range transmission may occur due to droplets or aerosols, but the relative contribution of either is specific to each case-contact interaction which varies based on contextual factors including source/receptor and pathway characteristics.

Environmental Factors Affecting Short-range Droplets and Aerosols

In addition to virus and host factors, environmental factors are associated with short-range viral transmission. The distance travelled by large respiratory droplets is generally <2 m, although it can reach up to 8 m in certain circumstances. In a study by Guo et al. (2020), SARS-CoV-2 virus was detected on the floor up to 4 m away from a patient.[12] In a systematic review of studies assessing the horizontal distance travelled by respiratory droplets, Bahl et al. (2020) reported that droplets could travel up to 8 m.[13] In a mathematical model, Chen et al. (2021) reported that respiratory droplets >100 µm in diameter are only important in transmission at a distance of less than 0.2 m when the infector is talking, or within 0.5 m when the infector is coughing.[14] Modelling by Wang et al. (2021) (preprint) suggested droplets >100 µm would most often not travel past 1.75 m (most droplets >100 µm diameter settle before 1.25 m).[15]

In a review of respiratory virus transmission, Leung (2021) reported that environmental factors affecting transmission include temperature, relative humidity, ventilation, airflow and ultraviolet (UV) light.[16] Ventilation, airflow and forceful expulsion (sneezing or coughing) can make respiratory particles travel further than 2 m through momentum.[14,17] High temperature and low humidity contributes to shrinking of droplets such that they may remain suspended in air for longer periods of time.[18]

Even at short-range distances, ventilation may affect transmission. De Oliveira et al. (2021) modelled infection risk in ventilated (10 air changes per hour [ACH]) and unventilated spaces without respiratory protection during a 1-hour exposure at 2-m distance.[19] The impact of decreasing concentration of virus in the air through ventilation was notable. Estimates of infection risk were reduced by at least three times based on the parameters and assumptions of their model. The authors also commented that the direction of airflow can have a significant impact – upward air streams can maintain aerosols at face height significantly increasing infectious risk.

Indoor settings are a predominant risk factor for transmission. In a systematic review of 5 studies, Bulfone et al. (2020) reported that the odds of indoor transmission were 18.7 times (95% confidence interval [CI]: 6.0–57.9) higher than outdoor settings, and less than 10% of infections occurred outdoors.[20] Very few superspreading events have been described from exclusively outdoor exposures. The explanation for this observation is likely multifactorial which includes important differences in ventilation, UV light, humidity, as well as possible differences in behaviour.

Epidemiological and Modelling Studies Describing Short-range Transmission

The following section reviews the epidemiologic and modelling evidence supporting short-range transmission of COVID-19. It reviews the reproductive number and summarizes the epidemiological and modelling studies by setting, including transportation, health care and sports.

The reproductive number (R_0) of SARS-CoV-2 is less suggestive of long-range transmission commonly occurring, as viruses where long-range transmission commonly occurs tend to have a higher R_0.[16] For example, in a systematic review by Guerra et al. (2017), the R_0 for the measles virus in the pre-vaccine era was 6.1–27.0,[21] compared to the median range of R_0 (2.7–3.3) reported for SARS-CoV-2.[22] It is important to note that R_0 is not a direct measure or indication of transmission route, as R_0 can be setting and population-specific, and be impacted by factors such human behaviours. The R_0 for SARS-CoV-2 also displays overdispersion, where the overall R_0 is lower than pathogens that commonly transmit through aerosols at long-range, but a small proportion of cases are associated with reproductive numbers in the range typical of viruses that commonly transmit through aerosols at long-range (i.e., superspreader events).[23] Such cases illustrate the potential variability in COVID-19 transmission, depending on differences in source/receptor characteristics and environment.

Short-range transmission was favoured in a retrospective cohort study of 18 short-to-medium haul flights (median flight time 115 minutes) to England from the beginning of the pandemic.[24] The attack rate was 0.2% (95% confidence interval [CI]: 0.1–0.5) for all aircraft-acquired cases, and was higher at 3.8% (95% CI: 1.3–10.6) if a subgroup analysis was performed only on contacts within a two-seat radius. It was assumed that no masks were worn given that it was early in the pandemic.

Family gatherings for meals are high-risk scenarios for transmission. Lo Menzo et al. (2021) reported transmission of lineage B.1.1.7 variant of concern to 8 of 9 family members during a dinner gathering.[25] The only uninfected family member was presumed to have immunity acquired from a previous infection (high antibody titres and polymerase chain reaction (PCR) negative result). Contact and fomite transmission cannot be excluded from this type of event.

In a case-control study of 154 patients 18 years and older in the United States (US), Fisher et al. (2020) reported that close contact with a person with COVID-19 was reported more often among cases (42.2%) than controls (14.5%) ($p<0.01$).[26]

Short-range transmission has been documented in school settings. Four student-to-student and one student-to-teacher transmission events were reported in Salt Lake County, Utah.[27] For four transmission events, unprotected, short-range exposures were noted. There was a lack of transmission to other students that were a median of 1 m away during class, but adhered to control measures implemented in the school. However, when household transmission associated with the secondary cases was evaluated, transmission was high for 3 of the 5 households of secondary patients. In these three households, 6 of 8 household members were also infected and may be related to challenges with physical distancing, masking, and shared surfaces in the household.

Using whole genome sequencing of SARS-CoV-2 clinical samples (n=50) in Dublin, Ireland, Lucey et al. (2020) investigated cases of hospital-acquired COVID-19 and reported that the majority of infections were among patients who required extensive and prolonged care by health care providers.[28] The authors concluded that the likely mode of transmission from health care workers to patients was through short-range transmission and close contact, rather than long-range transmission. Notably, the use of masks by health care providers was not universal and patients were not wearing masks either.

Three short-range health care-associated transmission events have been reported where large respiratory droplet transmission was less likely because masks were worn by either the source or the contact and in two of three events, the contact was also wearing eye protection.[29] In case 1, an asymptomatic, unmasked patient transmitted infection to two health care workers who wore medical masks and face shields, following multiple hours of exposure in a room with 6 ACH. A second case occurred where a presymptomatic masked health care worker transmitted infection to an unmasked patient in a room with 6 ACH. A third case involved a presymptomatic masked patient transmitting infection to a health care worker who was wearing a mask and goggles during a 45 minute face-to-face discussion at 1 m. Notably in the third case, the patient's mask was removed temporarily for oropharynx inspection. While each case was verified by whole genome sequencing, there was a lack of detail about the specific encounters (e.g., distance, duration, if direct contact occurred, if doffing errors occurred), and no airflow studies were conducted.

An analysis of SARS-CoV-2 infections in an outdoor rugby league, including video evaluation of close contact due to tackling inherent in the game, indicated that no cases among players in the league could be linked to close-contact during the outdoor rugby games.[30] Instead, transmissions were linked to other indoor short-range transmission events. While this study demonstrates examples where outdoor close-contact transmission did not occur, there were not enough close-contacts documented to provide evidence that close-contact transmission could not have occurred in the context of outdoor rugby.

In a modelling study, Zhang and Wang (2020) reported that the median infection risk via long-range aerosol transmission (10^{-6}–10^{-4}) was significantly lower than the risk via close contact (10^{-1}).[31] The model was based on a 1-hour exposure in a room with an area of 10–400 m^2, with one infected individual and a ventilation rate of 0.1–2.0 ACH. In a modelling study by Hu et al. (2020), the transmission risk from epidemiological data among train passengers as 0%–10.3% (95% CI: 5.3%–19.0%).[32] Travellers directly adjacent to the index patient had a much higher infection risk (relative risk [RR]: 18.0; 95% CI: 13.9–23.4), and the attack rate decreased with increasing distance.

Household and Non-Household Secondary Attack Rates

The consensus among systematic reviews is that household settings, where physical distancing, consistent source control mask-wearing, and disinfection of shared surfaces are potentially not feasible, are associated with a higher risk of infection compared to casual-contact settings (17%–27% compared

to 0%–7%). However, the secondary household attack rates are not as high as would be expected if SARS-CoV-2 easily spread through long-range transmission (e.g., >90% in measles).[16,33]

In a systematic review and meta-analysis of 54 studies and 77,758 patients, Madewell et al. (2020) reported that the household secondary attack rate was 16.6% (95% CI: 14.0–19.3).[34] In a systematic review and meta-analysis of 45 studies, Thompson et al. (2021) estimated the household secondary attack rate as 21.1% (95% CI: 17.4–24.8; 29 studies).[35] Non-household settings had lower secondary attack rates: 1) social settings with family and friends (5.9%; 95% CI: 0.3–9.8; 7 studies); 2) travel (5.0%; 95% CI: 0.3–9.8; 5 studies); 3) health care facilities (3.6%; 95% CI: 1.0–6.9; 10 studies); workplaces (1.9%; 95% CI: 0.0–3.9; 7 studies); and casual social contacts with strangers (1.2%; 95% CI: 0.3–2.1; 7 studies). Koh et al. (2020), in a meta-analysis of 43 studies, reported that the household secondary attack rate was 18.1% (95% CI: 15.7–20.6; 43 studies), much higher than the secondary attack rate in health care settings (0.7%; 95% CI: 0.4–1.0; 18 studies).[36] In a systematic review and meta-analysis of 24 studies, Lei et al. (2020) reported that the secondary attack rate in households was 27% (95% CI: 21−32); the risk of secondary infection was 10 times higher in households compared to non-household settings (odds ratio [OR]: 10.7; 95% CI: 5.7–20.2; p<0.001).[37] Tian and Huo (2020), in a meta-analysis of 18 studies, reported that the household secondary attack rate was 20% (95% CI: 15–28; 15 studies; n=3,861 patients), followed by social gatherings at 6% (95% CI: 3–10; 5 studies; n=2,154 patients) and health care settings at 1% (95% CI: 1–2; 4 studies; n=1,320 patients).[38]

Long-range Transmission

Main Findings

Transmission of SARS-CoV-2 over longer distances (generally >2 m) and time occurs through inhalation of aerosols under favourable circumstances, such as prolonged exposure in an inadequately ventilated space. Current evidence supports long-range transmission of SARS-CoV-2 occurring “opportunistically”, in that long-range transmission can occur under some circumstances, but inconsistently, and is not the predominant situation in which transmission occurs. Epidemiological and modelling studies support that long-range transmission via aerosols occurs. All of these examples include combinations of favourable source/receptor and pathway conditions such as inadequate ventilation, prolonged exposure time, high viral load, with certain activities (singing, exercising, yelling, etc.), and lack of masking for source control by the index case.

Environmental Factors Affecting Long-range Aerosols

In experimental models, researchers have demonstrated the potential for long-range transmission. In a series of experiments, simulations and modelling, Wang et al. (2021) (preprint) reported that aerosols could remain suspended for a longer period than historically predicted.[15] In general, viral copies/millilitre (ml) or concentration decreased as distance from source increased. The work showed that the evaporation time for large respiratory droplets is longer than predicted, especially at higher relative humidity (90%). In a sneeze plume, the largest respiratory droplets (>100 µm) are centrally located within the plume, with smaller respiratory droplets and aerosols at the periphery. The largest droplets contain more virus copies but are less abundant as they settle quickly to the ground, while smaller droplets carry fewer virus copies but are more abundant and remain in the air. The authors conclude that while aerosol transmission is important past 1 m from the source, aerosol transmission is likely even more important at shorter ranges.

Modelling studies have also highlighted the potential for aerosol transmission at varying distances. Xu et al. (2021) analysed the data of 197 symptomatic COVID-19 cases in the Diamond Princess cruise ship outbreak and concluded that long-range transmission did not occur between cabins based on the random distribution of symptomatic cases on all decks and the lack of spatial clusters of close contact (within cabin) infection.[39] The authors inferred that most transmission had occurred in public areas before the quarantine, possibly due to crowding and insufficient ventilation in those spaces. The authors also inferred that there was no transmission between passenger rooms during the quarantine period, and suggested that the ship's central heating, ventilation, and air conditioning (HVAC) system did not play a role in SARS-CoV-2 transmission. However, the authors noted that the lack of data on 109 of the 306 symptomatic individuals and on the 328 asymptomatic individuals may alter their estimation. In addition, their estimation did not take into consideration possible transmission between crew and passengers. Another model of the same outbreak estimated that the contribution of short-range transmission (from large droplets or aerosols) accounted for a median of 36% (mean: 35%) of transmission events, fomite (median: 21%; mean: 30%) and long-range (median: 41%; mean: 35%) contributing to the remainder.[40]

A study of aerosol particles (<5 μm diameter) by Dobramysl et al. (2021) (preprint) reported that time to infection increases approximately linearly as distance from source increases, the most important parameter for time to infection.[41] Exposure to a person breathing normally (simulating an asymptomatic individual) at a distance of 1 m led to infection after 90 minutes; however, coughing every 5 minutes led to infection in 15 minutes. Mask use and even minimal ventilation increased time to infection at a given distance. The importance of ventilation is also described in a modelling study by Jones (2020) which suggested that exposure to inhalable particles mostly (80%) occurs within close proximity to the patient.[42] In still air, aerosols will rise above head-level; however, turbulent air can change the trajectory of virus-laden aerosols, bringing aerosols closer to the head.[43-45] A modelling study by Sen (2021) found that when the ceiling-mounted elevator fan was off, about 11% of the droplets expelled by coughing fell to the ground while 89% evaporated and became smaller.[46] After travelling downward in cough-induced turbulence for approximately 6 seconds, droplets about 50 μm tended to move up and spread in the upper part of the elevator. If the cough happened at 30° to another rider, up to 40% of the droplets may fall on the face of another elevator rider. However, when the fan is operating, up to 50% of the droplets were dragged down to the floor in less than 3 seconds.

The basement of a large wholesale market was investigated as the source of a major outbreak in Beijing, China.[47] Many factors contributed to spread across multiple possible modes of transmission including long-range transmission. A field study of the area using fluorescent powders and microspheres as tracers allowed authors to conclude that while air was circulated, the air was unfiltered and there was very little fresh air, there was high humidity, low temperature, inadequate hand sanitization supplies in washrooms, and significant contamination of surfaces possibly due in part to resuspension of droplets from wet floors.

Given that persistence of aerosols over time is a factor in long-range transmission, the viability of SARS-CoV-2 in aerosols is important to consider. The half-life of SARS-CoV-2 in aerosols is approximately 1 hour.[48,49] Humidity seems to have less of an effect on SARS-CoV-2 viability in aerosols compared to the effect of sunlight or temperature.[50,51] Increasing temperature is associated with a reduction in the half-life of SARS-CoV-2 in aerosols.[52-54] Using a rotating drum experiment similar to other studies for viability of SARS-CoV-2, simulated sunlight (UVA/UVB) was applied to aerosolized virus through a window on the drum.[51] Results indicated 90% inactivation of virus within 20 minutes.

Inadequate ventilation can contribute to spread of aerosols, where the buildup of infectious aerosols is inversely proportional to the number of air exchanges.[55-57] In a modelling study, Schijven et al. (2021) assessed the risk of aerosol transmission of SARS-CoV-2 at a distance beyond 1.5 m from continuous breathing, speaking, or singing, or from one cough or one sneeze, in an indoor environment of 100 m^3.[58] Where there was no ventilation, the mean risk of transmission (derived from dose-response data for human coronavirus 229E) after 20 minutes of exposure to a person with 10^7 RNA copies/ml of mucous was estimated at 0.1%, except for sneezing with high aerosol volume (40,000 picolitres/sneeze). The mean risk of transmission increased to above 30% for sneezing with high aerosol volume and above 10% for singing after an exposure of 2 hours to a person with mucous RNA concentration above 10^8 copies/ml. Ventilation at 1 ACH reduced the risk by approximately half and at 6 ACH, the risk of transmission was reduced by a factor of 8–13 for sneezing and coughing, and by a factor of 4–9 for singing, speaking and breathing.

Estimates for minimum infectious dose, amount of viable virus in aerosols and quantified exposure rates are lacking. One preprint study assessed superspreading events related to long-range transmission in order to determine a minimum infectious dose for transmission.[59] The model used rate of aerosolized virion shedding based on data from other coronaviruses and a destabilization rate measured for SARS-CoV-2. They reported a critical exposure threshold for aerosol transmission of 50 virions. A computational characterization of inhaled droplets by Basu (2021) reported an estimated inhaled infectious dose around 300 virions, which was similar to estimates of 500 virions for ferrets.[60] The author acknowledged that this estimate could vary widely depending on environmental and individual biological factors.

Epidemiological and Modelling Studies Describing Long-range Transmission

Epidemiological case studies have reported long-range transmission of SARS-CoV-2, exclusively in indoor settings (e.g., bus, church, restaurant, concert halls, apartment building, office building).[61-67] In most of these case studies, long-range transmission was inferred as the dominant route of transmission, given that infectees were usually further than 2 m away from index cases. In addition, in these case studies, susceptible people were exposed to index cases for prolonged periods (>50 minutes) in indoor environments with inadequate ventilation and, in some instances, with increased respirations (e.g., singing, yelling, or exercising) and/or no face mask use (by case and/or contact). As with most epidemiological studies on transmission events, it was difficult to exclude other contributing routes of transmission. We summarize a few of these case studies, highlighting settings and contributing contextual factors to long-range transmission.

Stagnant indoor conditions can contribute to aerosol transmission. One example is a series of transmissions linked to an individual who developed symptoms around the time they were playing squash in an unventilated squash court.[68] Players who arrived hours after the index case and played in the same squash court were later identified as positive cases, though the role of other potential routes (e.g. unidentified staff contacts, shared surfaces) may have contributed as well and the source of transmission could not be confirmed. In contrast, a post-operative analysis of susceptible patients (no previous SARS-CoV-2 infection or vaccination) in a surgical suite within 48 hours following the use of the suite by SARS-CoV-2 positive patients indicated that there were no transmission events. The event rate was lower than the number of events in a control group (0% vs. 1.9%).[69] Ventilation was likely a significant factor that prevented transmission in the surgical suite.

In a study of six indoor singing events (five with transmission) in the Netherlands, Shah et al. (2021) (preprint) reported that long-range transmission was the likely route of transmission (short-range transmission possibly contributing to transmission at three of these events and indirect contact transmission possibly contributing to transmission at one of the events).[62] The authors assigned transmission likelihood as either less likely or possible; however, the authors do not state how these were defined. Attack rates at these events ranged from 25%–74% (9–21 people aged 20–79 years attended the events) and authors hypothesize that singing led to transmission. The authors note that they cannot quantify the contribution of each route of transmission. Genomic sequencing was not performed to help rule out other sources of SARS-CoV-2.

In a choir group (Washington, US), 53 of 60 individuals (excluding the index patient) were confirmed or strongly suspected to have been infected during a 2.5 hour rehearsal in a main hall.[64] Individuals who moved to another area of the building from the index case to practice for 45 minutes were less likely to become infected than those who remained in the main hall for the full duration of the rehearsal.

Twelve secondary cases of SARS-CoV-2 were linked to an index case, an 18-year-old chorister with high viral load who sang at four 1-hour services.[70] The index case was seated at a piano raised approximately 3 m from the ground floor and facing away from the secondary cases. Secondary cases sat between 1–15 m (horizontal distance) from the index case. Use of masks was not in place and there was minimal ventilation during the service (ventilation system was off, fans were off and doors and windows were largely closed). Interestingly, no new cases were linked to exposure that occurred the day of respiratory symptom-onset, and no explanation could be provided for why only a certain section near the chorister was affected and other sections (including those directly in front of the index case) were not.

In a case study by Shen et al. (2020), passengers who were not wearing masks were exposed to a presymptomatic index patient for 100 minutes while on a bus in eastern China.[61] Twenty-four of 67 passengers became infected, including several passengers seated beyond 2 m distance. The bus containing the index patient was heated and air was recirculated without filtration. Infections occurred in individuals at either end of the bus and the index case was located roughly in the middle. Risk of infection was only moderately higher for individuals sitting closer to the index patient. In contrast, seven of 172 other people attending the same religious event were positive for SARS-CoV-2. Some of the cases became positive after 14 days from exposure; thus, transmission likely did not occur on the bus for these case. The authors of this study postulate that the poor ventilation in the bus supports aerosol transmission in this cluster; however, other routes of transmission such as close contact from movement within the bus or fomites could not be excluded.

Vehicles are also potential environments for short-range and long-range transmission. A patient transport van was implicated in long-range aerosol transmission despite physical distancing observed by the infected drivers in two distinct transmission events.[71] One driver did not wear a mask, but all passengers wore a single-layer mask. The passengers were exposed for 2 hours during both events. Transmission was confirmed by whole genome sequencing. Fans were on medium speed and windows were closed. Airflow experiments were conducted with different size aerosols demonstrating plausibility of spread from the driver.

An epidemiological investigation of a chain of transmissions was reported beginning with a flight from India to New Zealand, a bus ride to a quarantine facility, a stay at a quarantine facility, a bus ride to the airport, and subsequent household transmissions.[72] Based on positivity test dates, genome sequencing, flight positions and hotel room placement the transmission events were ascribed to both short-range and long-range transmission on flights, within the quarantine facility, and within households. Masks

were required on flights and bus rides. One of the transmission events occurred between two adjacent hotel rooms in the quarantine facility. The authors used recorded video and observed >20 hours between any shared items and no direct contact. The authors concluded that fomite transmission was unlikely and attributed transmission to aerosols in the corridor outside of the hotel rooms wherein the space was enclosed and unventilated. Notably, the hotel rooms themselves, based on a review of the ventilation system, exerted positive pressure relative to the corridor.

An investigation by Lin et al. (2021) into an outbreak of nine COVID-19 cases from three families living in vertically-aligned units of an apartment building in Wuhan, China supported the possibility of long-range transmission.[66] Phylogenetic analysis of respiratory samples showed that all cases were infected by the same strain of SARS-CoV-2. Epidemiological investigation revealed that 4/5 cases of the index family in apartment 15-b had a travelling history to Wuhan, while the other four cases in apartments 25-b and 27-b had neither a travelling history to Wuhan nor close contact with any COVID-19 cases prior to their infection. Transmission through close contact in the elevators was considered unlikely as video records in the elevator did not show any close contact between the index family and the cases from units 25-b and 27-b. However, there was an incident where one unmasked occupant of unit 27-b took the elevator 8 minutes after two unmasked occupants from the index family had left the elevator. Epidemiologically, the infection rate for residents in units b was significantly higher ($p<0.05$) than that in units a and c. Testing of wind speed at the bathtub drain and floor drain found that the airflow produced by toilet flushing on one storey can influence the entire building as the drain pipes for toilets and the sewage pipes connected with floor drains were connected with the exhaust pipe. An experiment with a tracer gas indicated that gas could spread from one storey to another via the drainage and vent systems, especially as the seals in U-shaped traps in the floor drains were dried out in some units and the use of exhaust fans could create a negative pressure in the pipeline system. A similar situation was reported involving air ducts in a naturally ventilated apartment complex in Seoul, South Korea.[67] There were no valves blocking air from entering the bathrooms from the shared natural ventilation shafts (not for building or apartment unit ventilation). Limitations of this outbreak investigation included no genome sequencing or air sampling. Direct applicability to Canadian contexts may be limited by different building construction standards and practices.

Independent of ventilation, movement of air from an infected individual to others nearby can be an important factor in long-range transmission. Direct airflow was deemed responsible for a long-range transmission event in a restaurant in Korea.[73] The suspected index case sat 4.8 m and 6.5 m away and directly upwind of the airflow from two secondary cases at different tables. Nine other visitors in the restaurant did not test positive for SARS-CoV-2 even though at least two were closer to the index case for longer but not in the direct path of airflow originating from the index case. Notably the transmission in one case was suspected to have occurred from an exposure as short as five minutes, and three patrons sitting with the secondary cases but facing away from the index cases were not infected.

An investigation by Lu et al. (2020) into a COVID-19 outbreak in a restaurant in Guangzhou, China involving three families sitting at three tables in close proximity for about 1 hour concluded that the air conditioning (AC) system likely contributed to transmission.[63] In this scenario, a presymptomatic index case and secondary cases were present in the same area for 53–73 minutes. The location of a consistently running AC unit was in the airflow path of the secondary cases and was in an enclosed environment. No secondary cases occurred in staff or at adjacent tables that were outside of the likely "air column". The furthest distance between index and secondary cases was approximately 3 m. Additional investigation indicated that the exhaust fans had been closed due to cold outside temperatures.[74] The airflow assessment indicated that air was recirculating in a defined area, which exposed the three families.

A report involving group exercise at three facilities in Hawaii, US calculated attack rates of 25%–100%.[75] There was no fresh air ventilation and exposure occurred over a duration of 1 hour. Extended close contact and lack of masks in some cases were concluded as contributing to the transmission.

An outbreak in a multi-bed hospital room occurred wherein three patients and six health care workers became infected despite the use of masks and presence of ventilation of 3–4 ACH.[76] The presymptomatic index case was a parent located in a chair beside their child's bed who constantly wore a surgical mask, near the entrance to the room. Notably the air conditioning unit appeared to be located on the ceiling and no details were given about how it operated (e.g., constant versus timed/triggered) and what amount of fresh air circulation it provided. There were no exhaust vents indicated on the room diagram. Exposures for health care workers were in the range of 10–15 minutes, most at distances further than 2 m from the index patient. The report noted that masks were worn as personal protective equipment by health care workers. Transmission was based on the epidemiology of the outbreak without corroboration by genomic analysis of infections.

Detection of SARS-CoV-2 in Air Samples

Air sampling for virus refers to the process of collecting volumes of air by a device to determine if aerosols may contain virus. Collection can vary by aerodynamic size captured, duration of collection, volume per second collected, and media on which samples deposit. Air samples can then be tested by molecular methods such as reverse transcription PCR (RT-PCR) to amplify viral nucleic acids and/or viral culture. RT-PCR cannot determine whether the microorganisms detected are viable. Viral culture is used to determine whether a sample containing the virus is capable of replication. While there are several factors that contribute to the probability of infection, replication is a surrogate measure for inducing infection. To detect viability, researchers apply a sample to a susceptible cell culture and incubate up to a few weeks to detect morphological changes.

Detection of SARS-CoV-2 RNA in air samples has been inconsistent.[77] Multiple air sampling studies performed in proximity to confirmed COVID-19 cases were unable to detect any virus by RT-PCR.[78-86] Kenarkoohi et al. detected SARS-CoV-2 RNA by RT-PCR in 1/5 samples from a ward containing intubated, severely ill patients, but did not find any positive air samples in other areas of the hospital such as wards with suspected, confirmed and mild patients (culturing of virus was not attempted in this study).[87] Chia et al. (2020), in an extended study of Ong et al. (2020), detected SARS-CoV-2 RNA by RT-PCR in air samples collected within 1 m of patients in two of three airborne infection isolation rooms (AIIRs) (no culture of virus attempted).[88] Lei et al. (2020) reported limited detection of SARS-CoV-2 RNA virus by air sampling in open wards, private isolation rooms and bathrooms.[85] One PCR-positive air sample was obtained during an endotracheal intubation within 10 cm of the patient's head in a naturally ventilated room (window open with fan attached), eleven other air samples near patients and 17 samples outside patient rooms and at nursing stations were PCR-negative.[89] The stage of infection and level of infectiousness of the patient populations sampled were not reported.

In a study of SARS-CoV-2 RNA in air samples collected from a variety of settings, Liu et al. (2020) reported that the highest concentration of viral RNA was reported from patient and staff areas of hospitals, compared to public areas.[90] Gharehchahi et al. (2021) (preprint) found SARS-CoV-2 RNA in 7/17 (41.2%) of air samples in a hospital for COVID-19 patients, including a mechanically-ventilated temporary waste storage area, two naturally-ventilated offices (one in the admission and discharge area, the other in an administrative department), and within 2 m of patients' beds in two intensive care units (ICUs), a negative pressure room, and an accident and emergency ward that are mechanically-ventilated with or without natural ventilation.[91] SARS-CoV-2 RNA was not detected from the four

samples at nursing stations 2–5 m from patients' beds. The authors speculated that the detection of RNA in non-clinical areas could be due to inadequate ventilation and the occasional presence of infected health care workers.

Stern et al. (2021) sampled air in locations outside of patient care areas in an acute care hospital and found 8/90 (9%) of the samples positive for SARS-CoV-2 RNA, with concentrations ranging from 5–51 copies/m^3.[92] The size of the RNA-positive samples ranged from ≤2.5 to ≥10 μm. Locations adjacent to negative-pressured wards designated for COVID-19 patients did not appear to increase the likelihood of detecting viral RNA, having higher viral concentration, or finding particles of specific sizes in air samples. However, a significant positive association was observed between the average number of COVID-19 patients staying in the hospital during each sampling period, and the likelihood of an air sample testing positive for SARS-CoV-2 RNA. Furthermore, areas where staff congregated during times of high community rates of COVID-19 were associated with positive air samples. Of note, one RNA-positive air sample was taken when the unit was closed for cleaning and not under negative pressure, and the unit doors were left open for cleaning staff who had to pass by the air sampler to access the area for cleaning.

When air samples were RT-PCR-positive, culturing attempts were infrequently successful. In a systematic review and meta-analysis of 24 studies, Birgand et al. (2020) reported that 17.4% (82/471) of air samples from patient environments were RNA-positive (there was no difference in positivity at ≤1 m [2.5%] or 1–5 m [5.5%]; p=0.22), while culturing produced viable virus in 8.6% (7/81; 2 out of 5 studies) of samples.[93] A study by Guo et al. (2020) detected SARS-CoV-2 by RT-PCR in 35% (14/40) of air samples in an ICU and 12.5% (2/16) of air samples in the general ward that managed patients with COVID-19. Fifteen of 16 RT-PCR-positive air samples were from within 2 m of patients, with 1/8 samples positive at 4 m away.[12] Ben-Shmuel et al. (2020) conducted limited sampling (generally one air sample per area) in rooms with ventilated and non-ventilated patients, at a nursing station, and in private and public areas of a quarantine hotel.[94] RT-PCR-positive air samples were detected in a room with a ventilated patient (distance from patient was not reported) (n=1/1), at a nursing station (n=1/1), and in a quarantine hotel room (n=1/1). However, there were no positive air samples in rooms of non-ventilated patients (n=0/3), a doffing area (n=0/1), and a public area of a quarantine hotel (n=0/1). The authors attempted viral culturing; however, no samples were positive.

At this time, only three studies, two from the same research group and one preprint from July 2020, have successfully cultured viable virus from the air. The preprint and one published study were already referred to above in the summary of Birgand et al. (2020). Sampling techniques and equipment may have caused the lack of culture viability despite RT-PCR detection in other studies. Future studies should aim to replicate the use of equipment and culture methods as these studies.

Lednicky et al. (2021) used a prototype and commercial version of an air sampler and custom RT-PCR probes for detection of SARS-CoV-2 in a patient room with two patients. One patient was discharged soon after sampling periods began and after receiving a negative RT-PCR test.[95] The remaining patient began experiencing respiratory illness two days prior to admission to the room. The study detected RT-PCR-positive air samples following 3 hours of sampling as well as positive viral cultures. Researchers positioned samplers 2–4.8 m from the recently symptomatic patient's head. The ventilation unit provided 6 ACH, filtering air and treating air with UV irradiation before recycling the air. Estimates of virus per volume of air ranged from 6–74 tissue culture infective dose $(TCID)_{50}$ units/L of air. Recently, a second study by Lednicky et al. was performed to detect viable SARS-CoV-2 virus from the front passenger seat area of a car driven by a SARS-CoV-2-positive patient without cough symptoms.[96] This study involved a sampler affixed to the sun visor in the passenger seat collecting particles sizes in ranges

of <0.25 µm, 0.25–0.50 µm, 0.50–1.0 µm, 1.0–2.5 µm and >2.5 µm. The patient drove for 15 minutes with the windows up and air conditioner on. The sampler was turned off 2 hour after the patient completed the 15 minute drive. Viable virus was cultured only from the 0.25–0.5 µm fraction, which also had the highest quantity of detectable copies of viral RNA.

Further research is needed to reconcile differences in viral RNA detection and virus viability in air samples, despite RT-PCR-positive samples found on the surfaces of ventilation units.[97] Differences may be due to several factors, including: 1) air sampling devices are potentially not capable of maintaining viability of captured virus; 2) timing of air sampling varies by time since onset of symptoms, severity of disease or viral load; and 3) the conditions of ventilation (engineering controls) reducing concentrations of viral aerosols to undetectable levels. Even in rooms with high air exchanges, Tang et al.'s review of SARS-CoV-2 aerosols indicates that viral RNA copies can still be detected in air samples from patient rooms (1.8–3.4 viral RNA copies/m^3), toilet rooms (19 copies/m^3), and personal protective equipment doffing rooms (18–42 copies/m^3).[98] In a series of distinct room types (two AIIR with 15+ ACH, an isolation room without negative pressure and a shared cohort room) for patients admitted within 7 days of symptom-onset, Kim et al. reported that 32 air samples were negative and 20 air samples from anterooms were also negative.[86] Culturing viruses is technically challenging; therefore, the lack of positive cultures does not necessarily indicate an absence of infectious virus. On the other hand, the detection of SARS-CoV-2 viral RNA on surfaces that are rarely touched suggests that the virus may be transported through the air to those no-touch surfaces.[99]

Conclusions

Respiratory virus transmission occurs on a spectrum, from larger droplets that spread at short range, to aerosols that are present at short ranges but may also contribute to long-range transmission. As a result, categorizing SARS-CoV-2 transmission as either droplet or airborne does not accurately reflect this spectrum. Other respiratory viruses, like influenza, have similarly been described to demonstrate a spectrum of droplet sizes contributing to transmission.[100,101]

The highest risk of SARS-CoV-2 transmission likely occurs via close (<2 m), unprotected exposure (lacking multiple prevention measures) to an infectious individual. While there is a lower risk of transmission at longer distances with unprotected exposure, this kind of transmission has only been documented to occur under certain conditions, usually involving inadequate ventilation or with recirculation of unfiltered or untreated air in combination with activities involving increased exhalation/expulsion (e.g., shouting, singing, exercising), and often with a lack of source control masking.[102] Defining measures or cutoffs for inadequate ventilation was not possible based on the available descriptions of the contexts in which inadequate ventilation was reported to contribute to transmission. However, they included situations where air is circulated without filtration or exchange with fresh air, where there is no ventilation (e.g., windowless rooms without a ventilation system), and where the size of the room and ventilation rate relative to the quantity of infectious aerosols generated exceeds an unknown threshold of risk for infection. VOCs may be more effectively transmitted across all modes of transmission; however, there is no evidence that any VOCs transmit by fundamentally different routes.[103-105]

The delineation of relative contributions of short-range large respiratory droplets and aerosols and long-range aerosols to overall transmission patterns is complicated by the variable confluence of dynamic source/receptor factors and pathway factors. For example, each infector/infectee interaction is affected by source activities and amount of source viral load (e.g., forceful expulsion of droplets during coughing or singing, and timing in the course of illness), source/receptor adherence to preventative measures in place (e.g., hand hygiene, physical distancing, surface disinfection, mask-wearing and ventilation), and

pathway factors that include airflow, UV, temperature, and humidity in indoor or outdoor environments.[16] It is likely that the relative contribution of respiratory particle size to transmission will depend on these combination of factors.

A large body of evidence is emerging related to SARS-CoV-2. Studies related to identification of a specific mode of transmission are generally low quality. Moreover, data from different fields (e.g., epidemiology versus modelling) can be at odds with respect to conclusions drawn about the role of different sized droplets in short-range transmission and relative importance of long-range transmission events. Ongoing study is needed for further evidence regarding the quantity of viral particles required to cause infection. Additional assessment of SARS-CoV-2 viability in aerosols is needed. Lastly, elucidation of setting-specific risk factors for transmission (e.g., differences between source/receptor and pathway factors in health care settings, residential buildings, schools, warehouses, transportation) may provide further insight into mechanisms for transmission.

The COVID-19 pandemic has identified the importance of interdisciplinary collaboration towards understanding and having a common lexicon for describing virus transmission. When the analysis and interpretation of data is challenged by variable terminology used between and within public health, clinicians, aerosol scientists and the public, this can limit progress towards identification and application of appropriate mitigation measures.[106]

Implications for Practice

This document summarizes the evolving evidence on transmission through respiratory particles and acknowledges the role for both larger droplets and aerosols in transmission. While our understanding of how transmission occurs has evolved and the relative contribution of droplets and aerosols continues to be studied, this may not necessitate a change in infection control measures, but highlights the importance of incorporating multiple infection control layers to mitigate transmission. Translation of this information into recommendations for control measures also needs to take into consideration evidence not reviewed in this document on the overall effectiveness of control measures to date: 1) effectiveness of measures in isolation and in combination as layered mitigation; 2) effectiveness in the community vs. health care settings; and 3) effectiveness and the impact of implementation fidelity.

A detailed assessment of the evidence for infection prevention and control measures was out of scope for this document and thus limits discussion of recommendations for specific measures in different contexts. Of note, vaccination against SARS-CoV-2 is a relatively recent measure that is very effective at reducing transmission regardless of the mode of transmission and should be the priority control measure both in health care and community settings.[107]

In health care settings, recommendations for IPAC measures are described in *IPAC Recommendations for Use of Personal Protective Equipment for Care of Individuals with Suspect or Confirmed COVID-19* and *Interim Guidance for Infection Prevention and Control of SARS-CoV-2 Variants of Concern for Health Care Settings*.[7,8] These documents integrate the existing evidence around droplet, aerosol and contact transmission with jurisdictional experience with control measures and outbreak management to date, and recommends the use of the hierarchy of hazard controls to reduce the risk of transmission.

The bulk of disease transmission occurs in the community and in workplaces, not in health care settings. As SARS-CoV-2 transmits early in the course of infection, most commonly in the asymptomatic or presymptomatic period[108-111] and within the first two days of symptom-onset, cases may not seek health care during their most transmissible phase. In all settings it is necessary to utilize multiple control

measures to mitigate the dynamic transmission factors and address potential routes of transmission. Infection prevention controls should also be context-dependent and take into account vaccination status/coverage, the ability to physically distance and avoid crowding, the feasibility of proper wearing of appropriate personal protective and source control equipment, training and education on the appropriate use of personal protective equipment, hand hygiene, surface disinfection, indoor ventilation, and early identification and isolation of infectious persons. Finally, application of measures should also be in the context of overall rates of community transmission and risk of exposure.

Several resources exist for community guidance (e.g., non-health care workplaces, public and private spaces) on how to reduce the risk of SARS-CoV-2 transmission through a layered approach of multiple public health measures designed to mitigate short-range and long-range transmission.[112-114] In general these involve avoiding the "3 C's": closed spaces, crowded places, and close contact. The degree to which various mitigation layers are necessary or possible will depend on the setting and risk context. Transmission can be mitigated through:

- Getting vaccinated[115,116] (higher vaccine coverage in the population can reduce risk for individuals unable to receive a vaccine)
- Staying home when sick[117,118] (e.g., active and passive screening prior to entry into public settings)
- Limiting the number and duration of contacts with individuals outside your household
- Physical distancing[114] and avoiding crowded spaces
- Consistently and appropriately using a well-fitted, well-constructed (2-3-layer) mask for source control and personal protective equipment.[119-122]
- Ensuring that ventilation systems[123] are well-maintained and optimized with the support of professionals according to relevant recommendations (e.g., from American Society of Heating, Refrigerating and Air-Conditioning Engineers) and/or using outdoor environments whenever possible.
- Performing hand hygiene, respiratory etiquette, and environmental cleaning[124]

The above measures are effective means of reducing risk of transmission irrespective of the relative contribution of larger droplets or aerosols to transmission. Some controls will be more effective than others and it is the combination and consistent application of these controls that is most effective for reducing disease spread.

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Ontario

This is **Exhibit "DD"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

Public Health Ontario | Santé publique Ontario

SYNOPSIS

05/22/2020

COVID-19 – What We Know So Far About… Asymptomatic Infection and Asymptomatic Transmission

Introduction

PHO is actively monitoring, reviewing and assessing relevant information related to Coronavirus Disease 2019 (COVID-19). "What We Know So Far" documents are intended to provide a rapid review of the evidence related to a specific aspect or emerging issue related to COVID-19.

The development of these documents includes a systematic search of the published literature as well as scientific grey literature (e.g., ProMED, CIDRAP, Johns Hopkins Situation Reports) and media reports, where appropriate. Relevant results are reviewed and data extracted for synthesis. All "What We Know So Far" documents are reviewed by PHO subject-matter experts before posting.

As the COVID-19 outbreak continues to evolve and the scientific evidence rapidly expands, the information provided in these documents is only current as of the date of posting.

Key Points

This document summarizes the evidence regarding asymptomatic infection and transmission of SARS-CoV-2, the virus that causes COVID-19, by individuals who are asymptomatic. For clarity, in this document we will use the term COVID-19 to refer to both the virus and the disease.

Asymptomatic infection:

- **There is clear evidence of asymptomatic infection with COVID-19**. Estimates of the proportion of laboratory-confirmed cases who are asymptomatic may vary by age group, study setting and study methodology, ranging from 8.2% (infants under 1 year of age),[1] 18.2% (contact tracing in a conference outbreak),[2] 36.7% (travellers),[3] 43.2% (universal screening in a town),[4] up to 87.8% (outbreak investigation in a homeless shelter)[5] (see Asymptomatic Infection). The method of detection of asymptomatic cases (i.e., mass screening or testing contacts of cases), and the duration of follow-up to ensure asymptomatic individuals do not subsequently develop symptoms may influence the proportion of cases who are reported to be asymptomatic.

Asymptomatic transmission:

- There is some epidemiological and virological evidence of transmission from people who are asymptomatic and never develop symptoms. On the other hand, there is **more epidemiological and virological evidence as well as inferences from modelling and statistically analyses, that**

transmission can occur from presymptomatic COVID-19 patients (where transmission takes place during their incubation period). In particular, epidemiological investigations and virological findings have suggested that **transmission can occur as early as six days before symptom onset** and possibly even earlier, although alternative unrecognized sources of infection cannot be ruled out. Other studies have estimated the serial interval (time from onset of symptoms in one case to the onset of symptoms in the person they infect) and found that it is shorter than the length of the incubation period, suggesting transmission during the incubation period (see Modelling and Statistical Analysis below).

Background

Asymptomatic infection occurs when an individual is infected but experiences no symptoms, while asymptomatic transmission occurs when an infected individual without symptoms transmits the virus to another person. There are two mechanisms by which asymptomatic transmission can potentially occur:

1. Transmission from an individual who never develops symptoms—if the infected person is asymptomatic throughout his/her infection but nevertheless is infectious.

2. Transmission from an individual during their incubation period—if the infected person is infectious before he/she develops symptoms.

Asymptomatic Infection

Evidence of asymptomatic COVID-19 infection has been reported in studies that report on contact tracing activities, as well as in outbreak investigations and surveillance data. Asymptomatic infections have been reported in all age groups, occurring in various proportions of confirmed cases in different settings. Several studies reported that a substantial portion of COVID-19 patients remained asymptomatic at the end of their isolation period.

Asymptomatic Infections by Settings

The following highlights the proportion of asymptomatic COVID-19 cases from contact tracing activities, outbreak investigations and surveillance activities in various settings.

HEALTH CARE SETTING

A number of studies reported rates of asymptomatic infections after a period of isolation:

- Among the 138 cases detected in Brunei from March 5 to April 24, 2020, all were hospitalized and followed until viral clearance; 42 (30%) were presymptomatic at the time of diagnosis but later developed symptoms and **16/138 (12%) remained asymptomatic until viral clearance**.[3]

- 13/23 (57%) resident cases identified at a point-prevalence screening in a long-term care skilled nursing facility in Washington, United States with a COVID-19 outbreak were asymptomatic; only **3/23 (13.0%) remained asymptomatic at rescreening one week later**.[6]

- 14/19 (74%) resident cases and 4/8 (50%) staff cases identified at multiple point-prevalence screenings in a long-term care skilled nursing facility in California, United States with a COVID-19 outbreak were asymptomatic; **6/19 (31.6%) resident cases remained asymptomatic after at least 17 days of observation**.[7]

- 29/33 (87.9%) pregnant women who tested positive for SARS-CoV-2 at two New York obstetric centres were asymptomatic when screened at delivery; **26/33 (78.8%) remained asymptomatic until discharge**.[8] In another report from about a week before to a week after universal screening was started at these same two centres, 14/43 (32.6%) SARS-CoV-2–positive pregnant women were found to be asymptomatic on admission (two because they later developed symptoms and 12 by screening); 4/43 (9.3%) were asymptomatic throughout their postpartum courses.[9]

- **28/131 (21.4%)** COVID-19 confirmed hemodialysis patients from 65 centres in Wuhan, China remained **asymptomatic throughout** the course of their infection.[10]

- 30/1,012 (3%) patients admitted during February 7-12 to a make-shift hospital for non-critically ill COVID-19 patients in Wuhan, China were asymptomatic on admission. **14/1,012 (1.4%) patients remained asymptomatic after a median duration of 24 days** from exposure (interquartile range: IQR: 22-27).[11]

- Of 31 patients who were asymptomatic on admission to a hospital in Guangzhou, China, **9/31 (29.0%) remained symptom-free during hospitalization**. The viral load was higher in those who subsequently developed symptoms than in those who remained symptom-free.[12]

- 13/328 (4.0%) adult **patients admitted** to a public health centre in Shanghai, China were asymptomatic; **10/328 (3.0%) remained asymptomatic from 5 to 21 days after admission**, although all but one patient had radiologic abnormalities on chest CT.[13]

- **13/71 (18.3%) admitted patients** at a hospital in South Korea were **asymptomatic on admission. 10/71 (14.1%) remained asymptomatic for the entire quarantine period**, and the other 3 cases developed symptoms within 2 days of admission.[14]

CONGREGATE LIVING SETTINGS

High prevalence of asymptomatic infections at the time of testing have been reported in a few congregate settings:

- 87.8% of 147 adult COVID-19 cases identified through screening at a homeless shelter in Boston.[5]

- More than 350 of 615 (>57%) COVID-19 cases on the Theodore Roosevelt aircraft carrier.[15]

- 3 of the 4 resident cases identified at a senior independent and assisted living community in Seattle, Washington reported feeling well between the 14 days prior to and 14-21 days after testing.[16]

- 410/696 (58.9%) confirmed passenger and crew COVID-19 cases in the Diamond Princess cruise ship outbreak.[17] Adjusting for the possible future development of symptoms (right censoring) using a statistical model, Mizumoto et al. estimated the asymptomatic proportion to be 17.9% (95% credible interval (CrI): 15.5 to 20.2%).[18]

COMMERCIAL PREMISES

Two outbreak reports identified cases that remained asymptomatic through the follow-up period:

- In a call centre outbreak in Seoul, 4/97 (4.1%) confirmed COVID-19 cases were presymptomatic and another **4/97 (4.1%) remained asymptomatic throughout a 14-day isolation period**.[19]

- In a conference outbreak in Munich, Germany, **2/12 (17%)** infected attendees **remained asymptomatic after weeks of follow-up**.[2]

COMMUNITY

There are regional and national surveillance reports on the presence of asymptomatic infection in the community:

- A national surveillance report by the Chinese Center for Disease Control and Prevention reported 889/45,561 (2%) of laboratory-confirmed cases as asymptomatic at the time testing as of February 11.[20]

- 94/728 (12.9%) laboratory-confirmed children reported to the Chinese Center for Disease Control and Prevention during January 16-February 8, 2020 were asymptomatic (from 8.2% in children <1 year of age [7/85] to 17.6% for those 6-10 years of age [30/170]).[1]

- Integrated surveillance of COVID-19 in Italy reported 28.6% of the 33,189 cases with clinical data were asymptomatic as of May 20.[21]

- Analysis of regional surveillance data from one day in Lombardy, Italy found 17/380 (4.5%) cases as asymptomatic.[22]

- 35/81 (43.2%) cases identified in two point-prevalence surveys of all inhabitants of the municipality of Vò, Italy were asymptomatic at the time of testing.[4]

- 30/112 (26.8%) cases in a cluster of fitness dance classes in South Korea were asymptomatic at the time of testing.[23]

There are also studies reporting community-based infections that remained asymptomatic after a period of time:

- **50/1,015 (4.9%) confirmed cases** (41 adults and 9 children) in Huangshi, China were **asymptomatic throughout a quarantine period of at least 14 days**, according to publicly available disease databases of Hubei Provincial Health Committee up to March 27, 2020.[24]

- **5/48 (10.4%) secondary cases** among close contacts in Zhuhai, China **remained asymptomatic through a 21-day follow-up**.[25]

- Wan R et al. described 2 close contacts of confirmed patients. Case 1 was exposed at work to a COVID-19 patient and diagnosed 16 days later by reverse transcription polymerase chain reaction (RT-PCR). He **remained asymptomatic up to the end of the isolation period 25 days after exposure**; two chest radiographs taken during his isolation period were negative. Case 2 was the adult son of a COVID-19 patient. Case 2 was isolated the day after the parent's diagnosis and he **remained asymptomatic throughout 26 days of isolation**. Two chest radiographs taken during his isolation were also negative.[26]

TRAVELLERS

A few countries that tested their repatriated passengers or travellers from countries at high-risk of COVID-19 also reported asymptomatic infections:

- 40/783 (5.1%) repatriated passengers to Greece during March 20-25, 2020 who tested positive for SARS-CoV-2 reported no general or respiratory symptoms.[27]
- 2/114 (1.8%) repatriated passengers to Germany on February 1 were asymptomatically infected and remained afebrile 7 days after diagnosis, although one patient developed a faint rash and minimal pharyngitis.[28]
- Out of the 30 arrivals to Brunei who tested positive for SARS-CoV-2 between March 21 and April 24, 11 (36.7%) were presymptomatic and 3 (10%) were asymptomatic.[3]
- In a cluster of 6 travellers and 6 secondary cases in Vietnam, 1/12 cases (8.3%) remained asymptomatic but viral RNA was detected by RT-PCR throughout the 9-day follow-up period.[29]

Abnormal Chest Imaging

Asymptomatically infected individuals can have abnormal chest imaging.

- Hu Z et al. showed that 12/19 asymptomatic adults and children had abnormal chest CT scans.[30]
- Chan JF et al. described an abnormal chest CT in a 10-year old asymptomatic child.[31]
- Wang Y et al. noted pneumonia in CT findings in 37/55 of asymptomatic cases on admission. Note that all 55 cases developed symptoms during hospitalization: 14 had mild infection, 39 had ordinary symptoms and 2 had severe COVID-19.[32]
- Zhou X et al. reported that 9/10 asymptomatic patients hospitalized at a public health centre had signs of pneumonia on their chest CT scans.[13]
- Zhou R et al. noted bilateral abnormalities in chest CT scans typical of pneumonia in 4/9 patients who remained asymptomatic throughout hospitalization.[12]
- Inui S et al. reported that chest CT findings consistent with pneumonia were seen in 41/76 (54%) asymptomatic passengers on Diamond Princess cruise ship.[33]

Asymptomatic Transmission

There is some **evidence of transmission from people who are asymptomatic and never develop symptoms**, and **more evidence of transmission from people who are in their incubation period** (i.e. people who transmit infection while asymptomatic, but prior to their development of symptoms).

Transmission From People who Never Developed Symptoms

Findings from epidemiological and virological investigation have been published to support the observation that transmission can occur from people who never developed symptoms after their infection.

EPIDEMIOLOGICAL EVIDENCE FOR ASYMPTOMATIC TRANSMISSION

Several authors reported clusters of infections in China where epidemiological findings suggest the possibility of transmission by asymptomatic patients.

- Zhou J et al. reported two transmission events by asymptomatic patients in ZhuZhou, China.[34]
    - A 37-year-old woman was isolated for observation after returning from Wuhan on January 22, 2020. Viral RNA was only detected in the 5th specimen taken on February 15, and she remained asymptomatic up to March 2 when her test turned negative and showed no pulmonary imaging changes. Meanwhile, her father was diagnosed of COVID-19 on February 12, 3 days before viral RNA was detected in the woman's specimen.
    - An asymptomatic patient who returned from Wuhan appears to have infected her mother-in-law and father-in-law.

    Zhou et al. conclude that asymptomatic SARS-CoV-2 carriers can spread the virus before viral RNA was detected. It should be noted that they did not provide any information on potential alternate sources of infection or on the reliability of the testing done.

- Zhang J et al. reported a family cluster of 5 in Beijing. The index case was the only one in the cluster who had been to Wuhan; he returned to Beijing in January and invited his nephew (M/32) for dinner that day. This nephew became ill 3 days later and was diagnosed 2 days after symptom onset. Around that time, the index patient's wife (F/45) had a fever and they heard of a relative in Wuhan having COVID-19. As a result, the index patient and family visited a hospital to be assessed and the index and 4 family members (including the nephew and wife) were diagnosed with COVID-19. Both the index patient and a family member remained asymptomatic throughout the observation up to the end of February. The index patient's chest radiograph showed ground glass opacities but that of the other asymptomatic family member was normal. The authors believe the index patient passed the infection on to his family despite having no symptoms himself. However, details of other family members' contact history were not given to rule out potential alternate sources of infection.[35]

- A study by Bai Y et al. reported on an asymptomatic individual who transmitted COVID-19 to five family members in Anyang. She tested positive 18 days after her presumed exposure, with a negative test on day 16 and two negative tests on days 26 and 29. Although the authors argue that the asymptomatic individual was the source of infection for the family members, the family visited a hospital as well. Although the hospital reported no COVID-19 cases at that time, this is a potential alternative source of exposure.[36]

- Hu Z et al. reported on an asymptomatic case who appears to have acquired his infection in Hubei province and transmitted his infection to his wife, son and daughter-in-law who lived with him in Nanjing. His family members denied any other known exposures to confirmed or suspect COVID-19 patients.[30]

- Lavezzo E et al. reported on 3 cases who appeared to have acquired their infection based on contact with asymptomatic individuals. The cases were identified on the second of two point-prevalence surveys that took place at the end of a two-week lockdown of the municipality of Vò, Italy: case 1 had exposure to 4 infected relatives who did not have any symptoms at the time of contact; case 2 had a meeting with an asymptomatic case before the lockdown; case 3 shared

the same flat with two asymptomatic relatives. The authors noted that all the asymptomatic individuals never developed symptoms during the two-week lockdown.[4]

VIROLOGICAL EVIDENCE FOR ASYMPTOMATIC TRANSMISSION

Several studies reported high viral loads in asymptomatic individuals as measured by real-time RT-PCR.

- Arons MM et al.[37] cultured the real time RT-PCR-positive specimens from two point-prevalence surveys in a skilled nursing facility as part of an outbreak investigation, as described in Kimball A et al.[6] above. Viral growth was observed for 13/20 symptomatic residents, 17/24 presymptomatic residents, 1/3 asymptomatic residents. **Viable virus was isolated from 6 days before to 9 days after symptom onset**. In addition, **high viral RNA loads were detected in all groups with median cycle threshold values at 24.8 in those with typical symptoms and 25.5 for those who were asymptomatic**. This suggests the potential for substantial viral shedding in asymptomatic cases. No correlation was observed between cycle threshold values and time from symptom onset.[37]

- Zou L et al. noted that an asymptomatic individual had similar viral loads from nasal and throat swabs compared to 17 symptomatic individuals.[38]

- Roxby AC et al. noted that the viral load in 3 generally asymptomatic residents (one developed a mild cough) of an independent living community were similar to those reported among ill hospitalized patients.[16]

- Kam K et al. noted a high viral load in a nasopharyngeal specimen from a generally well baby. Nasopharyngeal specimens were positive for 16 days and one stool specimen was also positive.[39]

- Hoehl S et al. observed COVID-19 virus in cell culture in throat specimens from two repatriated passengers who tested positive by RT-PCR. One patient developed slight rash and minimal pharyngitis the day after testing but both persons remained well and afebrile during the 7 days after hospital isolation.[28]

- Cereda D et al. noted that the median viral RNA levels in nasal swabs were not statistically different between 295 symptomatic and 17 asymptomatic obstetric cases:
5.0 $\log_{10}$ RNA copies/mL (range 1.7-10.1) vs 4.7 $\log_{10}$ copies/mL (range 2.1-7.1), (P=.51).[22]

Transmission During the Incubation Period

There is both epidemiological and virological evidence, as well as inferences from modelling and statistical analysis, that point to transmission from people prior to their symptom onset.

EPIDEMIOLOGICAL EVIDENCE FOR PRESYMPTOMATIC TRANSMISSION

Several studies describe potential transmission prior to symptom onset, i.e., in the incubation period. In most instances, the contacts who acquired the infection reported no other known sources of exposure other than a case who was in their incubation or early symptomatic period.

- Hijnen D et al. reported an outbreak amongst at least 11/13 attendees (one attendee was not tested) from seven countries at a 2-day conference in Munich, Germany in February, when under 20 cases of COVID-19 had been diagnosed in the country. The **index patient** (a physician

was believed to have been infected when examining a patient in Italy two days before the start of the conference) **developed symptoms only after he had left the conference**.[2]

- Rothe C et al. reported an outbreak in Germany resulting from a business meeting in late January.[40] Böhmer MM et al. reconstructed the transmission events with epidemiological findings and whole genome sequencing of 13 of the 16 subsequent cases.[41] The index case was a Chinese resident from Shanghai who had had contact with her parents from Wuhan before visiting Germany in January for work reasons. Presymptomatic transmission likely occurred from patient 4 (symptom onset on January 24) to patient 5, as patient 5 did not meet the index case but had encounters with patient 4 on January 22 when they sat back to back in the canteen and patient 5 turned to ask patient 4 to borrow the salt shaker from their table. Böhmer MM et al. noted that **presymptomatic transmission is strongly supported by virus sequence analysis**. In addition, presymptomatic transmission could possibly have occurred for 5 more cases.[41]

- Jang S et al. reported on the active surveillance results of a COVID-19 cluster associated with fitness dance classes. On February 15, 2020, a 4-hour workshop for 27 fitness instructors took place in Cheonan, South Korea (approximately 200 km from Daegu where an outbreak was emerging). After discovering cases in Cheonan linked to fitness dance classes, the workshop was investigated. Eight of the 27 instructors at the workshop were found to be infected with SARS-CoV-2. One of these instructors was from Daegu, and therefore was the presumed source case for the outbreak, and developed symptoms on February 18, 2020, three days after the workshop.[23]

- Cheng HY et al. conducted a prospective study that enrolled all the initial 100 confirmed cases in Taiwan from January 15 to March 18, 2020 and their 2,761 close contacts. All close contacts were quarantined at home for 14 days after their last exposure to the index case, and any typical symptoms triggered testing. High-risk contacts (e.g., household and hospital contacts) were tested regardless of symptoms. No secondary clinical cases were detected from all 91 close contacts of the 9 asymptomatic patients. Cheng et al. identified 22 secondary cases, 18 of whom had symptoms. They determined a secondary clinical infection risk of 0.7% (95% confidence interval (CI): 0.4% - 1.0%) among 2,761 close contacts. **For the 299 contacts with exclusive presymptomatic exposures to the index case, the secondary clinical attack rate was 0.7% (95% CI, 0.2%-2.4%)**. The authors noted that the actual contribution of early transmission could be greater as they did not completely identify contacts before symptom onset of the index cases.[42]

- Wei WE et al. reviewed the clinical and epidemiological records of all 243 cases in Singapore to determine whether presymptomatic transmission might have occurred. Of these cases, **157 were locally acquired with 10 (6.4%) attributed to presymptomatic transmission within 7 clusters**, where investigation did not identify any other potential sources of infection. The authors noted that although an unknown source might have caused some of these infections, given that COVID-19 prevalence was very low during the period under investigation and strong surveillance systems were in place, presymptomatic transmission was deemed the most likely mode of transmission. The authors also note that recall bias related the onset date of symptoms might add uncertainty to the duration of the presymptomatic period.[43]

Multiple authors also reported clusters of infections in China where the transmission histories suggest the occurrence of presymptomatic transmission. It should be noted that due to circulation of COVID-19 in China during that time, it is possible that there was another unrecognized source of infection, in addition to the cases reported.

- Gao Y et al. reported a 15-person cluster with 4 generations of transmission and 6 asymptomatic cases in Wuxi. Except the index case, none of the other 14 cases had any history of suspicious exposure except for contact with the previous generation case(s). In this cluster, infections are believed to have spread to the next generation before onset in the previous generation as follows: 2-7 days before onset (1st to 2nd generation), 6-7 days before onset (2nd to 3rd generation), and 3-8 days and 9 days before onset (3rd to 4th generation). The authors noted that generation 2 might also have been infected from other sources while touring in Japan. However, the transmission history of the other generations support the idea of presymptomatic transmission.[44]

- Luo SH et al. reported a cluster of 4 adults in Anqing. Epidemiological evidence suggests that one patient was infected by her husband during the presymptomatic stage of his infection. Neither the wife nor husband had travelled to Wuhan or adjacent areas or had recent exposure to wild animals. However, the husband likely acquired his infection from a relative while the relative was symptomatic.[45]

- Huang L et al. reported a cluster of 8 teenagers and young adults aged 16-23 years in Hefei, originating from a 22-year-old male returning from Wuhan. Six secondary cases became infected after contact of several hours duration with the index case one day before his symptom onset; another secondary case was likely exposed 3 days before the index case's symptom onset. None of the secondary cases had visited Wuhan or had any exposure to wet markets, wild animals, or medical institutes within the previous 3 months.[46]

- Li C et al. described transmission in a familial and hospital settings in Xuzhou. The source case is believed to have acquired his infection on January 14, 2020 during a 6-hour transfer in a train station in Wuhan when travelling to Xuzhou and developed symptoms on January 19, 2020. While caring for his son-in-law in hospital he interacted with another patient and that patient's son from January 15 to 18 (1 to 4 days before the source patient's onset of symptoms); both the other patient and his son became infected. The source case also infected several members of his family whom he was with both before and after the onset of symptoms. Other source(s) of infection, particularly in the hospital setting may also be possible, although were not mentioned by the authors.[47]

- Li P et al. describe a familial cluster of 4 in Zhoushan, who had close contact with a presymptomatic family member 4 to 7 days before the index case's symptom onset. Other than the index case, the family reported no contact with people with fever or respiratory symptoms in Wuhan or other areas with persistent local COVID-19 transmission in the 14 days prior to their symptom onset, and no history of contact with wild animals or poultry.[48]

- Ye F et al. reported a cluster of 5 people from 2 families in Luzhou. The three members of Family 1 traveled from Wuhan to Luzhou on January 22, and met with the two members of Family 2 between January 23 and 25 and on January 30. Family 2 had not left Luzhou and their only contact with anyone from Wuhan was Family 1. The first and last contact between Family 1 and 2 was 13 and 6 days before the first case in Family 1 developed symptoms on February 5. All five family members developed symptoms and the symptoms in the first case in Family 2 started on February 1, 2020, 4 day before the symptoms in Family 1.[49]

- Yu P et al. described an 88-year-old man from Shanghai who developed symptoms 5 days after the arrival of two visitors from Wuhan. The two visitors developed symptoms after the man,

with the earliest symptom onset among the two visitors occurring 11 hours after the man's first symptoms. This suggests that at least one of the visitors had spread infection in their incubation period. Assuming the visitor with the earliest symptom onset transmitted infection to the man, **the earliest the infection could have occurred is from 5 days before onset of illness in that visitor**, based on the date of the visitors' arrival.[50]

- Huang R et al. described a patient from near Wuhan who visited her family in Nanjing and did not develop symptoms until 4 days after leaving Nanjing. She infected six family members, some of whom she lived with and some with whom she attended one or more dinners with, including one on the day before her departure. Two family members, who appear to have been infected at the family dinner with the visiting woman the day before her departure, attended another family dinner with three different relatives. This occurred on the day after the dinner with the visiting woman, and 3 and 4 days before the onset of symptoms. The three relatives subsequently developed symptoms and were found to be infected with COVID-19. **This suggests that transmission can occur at least 5 days before symptom onset and that transmission may occur as early as 1 day following exposure**.[51]

- Tong ZD et al. reported a case of COVID-19 from Wuhan who attended a conference in Zhoushan three days before illness onset. Two colleagues from Zhoushan also attended the conference and dined with the case the following day (2 days before illness onset), sharing the same serving plates. The two colleagues were subsequently confirmed to be infected. **This suggests that the source patient likely infected his two colleagues at least 2 days prior to symptom onset**.[52]

VIROLOGICAL EVIDENCE FOR PRESYMPTOMATIC TRANSMISSION

In addition to epidemiological reports that attribute the source of infection to presymptomatic COVID-19 patients, we found an article that reports on finding viable COVID-19 virus in specimens from patients prior to their symptom onset. Another two studies reported high viral loads in presymptomatic individuals as measured by real-time RT-PCR.

- Arons MM et al. cultured the real time RT-PCR-positive specimens from two point-prevalence surveys in a skilled nursing facility as part of an outbreak investigation (see also Virological Evidence for Asymptomatic Transmission). **Viable virus was isolated from 6 days before to 9 days after symptom onset**. In addition, **high viral RNA loads were detected in all groups with median cycle threshold values at 24.8 in those with typical symptoms and 23.1 for the presymptomatic**. This suggests the potential for substantial viral shedding in presymptomatic cases. No correlation was observed between cycle threshold values and time from symptom onset.[37]

- Kim SE et al. noted very high viral loads (cycle threshold values <20) in specimens from 2 presymptomatic patients two days before symptom onset.[14]

- Zhou R et al. noted significantly higher viral load in nasopharyngeal specimens from presymptomatic patients (median cycle threshold value: 34.5 [IQR 32.2-37.0]) than those from asymptomatic patients (median cycle threshold value: 39.0 [IQR 37.5-39.5]).[12]

MODELLING AND STATISTICAL ANALYSIS

We found a modelling study which estimated that **infectiousness started from 2.3 days (95% CI: 0.8-3.0 days) before symptom onset and peaked at 0.7 days** (95% CI: 2.0 days before symptom onset to 0.2 days after onset). In addition, a number of authors have compared the incubation period with the serial interval of COVID-19. The serial interval is the time from onset of symptoms in one case to the time of symptom onset in the case(s) they infect. When the serial interval is shorter than the incubation period, some transmission is likely to have occurred in the incubation period.

- He X et al. assessed viral RNA load from 414 throat swabs of 94 patients from symptom onset up to 32 days after onset. Viral load based on RT-PCR was observed to be high soon after symptom onset and then declined. The authors then identified 77 transmission pairs from publicly available international sources. Using a mean incubation period of 5.2 days, the serial interval was estimated to have a median of 5.2 days (95% CI: 4.1-6.4 days), with 7.6% having negative serial intervals (which occur when the secondary case's symptom onset precedes that of the primary case). The estimated proportion of presymptomatic transmission was 44% (95% CI: 25-69%).[53]

- From 22 transmission pairs out of 100 confirmed cases in Taiwan, Cheng HY et al. estimated a median incubation period of 4.1 days (95% credible interval, 0.4-15.8) and a median serial interval of 4.1 days (95% credible interval, 0.1-27.8).[42]

- Analyzing published data of 18 transmission pairs with onset dates clearly defined in published articles, Nishiura H et al. estimated a median serial interval of 4.6 days (95% CrI: 3.5-5.9), which was shorter than a mean incubation of approximately 5 days from other published sources.[54]

- Analyzing 16 cases in four transmission generations, Böhmer MM et al. estimated a median incubation period of 4.0 days (IQR 2.3-4.3) and a median serial interval of 4.0 days (IQR 3.0-5.0).[41]

- Assuming a single source of infection for each household, Wu J et al. analyzed 48 secondary cases from index cases in 35 households in Zhuhai, China and estimated a median incubation period of 4.3 days (95% CI: 3.4-5.3) and a serial interval of 5.1 days (95% CI: 4.3-6.2).[25]

- From a cluster of seven people (1 teenager, 6 young adults) infected by a 22 year-old in Hefei, China, Huang L et al. estimated a median incubation period of 2 days (range 1-4) and a median serial interval of 1 day (range 0-4).[46]

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Ontario

This is **Exhibit "EE"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

Public Health Ontario | Santé publique Ontario

SYNTHESIS

09/14/2020

Wearing Masks in Public and COVID-19 – What We Know So Far

Introduction

"What We Know So Far" documents are intended to provide an overview of some of the published and unpublished reports related to emerging issues with respect to Coronavirus Disease 2019 (COVID-19). The reports are found through ongoing scanning of the published literature and scientific grey literature (e.g., ProMed, CIDRAP, Johns Hopkins Situation Reports), as well as media reports. For this report, library information specialists at Public Health Ontario searched Ovid MEDLINE, Embase, PsycINFO, EBSCOhost, CINAHL, and Scopus from January 1, 2000 to August 31, 2020 (search strategy available upon request). It is recognized that there may be additional information not captured in this document. As this is a rapidly evolving outbreak, the information will only be current as of the date the document was written.

Key Points

- Public mask-wearing is **likely beneficial as source control** when worn by persons shedding infectious SARS-CoV-2 virus.
- **Mandatory public mask policies** have been associated with a decrease in new COVID-19 cases compared to regions without such policies.
- **Studies evaluating masking in children are limited and have demonstrated variable results** with respect to their effectiveness for source control. However, studies have consistently shown lower adherence, especially in younger children.
- Masking to **protect the wearer is unlikely to be effective in non-healthcare settings**. Existing evidence demonstrates that wearing a mask within households after an illness begins is not effective at preventing secondary respiratory infections.
- There is variability in the effectiveness of homemade and cloth masks. Some materials adequately filter the expulsion of viral droplets from the wearer making them theoretically suitable for **source control**.
- There are theoretical risks of harms from public mask use including self-contamination from improper use and facial dermatitis or discomfort. Children may experience more discomfort from wearing a mask compared to adults. Though there are studies that observe subtle physiologic changes caused by N95 use, there is currently **no evidence that surgical or cloth masks exacerbate respiratory diseases**.

Background

Masks have two potential functions. They may protect the wearer of the mask from exposure (personal protective equipment), or protect individuals from exposure to respiratory aerosols/droplets from the mask wearer, referred to as source control. The use of masks for the general public has been recommended as one of several COVID-19 pandemic mitigation strategies. The Canadian and Ontario governments are currently recommending non-medical face masks or homemade face coverings to be worn by the public when physical distancing cannot be maintained.[1,2] The World Health Organization revised their guidance on June 5, 2020 that "governments should encourage the general public to wear masks in specific situations and settings as part of a comprehensive approach to suppress SARS-CoV-2 transmission".[3,4] These recommendations have been made largely due to the increasing recognition of the importance of pre-symptomatic and asymptomatic transmission and the potential benefit for source control.[5,6] As part of Ontario's school re-opening plans, masks are recommended for children in junior kindergarten (JK) to grade 3 and mandatory for grades 4-12.[7] This *What We Know So Far* was updated on September 8, 2020 and reviews the available evidence for wearing a mask to prevent respiratory viral infections in non-healthcare settings including evidence surrounding homemade masks and evidence specific to children.

Mask-wearing in Non-Healthcare Settings - COVID-19 Studies

No randomized trials have been published so far on mask use by the public during the COVID-19 pandemic. However, observational and ecological studies suggest that mask-wearing provides source control and public mask-wearing mandates have led to reduced daily COVID-19 growth rates.[8-11]

- An ecological report from Germany released in June 2020 utilized Synthetic Control Methodology (SCM) to evaluate the impact of mandatory mask use on public transportation and in sales shops in the city of Jena.[10] On March 30th, the local government in Jena announced that masks would be mandatory starting April 6th, 2020. Masks became mandatory in the rest of Germany between April 20 and 29th, 2020. SCM involves identifying synthetic control groups which were following the same COVID-19 trend as Jena prior to April 6th. The weighted average of this synthetic control group of regions where masks did not become mandatory on April 6th were used as a counterfactual to evaluate the causal effect of mandatory masking. The authors concluded that mandatory masking reduced the daily growth rate of COVID-19 in Jena by 40%. It is not known from this ecological analysis the extent and quality of uptake of mask wearing, the type of masks worn, and if the demonstrated benefit is related to source control, protecting the wearer, or a combination thereof. It is possible there were other public health measures taken in Jena at this time that confound this finding (i.e. physical distancing), and the impact of behavioural change due to mandatory masking was not addressed. However, the authors do note that the timing of the introduction of face masks was not affected by other overlapping public health measures as a general "lock down" had been in place for two weeks. This report has not been peer-reviewed.[10]
- Lyu et al. 2020 performed an observational event analysis, similar to a difference-in-differences design, which provides evidence that states in the United States (US) mandating face mask use in public had a greater decline in daily COVID-19 cases compared to states that did not issue mandates.[11] Sixteen regions issued mask mandates between April 8th and May 15th. Compared to states without mandates, daily COVID-19 growth rates significantly declined by 0.9%, 1.1%,

1.4%, 1.7%, and 2.0% at 1-5, 6-10, 11-15, 16-20, and 21 or more days following the state mandate, respectively. In another analysis, the authors evaluated the impact of employee-only mandates (no public community requirement) and did not find a significant impact from those more targeted mask mandates. While the authors attempted to adjust for other public health measures in their models, residual confounding is possible. This study was unable to assess masking adherence by the public, but provides supporting evidence that state-level mask mandates may have been effective in reducing COVID-19 case numbers.[11]

- Xu et al. 2020 conducted an interrupted time series evaluating trends in new COVID-19 cases and deaths in the US.[12] The authors report slope changes which they attribute to stay-at-home orders on March 23rd (slope change: -0.18, 95% CI: -0.22 to -0.14) and face mask recommendations by the US Centers for Disease Control and Prevention (CDC) on April 3rd (slope change: -0.10, 95% CI: -0.18 to -0.08). Two delayed slope changes were also identified in new deaths on April 9th (slope change: -0.17, 95% CI: -0.21 to -0.14) and April 19th (slope change: -0.13, 95% CI: -0.25 to -0.07). There is a high risk of residual confounding in this study. The attribution of the initial slope change to these two policy interventions is very close together and it is unlikely that the CDC recommendation on April 3rd would result in an immediate change in incidence of new cases. Furthermore, this observational study was unable to account for the multiple simultaneous public health interventions occurring.[12]
- Cheng et al. 2020 report COVID-19 data from Hong Kong with 11 clusters (113 cases) from "mask-off" settings (dining, karaoke, fitness clubs) compared to 3 clusters (11 cases) from "mask-on" settings in workplaces (p=0.036).[13] However, this study cannot differentiate if the differences are related to masks versus physical distancing and increased expulsion of droplets (i.e., singing, exercising) in these settings. They also describe COVID-19 epidemiology in Hong Kong, which had a daily mask compliance of >95%, compared to representative countries in North America, Europe, and Asia and describe significantly lower COVID-19 incidence in Hong Kong. These findings also have potential confounding from broad public health measures of strict quarantine and physical distancing guidance early on in the pandemic in Hong Kong.[13]
- Wang et al. 2020 conducted a retrospective cohort study of household contacts of COVID-19 cases for predictors of secondary transmission in Beijing, China.[9] The overall secondary attack rate was 23% and they found that if it was reported that one or more family members (primary case or family contacts) wore face masks **prior to the development of symptoms**, then there was a 79% reduction in transmission (OR=0.21, 95%CI: 0.06-0.79). Of note in this study was no protective effect of mask-wearing by household contacts if initiated after symptom-onset in the primary case. The findings are associated with the inherent limitations with telephone interview including recall bias.[9]
- Hong et al. 2020 conducted contact tracing of 197 residents in Taizhou, China exposed to 41 presymptomatic COVID-19 positive cases who returned from Wuhan in January 2020.[8] The secondary attack rates from 28 mask-wearing presymptomatic cases was 8.1% (10/123) compared to 19.0% (14/74) from 13 non-mask-wearing presymptomatic cases (p<0.001).[8]
- A contact investigation of two hairstylists with respiratory symptoms and confirmed COVID-19 who wore cloth face masks during close contact with 139 clients did not result in any secondary transmissions (67 of whom tested negative for SARS-CoV-2 by RT-PCR).[14]
- Two case reports describe no in-flight transmission aboard an airplane with symptomatic COVID-19 cases who wore masks during the flight.[15,16]
- Chou et al. 2020 are conducting a living rapid systematic review on the effectiveness of mask use in both healthcare and community settings.[17] As of their most recent update on September

1st, 2020, they have identified one study by Wang et al., discussed above. Updates are expected every 1-2 months.[17]

Mask-wearing as Source Control – Non-COVID-19 Studies

Studies to date have found that the use of medical masks may reduce the amount of aerosol/droplet shedding of some bacteria and viruses from symptomatic individuals, but have inconsistently demonstrated a reduction in secondary cases in household or other close contact studies.

- MacIntyre et al. 2020 re-analyzed data from a previous clinical trial using only seasonal coronavirus data.[18] They identified 10 index cases in the mask group and 9 controls. There was no secondary transmission in either group, although 5/9 control index cases reported wearing a mask.[18]
- Barasheed et al. 2014 conducted a pilot study randomizing tents at the Hajj to 'supervised mask use' (mask use 76%) or 'no supervised mask use' (mask use 12%) for both individuals with influenza-like illness (ILI) and their contacts who slept within 2 meters.[19] They found less ILI among contacts in the mask group (31% versus 53%, p=0.04); however, there were no differences in laboratory-confirmed respiratory virus detections.[19]
- MacIntyre et al. 2016 performed a cluster randomized controlled trial (RCT) of surgical masks for patients with ILI (n=123) compared to controls (n=122) evaluating the risk of secondary cases in household contacts.[20] There were no statistically significant differences in clinical respiratory illness (relative risk (RR) 0.61, 95% CI 0.18 to 2.13), ILI (RR 0.32, 95% CI 0.03 to 3.13) or laboratory-confirmed viral infections (RR 0.97, 95% CI 0.06 to 15.54). As one third of controls wore masks, the authors conducted a post-hoc per protocol analysis and there was a statistically significant protective effect in clinical respiratory infections (RR 0.22, 95% CI 0.06 to 0.86), but not laboratory-confirmed respiratory infections.[20]
- Stockwell et al. 2018 found that mask-wearing significantly reduced the release of *Pseudomonas aeruginosa* aerosols during coughing in people with cystic fibrosis compared to uncovered coughing.[21] The results were similar for surgical masks and N95 respirators.[21]
- Milton et al. 2013 examined exhaled breath samples from symptomatic people infected with seasonal influenza viruses and found that surgical masks reduced the amount of viral aerosol shedding by 3.4 fold overall, ranging from 2.8 to 25 fold depending on particle size.[22]
- Dharmadhikari et al. 2012 studied patients with multidrug-resistant tuberculosis and demonstrated that surgical mask-wearing significantly reduced transmission in experimental conditions.[23]
- Leung et al. 2020 studied surgical mask-wearing in 246 symptomatic individuals with influenza, rhinovirus, and seasonal coronaviruses.[24] They found a significant reduction in virus by polymerase chain reaction testing of exhaled breath droplets and aerosols in the 124 individuals randomized to wearing masks (4/10 versus 0/11, p=0.04). This study did not confirm if the quantity of virus was infectious.[24]

Evidence for Mask Use in Children

There have been no studies evaluating mask use for COVID-19 source control in children. However, there have been 4 cluster RCTs evaluating mask use for influenza prevention in the community that included children as the index cases. Two studies found a possible protective effect for masking and hand hygiene (HH) together, particularly if the intervention was implemented within 36 hours of symptom-onset in the index case,[25,26] while two studies found no apparent protective effect.[27,28]

However, in all studies, mask-adherence when reported was generally poor and the effects may have been related to adults in the study wearing masks, children wearing masks for source control, or a combination thereof. The one study which evaluated masking alone for source control (33% of the index cases were children) did not demonstrate any benefit.[27] One observational study in Japan found a small reduction in influenza infections from self-reported mask-wearing in schools.[29]

- Canini et al. 2010 performed a cluster RCT of masking the index patient for five days after testing positive for influenza on a rapid test to prevent secondary household transmission. ILI was reported in 16.2% of contacts where the index case was masked, and 15.8% when the index case was not masked; there were no significant differences between surgical mask and control groups. This study included 35 (33%) children <15 years as the index case. The analysis was not stratified by age; however, children were significantly more likely to report mask discomfort (i.e., reported feeling pain), compared to adults (3/12 [25%] vs. 1/39 [2.6%], p=0.036).[27]
- Suess et al. 2012 conducted a cluster RCT comparing masking, masking + HH, or control in 84 households, including index cases, with influenza infection in the 2009/10 and 2010/11 seasons.[25] There was no significant effect from either intervention in the primary analysis. Almost all index cases were children <14 years (81/84 [96%]). The average daily adherence to masking by index patients ranged from 40-60% and decreased over time. There was a potential effect observed in the subgroup that implemented masking + HH within 36 hours of symptom-onset of the index case (adjusted odds ratio (OR): 0.16, 95% CI: 0.03-0.92).[25]
- Simmerman et al. 2011 performed a cluster RCT of 442 households in Thailand during the influenza H1N1 pandemic comparing HH, HH + masking with surgical masks, or control to prevent influenza transmission in households with an influenza-positive child.[28] 50% (221/442) of the index patients were <6 years of age. There were no differences in clinical or laboratory-confirmed influenza in either intervention arm (HH + mask compared to control; OR: 1.16; 95% CI: 0.74-1.82). Adults wore their masks for a median of 153 (IQR: 40-411) minutes per day compared to 35 (IQR: 4-197) minutes in the child index cases.[28]
- Larson et al. 2010 conducted a cluster RCT in 509 households and 2,788 individuals (47.3% children ≤ 17 years) comparing health education (HE), HE + HH, or HE + HH + masking with surgical masks on incidence and secondary transmission of upper respiratory tract infections and influenza.[26] There was a significant decrease in secondary respiratory infections in the HE + HH + mask group compared to HE alone (OR: 0.82, 95% CI: 0.70-0.97). This study did not evaluate a masking-only group and while index cases were encouraged to wear masks in the masking group, adherence to mask use was reported as poor by the authors.[26]
- Uchida et al. 2017 conducted an observational questionnaire-based study with 10,524 school-aged children in Japan, of whom 5,474 (52.0%) reported wearing masks.[29] In the multivariable logistic regression model, wearing a mask was associated with reduced risk of influenza infection (OR: 0.86; 95% CI: 0.78-0.95). 21.5% of non-mask-wearing children in grades 4-6 were diagnosed with influenza compared to 18.9% of mask-wearing children (relative effectiveness 12.0%, absolute risk reduction 2.6%). 21.3% of non-mask-wearing children in grades 1-3 were diagnosed with influenza, compared to 20.2% of mask-wearing children (relative effectiveness 5.3%, absolute risk reduction 1.1%). No statistical analysis was performed on the subgroups by age.[29]
- Chen et al. 2020 conducted a survey of 3,649 school-aged children 6-13 years of age about mask use.[30] 51.6% reported good mask-wearing behaviour, with older children (grades 5-6 compared to grades 1-2; OR 1.21, 95% CI; 1.03-1.43), and parental educational level, being associated with better reported mask-wearing behaviour.[30]

- Allison et al. 2010 conducted a survey of teachers after distributing masks to both teachers and students for 4 weeks.[31] Teachers reported that 39% of them thought mask use was not disruptive and 35% reported they would use masks again the following winter. However, 97% reported they would use masks during a pandemic. By direct observation only 30% of students wore masks in week 1 of the study, which decreased to 15% in week 2.[31]
- Stebbins et al. 2009 conducted a parent and teacher survey on nonpharmaceutical interventions to prevent influenza in schools.[32] Student mask-wearing was among the lowest acceptable interventions by both parents and teachers.[32]
- Van der Sande et al. 2008, discussed further in the next section, compared homemade tea cloth masks, surgical masks, and FFP-2 (European equivalent of N95 respirators) in 28 healthy adult volunteers and 11 children between the ages of 5-11 years performing various physical maneuvers and measured quantitative differences in particles with a Portacount®.[33] There were no differences in median protection factors between adults and children.[33]

Protective Effects to the Mask-wearer in Non-Healthcare Settings - Non-COVID-19 Viral Respiratory Infections

Randomized Trials

There have been several cluster randomized studies on the use of medical masks outside of the hospital setting. These studies have evaluated the effectiveness of masking household members and individuals in other confined spaces (e.g. university residences, airplanes) to prevent acquisition of respiratory infections. In the majority of studies, no significant benefit from wearing masks was identified. Studies that demonstrated a benefit were associated with enhanced hand hygiene measures. No RCTs evaluating the effectiveness of mask use by the public to decrease COVID-19 infections have been completed, however there is a trial in Denmark under way (NCT04337541).[34]

- Dugre et al. 2020 performed an umbrella systematic review of masks in healthcare workers and the public.[35] They identified 11 systematic reviews, with 18 RCTs, of which 12 were in the community. In their meta-analysis, mask-wearing by the public did not reduce clinical respiratory infection (RR=1.06, 95% CI; 0.82-1.36; I^2=0%) or confirmed influenza or other viral respiratory infection.[35] The authors pooled the two studies below by Aiello from 2010 and 2012 and identified a significant protective effect on mask-wearing in university dormitories for ILI (RR=0.83, 95% CI; 0.69-0.99; I^2=0%; NNT=24).[36,37]
- Aggarwal et al. 2020 pooled controlled trials and did not identify a significant effect for either mask use alone versus control (5 studies, pooled effect size (pES) -0.17, 95%CI -0.43 to 0.10) or mask use with HH versus control (6 studies, pES -0.09, 95%CI -0.58 to 0.40), in reducing ILI in household and university settings.[38]
- Aiello et al. 2012 conducted a cluster RCT in university residents comparing three arms: HH + masking, masking alone, or control. They found no effect in the primary analysis of ILI or laboratory-confirmed respiratory infections. However, there was a significant effect on ILI in weeks 3-6 of the study in the mask + HH arm (RR = 0.25, 95% CI, 0.07 to 0.87), but not in the mask-only arm, suggesting the effect may have been due to HH.[37]
- Aiello et al. 2010 performed a cluster RCT in university residence halls with 3 arms; masking with surgical masks, masking + HH, or no intervention. In the primary adjusted analysis there were no

significant differences in the mask only group (relative risk (RR) 0.90, 95% confidence interval (CI) 0.77-1.05) or mask + HH group (RR 0.87, 95% CI 0.73-1.02).[36]

- Cowling et al. 2009 performed a cluster RCT of 259 households with confirmed influenza patients.[39] Households (≥3 people) were randomized to either HE (control), HH, or HH + masking with surgical masks. The study included 189 (73%) index cases <16 years. There was no statistically significant difference in either laboratory-confirmed or clinical influenza infection between the 3 groups. In a post-hoc analysis limited to those that applied the intervention within 36 hours of symptom-onset in the index case, mask + HH reduced laboratory-confirmed influenza infections (OR: 0.33, 95% CI; 0.13-0.87), but not clinically-defined influenza. Self-reported mask adherence + HH for index cases and contacts was 49% and 26%, respectively. The authors conclude that if applied early, masks + HH for household contacts of influenza-infected individuals may be effective.[39]
- MacIntyre et al. 2009 performed a cluster RCT of adult household members masking after a child was diagnosed with a respiratory illness. They compared surgical mask, N95 respirator, or control. There were no significant differences between either type of mask and control; however, mask adherence was low.[40]

Non-randomized Studies

Systematic reviews and meta-analyses of observational studies for non-COVID infections have found protective effects from mask-wearing. In contrast to the largely negative randomized trials above, the results of these studies should be interpreted cautiously considering the substantial biases present from the original studies used in these meta-analyses.

- Liang et al. 2020 performed a systematic review and meta-analysis of mask effectiveness. Of the 21 identified studies for inclusion, 8 were in non-healthcare workers.[41] The pooled results of these 8 studies published from 2004-2014 showed a significant protective effect from mask-wearing (OR: 0.53; 95% CI; 0.36-0.79, I^2=45%). However, a number of trials were not included and the observed effect was predominately driven by observational studies (not RCTs).[41]
- Chu et al performed a systematic review and meta-analysis utilizing observational data from Severe Acute Respiratory Syndrome (SARS), Middle East Respiratory Syndrome (MERS), and COVID-19 health-care and non-health care studies to evaluate the protective effects of physical distancing, mask use, and eye protection.[42] Overall, mask use (non-medical, medical or respirator) was effective (unadjusted studies OR 0.34, 95%CI 0.26-0.45; adjusted studies OR 0.15, 95%CI 0.07-0.34); however, from the three included non-healthcare settings (all patients with SARS) masks were significantly less protective compared to healthcare settings (OR 0.56, 95%CI 0.40-0.79, $p_{intereraction}$=0.049). The applicability of these studies to non-healthcare transmission of COVID-19 are questionable.[42]
- Saunders-Hastings et al. 2017 conducted a systematic review and meta-analysis on the effect of personal protective measures on pandemic influenza transmission.[43] The meta-analysis found regular HH provided a significant protective effect against pandemic viral transmission (OR = 0.62; 95% CI 0.52–0.73), but the effect of facemask use was not statistically significant (OR = 0.53; 95% CI 0.16–1.71).[43]
- There is a body of literature on wearing masks at mass gatherings (e.g. Hajj). Barasheed et al. 2016 performed a systematic review of 25 studies.[44] The studies were heterogeneous and generally of poor quality; however, the authors pooled results from 13 studies of masking involving 7,652 participants and found a small but significant protective effect against respiratory infections (RR 0.89 95% CI 0.84-0.94).[44]

- Zhang et al. 2013 conducted an observational study that evaluated the risk of influenza pH1N1 on two flights, after several passengers developed infections.[45] They found that on one flight from New York to Hong Kong there were 9 infections in passengers compared to 32 asymptomatic controls. None of the infected passengers wore masks compared to 15 (47%) of the controls who did wear masks. The index case was never identified. The authors concluded that wearing a mask on this flight was potentially protective.[45]

Homemade and Cloth Masks

Given the challenges in maintaining personal protective equipment supply during the COVID-19 pandemic, the use of homemade and/or cloth masks is the recommended mask type for use in non-healthcare settings. Broadly speaking, there are two types of studies on the effectiveness of cloth masks: studies that evaluate filter efficiency in a laboratory setting, and studies that evaluate infection risk to the wearer and those around them. There are more of the former studies which generally agree that at least some filtration occurs under certain conditions; the latter have observed some evidence for reduction of viral respiratory transmission at the population level, although have not proven such masks effective at an individual level. Overall, the evidence suggests there is variability in the effectiveness of cloth masks and that they are generally inferior to medical masks. One study in a healthcare setting demonstrated that cloth masks were associated with an increased risk of infection and they should not be used to protect healthcare workers.[46] However, the body of evidence supports that certain cloth materials provide sufficient filtration to be a suitable option for source control in non-healthcare settings. With respect to the materials used in cloth masks, a few studies looked at filtration efficiency in a lab setting, and generally agreed that cotton materials with high thread count were more efficient than other materials. There was some variability in findings of filtration efficiency with respect to layered designs and combining materials. Adding electrostatic charge was also noted to improve filtration efficiency.

- Ho et al. 2020 compared a 3-layer 100% cotton mask versus surgical mask and found 86.4% and 99.9% filtration efficiency, respectively.[47] They recruited 211 infected adult volunteers (205 influenza, 6 suspected COVID-19) and compared particle concentrations without masks, with medical masks, and with cotton masks. Both surgical and cotton masks significantly reduced ($p=0.03$) filtered particles, compared to no mask, with no significant differences between mask types.[47]
- Ma et al. 2020 conducted an experiment, using an avian influenza virus, on the comparable efficiency between N95, surgical masks, and homemade masks (made from 4 layers of “kitchen paper” plus 1 layer of polyester cloth) to block nebulizer-produced aerosols.[48] They found that the masks blocked 99.9%, 97.1%, and 95.2% of aerosols, respectively.[48]
- Davies et al. 2013 in an experimental study found that masks made from 100% cotton t-shirts had about 50% the median-fit factor of surgical masks.[49] Both masks blocked microorganisms expelled; however, surgical masks were three times more effective.[49]
- Dato et al. 2006 fashioned a nine-ply (one outer layer and eight inner layers) face mask out of heavy-weight 100% cotton T-shirt material, and achieved a maximum fit factor of 67 using quantitative measurements (a Portacount Fit Tester), with minimal discomfort or difficulty breathing reported in the three test subjects.[50] Note that National Institute for Occupational Safety and Health (NIOSH)-approved N95 respirators are required to have a fit factor of 100.[50]
- Rengasamy et al. 2010 similarly found in experimental conditions that cloth masks and various fabric materials were much less efficient than N95 respirators at filtering various size aerosols.[51] Sodium chloride (NaCl) aerosol penetration tests were run at face velocities of 5.5 and 16.5 cm/s

flow rates, using a NIOSH particulate respirator certification method for polydisperse (various size) NaCl aerosol and a TSI 3160 Fractional Efficiency Tester for monodisperse (specific size) NaCl aerosol. Percentage penetration (ratio of downstream to upstream concentration) for cloth masks and fabric ranged from 40-90% for polydisperse aerosols, compared to N95 penetrations of 0.12% and <5% at the lower and higher velocities, respectively. For monodisperse aerosols, penetration varied by particle size and fabric type in the 20-1000 nm range. Certain fabrics (e.g., towels and scarves) had slightly lower penetration (around 20-80% for towels, increasing with particle diameter), which was noted by the authors to be comparable to other studies of surgical mask penetration levels (measured in cited studies ranging from 51-89%). They conclude that fabric materials provide minimal respiratory protection to the wearer from aerosol-sized particles, but that "the use of improvised fabric materials may be of some value compared to no protection at all when respirators are not available."[51]

- MacIntyre et al. 2015 conducted a cluster RCT (N=1,607) on the effectiveness of cloth or surgical masks, compared to routine practices (personal protective equipment as needed), in hospital healthcare workers.[46] The primary outcomes were rates of ILI or laboratory-confirmed respiratory viral infection. Infection rates were highest in the cloth mask group, with an RR for ILI of 13 compared to the medical mask arm, an RR for ILI of 6.6 compared to the control arm, and an RR for laboratory-confirmed virus of 1.7 compared to the medical mask group. Penetration of particles in cloth masks was 97%, compared to 44% in the medical masks.[46]
- Van der Sande et al. 2008 compared homemade tea cloth masks, surgical masks, and FFP-2 (European equivalent of N95 respirators) in healthy volunteers performing various physical maneuvers and measured quantitative differences in particles with a Portacount®.[33] They calculated median protection factors (or PFs, the ratio of particle concentrations sized 0.02-1 µm outside to inside the mask) of 2.2-3.2 for cloth masks, 4.1-5.3 for surgical masks, and 66-113 for FFP-2 respirators among the adult volunteers. Marginal protection was seen for all mask types when testing for reduction in outgoing transmission of respiratory particles.[33]
- Konda et al. 2020 evaluated filtration efficiency for particle sizes in the 10nm to 10µm range for 15 different cloth types (e.g. cotton, silk, flannel, etc.).[52] These were evaluated in different configurations (e.g. layers, combinations, and with simulated "gaps" in seal as may be expected in real-world use), and compared to N95 and surgical masks, using an aerosol generator. They observed that combinations of materials (e.g. high threads-per-inch cotton along with silk, chiffon, or flannel) filtered particles across the tested size spectrum (<300nm-6um), and that was likely due to the combined effects of electrostatic and physical filtering, with efficiencies that were generally >80%. They also noted a significant drop in filter efficiency with simulated gaps, 60% drop in the >300 nm range, and this was observed for all materials including N95 and surgical masks.[52]
- Zhao et al. 2020 evaluated filtration efficiency for various common household materials (e.g. cotton, silk, nylon), as well as materials used in N95 and surgical masks (i.e. polypropylene).[53] Filtration efficiency for polypropylene in N95 masks was >95%, whereas for most other materials (including polypropylene from surgical masks) ranged from 5-30%. The authors noted that the testing did not account for leakage that would be expected in real-world settings, which would reduce efficiency further.[53]
- Lustig et al. 2020 evaluated filtration efficiency using simulated cough/sneeze-generated aerosols comprised of fluorescent aqueous droplets (intended to simulate viruses), testing over 70 different common fabric combinations.[54] Combinations of materials with hydrophilic, hydrophobic, and absorbent layers were most efficient, and were comparable to materials in N95 respirators in this laboratory setting.[54]

- Zangmeister et al. 2020 evaluated 32 different cloth materials and combinations of materials using NaCl aerosols of diameters of 50-825nm, and found that 3 of 5 top performing materials were high thread-count cottons.[55]

Risks Associated with Wearing Masks

Mask use by the general public could be associated with a theoretical elevated risk of COVID-19 through decreased physical distancing and self-contamination. The external surface of the mask may become contaminated and touching one's face is a common practice.[56] Continuous mask use may be associated with facial skin lesions, irritant dermatitis, impaired vision in those wearing glasses, or worsening acne.[4,57,58] One study observed physiologic respiratory changes from the use of N95 respirators in healthcare workers (with prolonged use), these finding were subtle and not considered clinically relevant.[59] Another study in healthcare workers reported various subjective complaints (e.g. headache, impaired cognition); however, only skin effects (e.g. irritation, acne) were consistently noted.[60] The Canadian Thoracic Society position statement on mask use for the public states, "There is NO evidence that wearing a face mask will exacerbate (cause a 'flare up' of) an underlying lung condition."[61] Studies in children have identified low adherence to proper use in school settings.[30-32] No study has evaluated the impact of mask use on children's education quality. Further studies are needed on optimal methods for optimizing mask use in children.

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Ontario

This is **Exhibit "FF"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

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SYNOPSIS

02/02/2021

Review of "Rapid review on the characteristics of effective non-medical face masks in reducing the risk of SARS-CoV-2 transmission"

Article citation: Young K, Otten A. Rapid review on the characteristics of effective non-medical face masks in reducing the risk of SARS-CoV-2 transmission [Internet]. Ottawa, ON: Public Health Agency of Canada; 2021 [cited 2021 Jan 27]. Available upon request from: https://www.nccmt.ca/covid-19/covid-19-evidence-reviews/261

One-Minute Summary

- This rapid review examined the evidence on the characteristics and efficacy of non-medical masks in reducing severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) transmission.
- **Primary findings of the rapid review:**
  - Experimental simulation studies have found that non-medical masks were more effective for source control (i.e., preventing the spread of SARS-CoV-2 if worn by an infectious person) than preventing infections in the person wearing the mask.
  - Non-medical masks reduced the distance respiratory droplets travelled during indoor talking, coughing and sneezing.
  - The filtration efficiency of non-medical face masks (with variable designs and fabrics) ranged from less than 10% to more than 95% in 42 studies.
  - The efficacy of non-medical masks depended on: 1) filtration efficiency, 2) breathability, and 3) fit.
    - When non-medical masks were made from high quality fabrics consisting of multiple layers and snug fit, they reduced the expulsion of respiratory droplets, although to a lesser extent than medical masks.
- **The characteristics of non-medical masks that reduced the risk of spreading or contracting SARS-CoV-2 included:**
  - Tight-fitting, double-layer masks with different material types (e.g., combed cotton and polyester) or masks made from one type of material but with greater than 2 layers exhibited similar source reduction efficiencies as medical masks (>90%). Loose-fitting non-medical masks reduced filtration effectiveness by more than 50% in some studies.
  - Multiple-layer non-medical masks improved filtration efficiency, but masks with more than three layers reduced breathability.
  - Fabrics should be of high-quality and tightly woven, including hydrophobic fabrics (e.g., polyester, spunbound polypropylene, polyaramid); fabrics that can capture charged particles (e.g., polyester, silk); or fabrics with hydrophilic properties that increase comfort

and longevity (e.g., cotton). The filtration efficiencies of most household fabrics were higher for larger, low-velocity respiratory droplets.
    - A triple-layered mask made of a hydrophobic exterior, blended non-woven fabric middle, and hydrophilic interior was the ideal combination for source reduction and potential infection prevention.
- The authors stated that "The existing research on how effective non-medical masks are is of low quality and results will likely change with additional research".

Additional Information

- The authors included 54 primary research articles in their rapid review. Twenty-two studies investigated non-medical masks as source control and 37 studies investigated how non-medical masks can prevent infection. Studies used human volunteers (n=15), manikins (n=15), filter-holders (n=34) and animal models (n=1). Of note, filter holder studies use fabric samples mounted in place by a filter holder and do not take fit of a human face into account.
- Non-medical masks, whether homemade or manufactured, are not considered personal protective equipment since they do not undergo standardized testing. Non-medical masks are not recommended for use by healthcare professionals and those with an increased risk of infection where physical distancing cannot be maintained.
- **Fabrics and designs to avoid in non-medical face masks:**
    - Avoid using vacuum cleaner bags as fabric, as they may contain harmful ingredients and fibers.
    - Avoid loosely-folded face masks, bandana-style face masks, and single-layered neck gaiters, as they do not effectively block respiratory droplets.
    - Avoid respirators with an exhalation valve, as these masks are not effective for source control.
- **Limitations:**
    - The majority of included studies were experimental and used non-human models. None of the studies identified how effective specific types of non-medical masks are in real-world settings.
    - The types and composition of non-medical masks used in the included studies, along with variability in fit and methodologies, made comparisons among studies difficult.
    - Studies that examined filtration efficiency used a variety of methods that targeted a wide variety of droplet sizes (<1 to >5 µm in diameter) using artificial materials. This variability made it difficult to compare filtration efficiencies between studies.

PHO Reviewer's Comments

- The evidence comparing non-medical masks to medical grade masks is limited to experimental studies evaluating filtering efficiency and is not based on clinical or real-world settings. The clinical data on public mask-wearing has been reviewed separately.[1]
- The body of evidence supports mask-wearing in public as effective for source control with possible synergistic effects for infection prevention if both the source and contact are appropriately wearing well-fitted non-medical masks.
- Experimental data supports higher quality masks, such as 3-layer non-medical masks or medical grade masks, as providing superior filtering efficiency. By inference, this may reduce the potential for transmission.

- Variants of Concern (VOC) have emerged in Ontario which have been associated with increased transmissibility. At the time of posting no studies have evaluated the relative effectiveness of different mask types in mitigating transmission from SARS-CoV-2 VOCs.[2]

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2. Ontario Agency for Health Protection and Promotion (Public Health Ontario). COVID-19 UK variant VOC-202012/01 – what we know so far [Internet]. Toronto, ON: Queen's Printer for Ontario; 2020 [cited 2021 Feb 02]. Available from: https://www.publichealthontario.ca/-/media/documents/ncov/covid-wwksf/2020/12/what-we-know-uk-variant.pdf?la=en

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This is **Exhibit "GG"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

Mask use in the context of COVID-19

Interim guidance

1 December 2020

World Health Organization

This document, which is an update of the guidance published on 5 June 2020, includes new scientific evidence relevant to the use of masks for reducing the spread of SARS-CoV-2, the virus that causes COVID-19, and practical considerations. It contains updated evidence and guidance on the following:

- mask management;
- SARS-CoV-2 transmission;
- masking in health facilities in areas with community, cluster and sporadic transmission;
- mask use by the public in areas with community and cluster transmission;
- alternatives to non-medical masks for the public;
- exhalation valves on respirators and non-medical masks;
- mask use during vigorous intensity physical activity;
- essential parameters to be considered when manufacturing non-medical masks (Annex).

Key points

- The World Health Organization (WHO) advises the use of masks as part of a comprehensive package of prevention and control measures to limit the spread of SARS-CoV-2, the virus that causes COVID-19. A mask alone, even when it is used correctly, is insufficient to provide adequate protection or source control. Other infection prevention and control (IPC) measures include hand hygiene, physical distancing of at least 1 metre, avoidance of touching one's face, respiratory etiquette, adequate ventilation in indoor settings, testing, contact tracing, quarantine and isolation. Together these measures are critical to prevent human-to-human transmission of SARS-CoV-2.
- Depending on the type, masks can be used either for protection of healthy persons or to prevent onward transmission (source control).
- WHO continues to advise that anyone suspected or confirmed of having COVID-19 or awaiting viral laboratory test results should wear a medical mask when in the presence of others (this does not apply to those awaiting a test prior to travel).
- For any mask type, appropriate use, storage and cleaning or disposal are essential to ensure that they are as effective as possible and to avoid an increased transmission risk.

Mask use in health care settings

- WHO continues to recommend that health workers (1) providing care to suspected or confirmed COVID-19 patients wear the following types of mask/respirator in addition to other personal protective equipment that are part of standard, droplet and contact precautions:
  - medical mask in the absence of aerosol generating procedures (AGPs)
  - respirator, N95 or FFP2 or FFP3 standards, or equivalent in care settings for COVID-19 patients where AGPs are performed; these may be used by health workers when providing care to COVID-19 patients in other settings if they are widely available and if costs is not an issue.
- In areas of known or suspected community or cluster SARS-CoV-2 transmission WHO advises the following:
  - universal masking for all persons (staff, patients, visitors, service providers and others) within the health facility (including primary, secondary and tertiary care levels; outpatient care; and long-term care facilities)
  - wearing of masks by inpatients when physical distancing of at least 1 metre cannot be maintained or when patients are outside of their care areas.
- In areas of known or suspected sporadic SARS-CoV-2 transmission, health workers working in clinical areas where patients are present should continuously wear a medical mask. This is known as targeted continuous medical masking for health workers in clinical areas;
- Exhalation valves on respirators are discouraged as they bypass the filtration function for exhaled air by the wearer.

Mask use in community settings

- Decision makers should apply a risk-based approach when considering the use of masks for the general public.
- In areas of known or suspected community or cluster SARS-CoV-2 transmission:
  - WHO advises that the general public should wear a non-medical mask in indoor (e.g. shops, shared workplaces, schools - see Table 2 for details) or outdoor settings where physical distancing of at least 1 metre cannot be maintained.
  - If indoors, unless ventilation has been be assessed to be adequate[1], WHO advises that the general public should wear a non-medical mask, regardless of whether physical distancing of at least 1 metre can be maintained.

[1] For adequate ventilation refer to regional or national institutions or heating, refrigerating and air-conditioning societies enacting ventilation requirements. If not available or applicable, a recommended ventilation rate of 10 l/s/person should be met (except healthcare facilities which have specific requirements). For more information consult "Coronavirus (COVID-19) response

  - Individuals/people with higher risk of severe complications from COVID-19 (individuals ≥ 60 years old and those with underlying conditions such as cardiovascular disease or diabetes mellitus, chronic lung disease, cancer, cerebrovascular disease or immunosuppression) should wear medical masks when physical distancing of at least 1 metre cannot be maintained.
- In any transmission scenarios:
  - Caregivers or those sharing living space with people with suspected or confirmed COVID-19, regardless of symptoms, should wear a medical mask when in the same room.

Mask use in children (2)

- Children aged up to five years should not wear masks for source control.
- For children between six and 11 years of age, a risk-based approach should be applied to the decision to use a mask; factors to be considered in the risk-based approach include intensity of SARS-CoV-2 transmission, child's capacity to comply with the appropriate use of masks and availability of appropriate adult supervision, local social and cultural environment, and specific settings such as households with elderly relatives, or schools.
- Mask use in children and adolescents 12 years or older should follow the same principles as for adults.
- Special considerations are required for immunocompromised children or for paediatric patients with cystic fibrosis or certain other diseases (e.g., cancer), as well as for children of any age with developmental disorders, disabilities or other specific health conditions that might interfere with mask wearing.

Manufacturing of non-medical (fabric) masks (Annex)

- Homemade fabric masks of three-layer structure (based on the fabric used) are advised, with each layer providing a function: 1) an innermost layer of a hydrophilic material 2) an outermost layer made of hydrophobic material 3) a middle hydrophobic layer which has been shown to enhance filtration or retain droplets.
- Factory-made fabric masks should meet the minimum thresholds related to three essential parameters: filtration, breathability and fit.
- Exhalation valves are discouraged because they bypass the filtration function of the fabric mask rendering it unserviceable for source control.

Methodology for developing the guidance

Guidance and recommendations included in this document are based on published WHO guidelines (in particular the WHO Guidelines on infection prevention and control of epidemic- and pandemic-prone acute respiratory infections in health care) (2) and ongoing evaluations of all available scientific evidence by the WHO ad hoc COVID-19 Infection Prevention and Control Guidance Development Group (COVID-19 IPC GDG) (see acknowledgement section for list of GDG members). During emergencies WHO publishes interim guidance, the development of which follows a transparent and robust process of evaluation of the available evidence on benefits and harms. This evidence is evaluated through expedited systematic reviews and expert consensus-building through weekly GDG consultations, facilitated by a methodologist and, when necessary, followed up by surveys. This process also considers, as much as possible, potential resource implications, values and preferences, feasibility, equity, and ethics. Draft guidance documents are reviewed by an external review panel of experts prior to publication.

Purpose of the guidance

This document provides guidance for decision makers, public health and IPC professionals, health care managers and health workers in health care settings (including long-term care and residential), for the public and for manufactures of non-medical masks (Annex). It will be revised as new evidence emerges.

WHO has also developed comprehensive guidance on IPC strategies for health care settings (3), long-term care facilities (LTCF) (4), and home care (5).

Background

The use of masks is part of a comprehensive package of prevention and control measures that can limit the spread of certain respiratory viral diseases, including COVID-19. Masks can be used for protection of healthy persons (worn to protect oneself when in contact with an infected individual) or for source control (worn by an infected individual to prevent onward transmission) or both.

However, the use of a mask alone, even when correctly used (see below), is insufficient to provide an adequate level of protection for an uninfected individual or prevent onward transmission from an infected individual (source control). Hand hygiene, physical distancing of at least 1 metre, respiratory etiquette, adequate ventilation in indoor settings, testing, contact tracing, quarantine, isolation and other infection prevention and control (IPC) measures are critical to prevent human-to-human transmission of SARS-CoV-2, whether or not masks are used (6).

Mask management

For any type of mask, appropriate use, storage and cleaning, or disposal are essential to ensure that they are as effective as possible and to avoid any increased risk of transmission. Adherence to correct mask management practices varies, reinforcing the need for appropriate messaging (7).

WHO provides the following guidance on the correct use of masks:

- Perform hand hygiene before putting on the mask.
- Inspect the mask for tears or holes, and do not use a damaged mask.
- Place the mask carefully, ensuring it covers the mouth and nose, adjust to the nose bridge and tie it securely to minimize any gaps between the face and the mask. If using ear loops, ensure these do not cross over as this widens the gap between the face and the mask.

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- Avoid touching the mask while wearing it. If the mask is accidently touched, perform hand hygiene.
- Remove the mask using the appropriate technique. Do not touch the front of the mask, but rather untie it from behind.
- Replace the mask as soon as it becomes damp with a new clean, dry mask.
- Either discard the mask or place it in a clean plastic resealable bag where it is kept until it can be washed and cleaned. Do not store the mask around the arm or wrist or pull it down to rest around the chin or neck.
- Perform hand hygiene immediately afterward discarding a mask.
- Do not re-use single-use mask.
- Discard single-use masks after each use and properly dispose of them immediately upon removal.
- Do not remove the mask to speak.
- Do not share your mask with others.
- Wash fabric masks in soap or detergent and preferably hot water (at least 60° Centigrade/140° Fahrenheit) at least once a day. If it is not possible to wash the masks in hot water, then wash the mask in soap/detergent and room temperature water, followed by boiling the mask for 1 minute.

Scientific evidence

Transmission of the SARS-CoV-2 virus

Knowledge about transmission of the SARS-CoV-2 virus is evolving continuously as new evidence accumulates. COVID-19 is primarily a respiratory disease, and the clinical spectrum can range from no symptoms to severe acute respiratory illness, sepsis with organ dysfunction and death.

According to available evidence, SARS-CoV-2 mainly spreads between people when an infected person is in close contact with another person. Transmissibility of the virus depends on the amount of viable virus being shed and expelled by a person, the type of contact they have with others, the setting and what IPC measures are in place. The virus can spread from an infected person's mouth or nose in small liquid particles when the person coughs, sneezes, sings, breathes heavily or talks. These liquid particles are different sizes, ranging from larger 'respiratory droplets' to smaller 'aerosols.' Close-range contact (typically within 1 metre) can result in inhalation of, or inoculation with, the virus through the mouth, nose or eyes (8-13).

There is limited evidence of transmission through fomites (objects or materials that may be contaminated with viable virus, such as utensils and furniture or in health care settings a stethoscope or thermometer) in the immediate environment around the infected person (14-17). Nonetheless, fomite transmission is considered a possible mode of transmission for SARS-CoV-2, given consistent finding of environmental contamination in the vicinity of people infected with SARS-CoV-2 and the fact that other coronaviruses and respiratory viruses can be transmitted this way (12).

Aerosol transmission can occur in specific situations in which procedures that generate aerosols are performed. The scientific community has been actively researching whether the SARS-CoV-2 virus might also spread through aerosol transmission in the absence of aerosol generating procedures (AGPs) (18, 19). Some studies that performed air sampling in clinical settings where AGPs were not performed found virus RNA, but others did not. The presence of viral RNA is not the same as replication- and infection-competent (viable) virus that could be transmissible and capable of sufficient inoculum to initiate invasive infection. A limited number of studies have isolated viable SARS-CoV-2 from air samples in the vicinity of COVID-19 patients (20, 21).

Outside of medical facilities, in addition to droplet and fomite transmission, aerosol transmission can occur in specific settings and circumstances, particularly in indoor, crowded and inadequately ventilated spaces, where infected persons spend long periods of time with others. Studies have suggested these can include restaurants, choir practices, fitness classes, nightclubs, offices and places of worship (12).

High quality research is required to address the knowledge gaps related to modes of transmission, infectious dose and settings in which transmission can be amplified. Currently, studies are underway to better understand the conditions in which aerosol transmission or superspreading events may occur.

Current evidence suggests that people infected with SARS-CoV-2 can transmit the virus whether they have symptoms or not. However, data from viral shedding studies suggest that infected individuals have highest viral loads just before or around the time they develop symptoms and during the first 5-7 days of illness (12). Among symptomatic patients, the duration of infectious virus shedding has been estimated at 8 days from the onset of symptoms (22-24) for patients with mild disease, and longer for severely ill patients (12). The period of infectiousness is shorter than the duration of detectable RNA shedding, which can last many weeks (17).

The incubation period for COVID-19, which is the time between exposure to the virus and symptom onset, is on average 5-6 days, but can be as long as 14 days (25, 26).

Pre-symptomatic transmission – from people who are infected and shedding virus but have not yet developed symptoms – can occur. Available data suggest that some people who have been exposed to the virus can test positive for SARS-CoV-2 via polymerase chain reaction (PCR) testing 1-3 days before they develop symptoms (27). People who develop symptoms appear to have high viral loads on or just prior to the day of symptom onset, relative to later on in their infection (28).

Asymptomatic transmission – transmission from people infected with SARS-CoV-2 who never develop symptoms – can occur. One systematic review of 79 studies found that 20% (17–25%) of people remained asymptomatic throughout the course of infection. (28). Another systematic review, which included 13 studies considered to be at low risk of bias, estimated that 17% of cases remain asymptomatic (14%–20%) (30). Viable virus has been isolated from specimens of pre-symptomatic and asymptomatic individuals, suggesting that people who do not have symptoms may be able to transmit the virus to others. (25, 29-37)

Studies suggest that asymptomatically infected individuals are less likely to transmit the virus than those who develop symptoms (29). A systematic review concluded that individuals who are asymptomatic are responsible for transmitting fewer infections than symptomatic and pre-symptomatic cases (38). One meta-analysis estimated that there is a 42% lower relative risk of asymptomatic transmission compared to symptomatic transmission (30).

Guidance on mask use in health care settings

Masks for use in health care settings

Medical masks are defined as surgical or procedure masks that are flat or pleated. They are affixed to the head with straps that go around the ears or head or both. Their performance characteristics are tested according to a set of standardized test methods (ASTM F2100, EN 14683, or equivalent) that aim to balance high filtration, adequate breathability and optionally, fluid penetration resistance (39, 40).

Filtering facepiece respirators (FFR), or respirators, offer a balance of filtration and breathability. However, whereas medical masks filter 3 micrometre droplets, respirators must filter more challenging 0.075 micrometre solid particles. European FFRs, according to standard EN 149, at FFP2 performance there is filtration of at least 94% solid NaCl particles and oil droplets. US N95 FFRs, according to NIOSH 42 CFR Part 84, filter at least 95% NaCl particles. Certified FFRs must also ensure unhindered breathing with maximum resistance during inhalation and exhalation. Another important difference between FFRs and other masks is the way filtration is tested. Medical mask filtration tests are performed on a cross-section of the masks, whereas FFRs are tested for filtration across the entire surface. Therefore, the layers of the filtration material and the FFR shape, which ensure the outer edges of the FFR seal around wearer's face, result in guaranteed filtration as claimed. Medical masks, by contrast, have an open shape and potentially leaking structure. Other FFR performance requirements include being within specified parameters for maximum CO_2 build up, total inward leakage and tensile strength of straps (41, 42).

A. Guidance on the use of medical masks and respirators to provide care to suspected or confirmed COVID-19 cases

Evidence on the use of mask in health care settings

Systematic reviews have reported that the use of N95/P2 respirators compared with the use of medical masks (see mask definitions, above) is not associated with statistically significant differences for the outcomes of health workers acquiring clinical respiratory illness, influenza-like illness (risk ratio 0.83, 95%CI 0.63-1.08) or laboratory-confirmed influenza (risk ratio 1.02, 95%CI 0.73-1.43); harms were poorly reported and limited to discomfort associated with lower compliance (43, 44). In many settings, preserving the supply of N95 respirators for high-risk, aerosol-generating procedures is an important consideration (45).

A systematic review of observational studies on the betacoronaviruses that cause severe acute respiratory syndrome (SARS), Middle East respiratory syndrome (MERS) and COVID-19 found that the use of face protection (including respirators and medical masks) is associated with reduced risk of infection among health workers. These studies suggested that N95 or similar respirators might be associated with greater reduction in risk than medical or 12–16-layer cotton masks. However, these studies had important limitations (recall bias, limited information about the situations when respirators were used and limited ability to measure exposures), and very few studies included in the review evaluated the transmission risk of COVID-19 (46). Most of the studies were conducted in settings in which AGPs were performed or other high-risk settings (e.g., intensive care units or where there was exposure to infected patients and health workers were not wearing adequate PPE).

WHO continues to evaluate the evidence on the effectiveness of the use of different masks and their potential harms, risks and disadvantages, as well as their combination with hand hygiene, physical distancing of at least 1 metre and other IPC measures.

Guidance

WHO's guidance on the type of respiratory protection to be worn by health workers providing care to COVID-19 patients is based on 1) WHO recommendations on IPC for epidemic- and pandemic-prone acute respiratory infections in health care (47); 2) updated systematic reviews of randomized controlled trials on the effectiveness of medical masks compared to that of respirators for reducing the risk of clinical respiratory illness, influenza-like illness (ILI) and laboratory-confirmed influenza or viral infections. WHO guidance in this area is aligned with guidelines of other professional organizations, including the European Society of Intensive Care Medicine and the Society of Critical Care Medicine, and the Infectious Diseases Society of America (48, 49).

The WHO COVID-19 IPC GDG considered all available evidence on the modes of transmission of SARS-CoV-2 and on the effectiveness of medical mask versus respirator use to protect health workers from infection and the potential for harms such as skin conditions or breathing difficulties.

Other considerations included availability of medical masks versus respirators, cost and procurement implications and equity of access by health workers across different settings.

The majority (71%) of the GDG members confirmed their support for previous recommendations issued by WHO on 5 June 2020:

1. In the absence of aerosol generating procedures (AGPs)[2], WHO recommends that health workers providing care to patients with suspected or confirmed COVID-19 should wear a medical mask (in addition to other PPE that are part of droplet and contact precautions).
2. In care settings for COVID-19 patients where AGPs are performed, WHO recommends that health workers should wear a respirator (N95 or FFP2 or FFP3 standard, or equivalent) in addition to other PPE that are part of airborne and contact precautions.

In general, health workers have strong preferences about having the highest perceived protection possible to prevent COVID-19 infection and therefore may place high value on the potential benefits of respirators in settings without AGPs. WHO recommends respirators primarily for settings where AGPs are performed; however, if health workers prefer them and they are sufficiently available and cost is not an issue, they could also be used during care for COVID-19 patients in other settings. For additional guidance on PPE, including PPE

[2] The WHO list of AGPs includes tracheal intubation, non-invasive ventilation, tracheotomy, cardiopulmonary resuscitation, manual ventilation before intubation, bronchoscopy, sputum induction using nebulized hypertonic saline, and dentistry and autopsy procedures.

beyond mask use by health workers, see WHO IPC guidance during health care when COVID-19 infection is suspected (3) and also WHO guidance on the rational use of PPE (45).

Exhalation valves on respirators are discouraged as they bypass the filtration function for exhaled air.

B. Guidance on the use of mask by health workers, caregivers and others based on transmission scenario

Definitions

Universal masking in health facilities is defined as the requirement for all persons (staff, patients, visitors, service providers and others) to wear a mask at all times except for when eating or drinking.

Targeted continuous medical mask use is defined as the practice of wearing a medical mask by all health workers and caregivers working in clinical areas during all routine activities throughout the entire shift.

Health workers are all people primarily engaged in actions with the primary intent of enhancing health. Examples are: nursing and midwifery professionals, doctors, cleaners, other staff who work in health facilities, social workers, and community health workers.

Evidence on universal masking in health care settings

In areas where there is community transmission or large-scale outbreaks of COVID-19, universal masking has been adopted in many hospitals to reduce the potential of transmission by health workers to patients, to other staff and anyone else entering the facility (50).

Two studies found that implementation of a universal masking policy in hospital systems was associated with decreased risk of healthcare-acquired SARS-CoV-2 infection. However, these studies had serious limitations: both were before-after studies describing a single example of a phenomenon before and after an event of interest, with no concurrent control group, and other infection control measures were not controlled for (51, 52). In addition, observed decreases in health worker infections occurred too quickly to be attributable to the universal masking policy.

Guidance

Although more research on universal masking in heath settings is needed, it is the expert opinion of the majority (79%) of WHO COVID-19 IPC GDG members that universal masking is advisable in geographic settings where there is known or suspected community or cluster transmission of the SARS-CoV-2 virus.

1. In areas of known or suspected community or cluster SARS-CoV-2 transmission, universal masking should be advised in all health facilities (see Table 1).

- All health workers, including community health workers and caregivers, should wear a medical mask at all times, for any activity (care of COVID-19 or non-COVID-19 patients) and in any common area (e.g., cafeteria, staff rooms).
- Other staff, visitors, outpatients and service providers should also wear a mask (medical or non-medical) at all times
- Inpatients are not required to wear a mask (medical or non-medical) unless physical distancing of at least 1 metre cannot be maintained (e.g., when being examined or visited at the bedside) or when outside of their care area (e.g., when being transported).
- Masks should be changed when they become soiled, wet or damaged or if the health worker/caregiver removes the mask (e.g., for eating or drinking or caring for a patient who requires droplet/contact precautions for reasons other than COVID-19).

2. In the context of known or suspected sporadic SARS-CoV-2 virus transmission, WHO provides the following guidance:

- Health workers, including community health workers and caregivers who work in clinical areas, should continuously wear a medical mask during routine activities throughout the entire shift, apart from when eating and drinking and changing their medical masks after caring for a patient who requires droplet/contact precautions for other reasons. In all cases, medical masks must be changed when wet, soiled, or damaged; used medical masks should be properly disposed of at the end of the shift; and new clean ones should be used for the next shift or when medical masks are changed.
- It is particularly important to adopt the continuous use of masks in potentially high transmission risk settings including triage, family physician/general practitioner offices; outpatient departments; emergency rooms; COVID-19 designated units; haematology, oncology and transplant units; and long-term health and residential facilities.
- Staff who do not work in clinical areas (e.g., administrative staff) do not need to wear a medical mask during routine activities if they have no exposure to patients.

Whether using masks for universal masking within health facilities or targeted continuous medical mask use throughout the entire shift, health workers should ensure the following:

- Medical mask use should be combined with other measures including frequent hand hygiene and physical distancing among health workers in shared and crowded places such as cafeterias, break rooms, and dressing rooms.
- The medical mask should be changed when wet, soiled, or damaged.
- The medical mask should not be touched to adjust it or if displaced from the face for any reason. If this happens, the mask should be safely removed and replaced, and hand hygiene performed.
- The medical mask (as well as other personal protective equipment) should be discarded and changed after caring for any patient who requires contact/droplet precautions for other pathogens, followed by hand hygiene.
- Under no circumstances should medical masks be shared between health workers or between others wearing them. Masks should be appropriately disposed of whenever removed and not reused.

- A particulate respirator at least as protective as a United States of America (US) National Institute for Occupational Safety and Health-certified N95, N99, US Food and Drug Administration surgical N95, European Union standard FFP2 or FFP3, or equivalent, should be worn in settings for COVID-19 patients where AGPs are performed (see WHO recommendations below). In these settings, this includes continuous use by health workers throughout the entire shift, when this policy is implemented.

Note: Decision makers may consider the transmission intensity in the catchment area of the health facility or community setting and the feasibility of implementing a universal masking policy compared to a policy based on assessed or presumed exposure risk. Decisions need to take into account procurement, sustainability and costs of the policy. When planning masks for all health workers, long-term availability of adequate medical masks (and when applicable, respirators) for all workers should be ensured, in particular for those providing care for patients with confirmed or suspected COVID-19. Proper use and adequate waste management should be ensured.

The potential harms and risks of mask and respirator use in the health facility setting include:

- contamination of the mask due to its manipulation by contaminated hands (53, 54);
- potential self-contamination that can occur if medical masks are not changed when wet, soiled or damaged; or by frequent touching/adjusting when worn for prolonged periods (55);
- possible development of facial skin lesions, irritant dermatitis or worsening acne, when used frequently for long hours (56-58);
- discomfort, facial temperature changes and headaches from mask wearing (44, 59, 60);
- false sense of security leading potentially to reduced adherence to well recognized preventive measures such as physical distancing and hand hygiene; and risk-taking behaviours (61-64);
- difficulty wearing a mask in hot and humid environments
- possible risk of stock depletion due to widespread use in the context of universal masking and targeted continuous mask use and consequent scarcity or unavailability for health workers caring for COVID 19 patients and during health care interactions with non-COVID-19 patients where medical masks or respirators might be required.

Alternatives to medical masks in health care settings

The WHO's disease commodity package (DCP) for COVID-19 recommends medical masks for health workers to be type II or higher (65). Type II medical masks provide a physical barrier to fluids and particulate materials and have bacterial filtration efficiency of ≥98% compared to Type I mask, which has bacterial filtration efficiency of ≥95% and lower fluid resistance (66) In case of stock outs of type II or higher medical masks, health workers should use a type I medical mask as an alternative. Other alternatives such as face shields or fabric masks should be carefully evaluated.

Face shields are designed to provide protection from splashes of biological fluid (particularly respiratory secretions), chemical agents and debris (67, 68) into the eyes. In the context of protection from SARS-CoV-2 transmission through respiratory droplets, face shields are used by health workers as personal protective equipment (PPE) for eye protection in combination with a medical mask or a respirator (69, 70) While a face shield may confer partial protection of the facial area against respiratory droplets, these and smaller droplets may come into contact with mucous membranes or with the eyes from the open gaps between the visor and the face (71,67).

Fabric masks are not regulated as protective masks or part of the PPE directive. They vary in quality and are not subject to mandatory testing or common standards and as such are not considered an appropriate alternative to medical masks for protection of health workers. One study that evaluated the use of cloth masks in a health care facility found that health care workers using 2 ply cotton cloth masks (a type of fabric mask) were at increased risk of influenza-like illness compared with those who wore medical masks (72).

In the context of severe medical mask shortage, face shields alone or in combination with fabric mask may be considered as a last resort (73). Ensure proper design of face shields to cover the sides of the face and below the chin.

As for other PPE items, if production of fabric masks for use in health care settings is proposed locally in situations of shortage or stock out, a local authority should assess the product according to specific minimum performance standards and required technical specifications (see Annex).

Additional considerations for community care settings

Like other health workers, community health workers should apply standard precautions for all patients at all times, with particular emphasis regarding hand and respiratory hygiene, surface and environmental cleaning and disinfection and the appropriate use of PPE. When a patient is suspected or confirmed of having COVID-19, community health workers should always apply contact and droplet precautions. These include the use of a medical mask, gown, gloves and eye protection (74).

IPC measures that are needed will depend on the local COVID-19 transmission dynamics and the type of contact required by the health care activity (see Table 1). The community health workforce should ensure that patients and workforce members apply precautionary measures such as respiratory hygiene and physical distancing of at least 1 metre (3.3 feet). They also may support set-up and maintenance of hand hygiene stations and community education (74). In the context of known or suspected community or cluster transmission, community health workers should wear a medical mask when providing essential routine services (see Table 1).

Table 1. Mask use in health care settings depending on transmission scenario, target population, setting, activity and type*

Transmission scenario	Target population (who)	Setting (where)	Activity (what)	Mask type (which one) *
Known or suspected community or cluster transmission of SARS-CoV-2	Health workers and caregivers	Health facility (including primary, secondary, tertiary care levels, outpatient care, and long-term care facilities)	For any activity in patient-care areas (COVID-19 or non-COVID-19 patients) or in any common areas (e.g., cafeteria, staff rooms)	Medical mask (or respirator if aerosol generating procedures performed)
	Other staff, patients, visitors, service suppliers		For any activity or in any common area	Medical or fabric mask
	Inpatients	In single or multiple-bed rooms	When physical distance of at least 1 metre cannot be maintained	
	Health workers and caregivers	Home visit (for example, for antenatal or postnatal care, or for a chronic condition)	When in direct contact with a patient or when a distance of at least 1 metre cannot be maintained.	Medical mask
		Community	Community outreach programmes/essential routine services	
Known or suspected sporadic transmission of SARS-CoV-2 cases	Health workers and caregivers	Health facility (including primary, secondary, tertiary care levels, outpatient care, and long-term care facilities)	In patient care area- irrespective of whether patients have suspected/confirmed COVID-19	Medical mask
	Other staff, patients, visitors, service suppliers and all others		No routine activities in patient areas	Medical mask not required. Medical mask should be worn if in contact or within 1 metre of patients, or according to local risk assessment
	Health workers and caregivers	Home visit (for example, for antenatal or postnatal care, or for a chronic condition)	When in direct contact or when a distance of at least 1metre cannot be maintained.	Medical mask
		Community	Community outreach programs (e.g., bed net distribution)	
No documented SARS-CoV-2 transmission	Health workers and caregivers	Health facility (including primary, secondary, tertiary care levels, outpatient care, and long-term care facilities)	Providing any patient care	Medical mask use according to standard and transmission-based precautions
		Community	Community outreach programs	
Any transmission scenario	Health workers	Health care facility (including primary, secondary, tertiary care levels, outpatient care, and long-term care facilities), in settings where aerosol generating procedures (AGP) are performed	Performing an AGP on a suspected or confirmed COVID-19 patient or providing care in a setting where AGPs are in place for COVID-19 patients	Respirator (N95 or N99 or FFP2 or FFP3)

**This table refers only to the use of medical masks and respirators. The use of medical masks and respirators may need to be combined with other personal protective equipment and other measures as appropriate, and always with hand hygiene.*

Guidance on mask use in community settings

Evidence on the protective effect of mask use in community settings

At present there is only limited and inconsistent scientific evidence to support the effectiveness of masking of healthy people in the community to prevent infection with respiratory viruses, including SARS-CoV-2 (75). A large randomized community-based trial in which 4862 healthy participants were divided into a group wearing medical/surgical masks and a control group found no difference in infection with SARS-CoV-2 (76). A recent systematic review found nine trials (of which eight were cluster-randomized controlled trials in which clusters of people, versus individuals, were randomized) comparing medical/surgical masks versus no masks to prevent the spread of viral respiratory illness. Two trials were with healthcare workers and seven in the community. The review concluded that wearing a mask may make little or no difference to the prevention of influenza-like illness (ILI) (RR 0.99, 95%CI 0.82 to 1.18) or laboratory confirmed illness (LCI) (RR 0.91, 95%CI 0.66-1.26) (44); the certainty of the evidence was low for ILI, moderate for LCI.

By contrast, a small retrospective cohort study from Beijing found that mask use by entire families before the first family member developed COVID-19 symptoms was 79% effective in reducing transmission (OR 0.21, 0.06-0.79) (77). A case-control study from Thailand found that wearing a medical or non-medical mask all the time during contact with a COVID-19 patient was associated with a 77% lower risk of infection (aOR 0.23; 95% CI 0.09–0.60) (78). Several small observational studies with epidemiological data have reported an association between mask use by an infected person and prevention of onward transmission of SARS-CoV-2 infection in public settings. (8, 79-81).

A number of studies, some peer reviewed (82-86) but most published as pre-prints (87-104), reported a decline in the COVID-19 cases associated with face mask usage by the public, using country- or region-level data. One study reported an association between community mask wearing policy adoption and increased movement (less time at home, increased visits to commercial locations) (105). These studies differed in setting, data sources and statistical methods and have important limitations to consider (106), notably the lack of information about actual exposure risk among individuals, adherence to mask wearing and the enforcement of other preventive measures (107, 108).

Studies of influenza, influenza-like illness and human coronaviruses (not including COVID-19) provide evidence that the use of a medical mask can prevent the spread of infectious droplets from a symptomatic infected person to someone else and potential contamination of the environment by these droplets (75). There is limited evidence that wearing a medical mask may be beneficial for preventing transmission between healthy individuals sharing households with a sick person or among attendees of mass gatherings (44, 109-114).

A meta-analysis of observational studies on infections due to betacoronaviruses, with the intrinsic biases of observational data, showed that the use of either disposable medical masks or reusable 12–16-layer cotton masks was associated with protection of healthy individuals within households and among contacts of cases (46). This could be considered to be indirect evidence for the use of masks (medical or other) by healthy individuals in the wider community; however, these studies suggest that such individuals would need to be in close proximity to an infected person in a household or at a mass gathering where physical distancing cannot be achieved to become infected with the virus. Results from cluster randomized controlled trials on the use of masks among young adults living in university residences in the United States of America indicate that face masks may reduce the rate of influenza-like illness but showed no impact on risk of laboratory-confirmed influenza (115, 116).

Guidance

The WHO COVID-19 IPC GDG considered all available evidence on the use of masks by the general public including effectiveness, level of certainty and other potential benefits and harms, with respect to transmission scenarios, indoor versus outdoor settings, physical distancing and ventilation. Despite the limited evidence of protective efficacy of mask wearing in community settings, in addition to all other recommended preventive measures, the GDG advised mask wearing in the following settings:

1. In areas with known or suspected community or cluster transmission of SARS-CoV-2, WHO advises mask use by the public in the following situations (see Table 2):

   Indoor settings:

- in public indoor settings where ventilation is known to be poor regardless of physical distancing: limited or no opening of windows and doors for natural ventilation; ventilation system is not properly functioning or maintained; or cannot be assessed;
- in public indoor settings that have adequate[3] ventilation if physical distancing of at least 1 metre cannot be maintained;
- in household indoor settings: when there is a visitor who is not a household member and ventilation is known to be poor, with limited opening of windows and doors for natural ventilation, or the ventilation system cannot be assessed or is not properly functioning, regardless of whether physical distancing of at least 1 metre can be maintained;
- in household indoor settings that have adequate ventilation if physical distancing of at least 1 metre cannot be maintained.

[3] For adequate ventilation refer to regional or national institutions or heating, refrigerating and air-conditioning societies enacting ventilation requirements. If not available or applicable, a recommended ventilation rate of 10 l/s/person should be met (except healthcare facilities which have specific requirements). For more information consult "Coronavirus (COVID-19) response resources from ASHRAE and others'' https://www.ashrae.org/technical-resources/resources

Table 2. Mask use in community settings depending on transmission scenario, setting, target population, purpose and type*

Transmission scenario	Situations/settings (where)	Target Population (who)	Purpose of mask use (why)	Mask type (which one)
Known or suspected community or cluster transmission of SARS-CoV-2	Indoor settings, where ventilation is known to be poor or cannot be assessed or the ventilation system is not properly maintained, regardless of whether physical distancing of at least 1 meter can be maintained	General population in public* settings such as shops, shared workplaces, schools, churches, restaurants, gyms, etc. or in enclosed settings such as public transportation. For households, in indoor settings, when there is a visitor who is not a member of the household	Potential benefit for source control	Fabric mask
	Indoor settings that have adequate [4] ventilation if physical distancing of at least 1 metre cannot be maintained			
	Outdoor settings where physical distancing cannot be maintained	General population in settings such as crowded open-air markets, lining up outside a building, during demonstrations, etc.		
	Settings where physical distancing cannot be maintained, and the individual is at increased risk of infection and/or negative outcomes	Individuals/people with higher risk of severe complications from COVID-19: • People aged ≥60 years • People with underlying comorbidities, such as cardiovascular disease or diabetes mellitus, chronic lung disease, cancer, cerebrovascular disease, immunosuppression, obesity, asthma	Protection	Medical mask
Known or suspected sporadic transmission, or no documented SARS-CoV-2 transmission	Risk-based approach	General population	Potential benefit for source control and/or protection	Depends on purpose (see details in the guidance content)
Any transmission scenario	Any setting in the community	Anyone suspected or confirmed of having COVID-19, regardless of whether they have symptoms or not, or anyone awaiting viral test results, when in the presence of others	Source control	Medical mask

**Public indoor setting includes any indoor setting outside of the household*

[4] For adequate ventilation refer to regional or national institutions or heating, refrigerating and air-conditioning societies enacting ventilation requirements. If not available or applicable, a recommended ventilation rate of 10l/s/person should be met (except healthcare facilities which have specific requirements).). For more information consult "Coronavirus (COVID-19) response resources from ASHRAE and others'' https://www.ashrae.org/technical-resources/resources

In outdoor settings:

- where physical distancing of at least 1 metre cannot be maintained;
- individuals/people with higher risk of severe complications from COVID-19 (individuals ≥ 60 years old and those with underlying conditions such as cardiovascular disease or diabetes mellitus, chronic lung disease, cancer, cerebrovascular disease or immunosuppression) should wear medical masks in any setting where physical distance cannot be maintained.

2. In areas with known or suspected sporadic transmission or no documented transmission, as in all transmission scenarios, WHO continues to advise that decision makers should apply a risk-based approach focusing on the following criteria when considering the use of masks for the public:

- **Purpose of mask use**. Is the intention source control (preventing an infected person from transmitting the virus to others) or protection (preventing a healthy wearer from the infection)?
- **Risk of exposure to SARS-CoV-2**. Based on the epidemiology and intensity of transmission in the population, is there transmission and limited or no capacity to implement other containment measures such as contact tracing, ability to carry out testing and isolate and care for suspected and confirmed cases? Is there risk to individuals working in close contact with the public (e.g., social workers, personal support workers, teachers, cashiers)?
- **Vulnerability of the mask wearer/population**. Is the mask wearer at risk of severe complications from COVID-19? Medical masks should be used by older people (≥ 60 years old), immunocompromised patients and people with comorbidities, such as cardiovascular disease or diabetes mellitus, chronic lung disease, cancer and cerebrovascular disease (117).
- **Setting in which the population lives**. Is there high population density (such as in refugee camps, camp-like settings, and among people living in cramped conditions) and settings where individuals are unable to keep a physical distance of at least 1 metre (for example, on public transportation)?
- **Feasibility**. Are masks available at an affordable cost? Do people have access to clean water to wash fabric masks, and can the targeted population tolerate possible adverse effects of wearing a mask?
- **Type of mask**. Does the use of medical masks in the community divert this critical resource from the health workers and others who need them the most? In settings where medical masks are in short supply, **stocks should be prioritized for health workers and at-risk individuals.**

The decision of governments and local jurisdictions whether to recommend or make mandatory the use of masks should be based on the above assessment as well as the local context, culture, availability of masks and resources required.

3. In any transmission scenario:

- Persons with any symptoms suggestive of COVID-19 should wear a medical mask and (5) additionally:
  - self-isolate and seek medical advice as soon as they start to feel unwell with potential symptoms of COVID-19, even if symptoms are mild);
  - follow instructions on how to put on, take off, and dispose of medical masks and perform hand hygiene (118);
  - follow all additional measures, in particular respiratory hygiene, frequent hand hygiene and maintaining physical distance of at least 1 metre from other persons (46). If a medical mask is not available for individuals with suspected or confirmed COVID-19, a fabric mask meeting the specifications in the Annex of this document should be worn by patients as a source control measure, pending access to a medical mask. The use of a non-medical mask can minimize the projection of respiratory droplets from the user (119, 120).
  - Asymptomatic persons who test positive for SARS-CoV-2, should wear a medical mask when with others for a period of 10 days after testing positive.

Potential benefits/harms

The potential advantages of mask use by healthy people in the general public include:

- reduced spread of respiratory droplets containing infectious viral particles, including from infected persons before they develop symptoms (121);
- reduced potential for stigmatization and greater of acceptance of mask wearing, whether to prevent infecting others or by people caring for COVID-19 patients in non-clinical settings (122);
- making people feel they can play a role in contributing to stopping spread of the virus;
- encouraging concurrent transmission prevention behaviours such as hand hygiene and not touching the eyes, nose and mouth (123-125);
- preventing transmission of other respiratory illnesses like tuberculosis and influenza and reducing the burden of those diseases during the pandemic (126).

The potential disadvantages of mask use by healthy people in the general public include:

- headache and/or breathing difficulties, depending on type of mask used (55);
- development of facial skin lesions, irritant dermatitis or worsening acne, when used frequently for long hours (58, 59, 127);
- difficulty with communicating clearly, especially for persons who are deaf or have poor hearing or use lip reading (128, 129);
- discomfort (44, 55, 59)
- a false sense of security leading to potentially lower adherence to other critical preventive measures such as physical distancing and hand hygiene (105);
- poor compliance with mask wearing, in particular by young children (111, 130-132);
- waste management issues; improper mask disposal leading to increased litter in public places and environmental hazards (133);
- disadvantages for or difficulty wearing masks, especially for children, developmentally challenged persons, those with mental illness, persons with cognitive impairment, those with asthma or chronic respiratory or breathing problems, those who have had facial trauma or recent oral maxillofacial surgery and those living in hot and humid environments (55, 130).

Considerations for implementation

When implementing mask policies for the public, decision-makers should:

- clearly communicate the purpose of wearing a mask, including when, where, how and what type of mask should be worn; explain what wearing a mask may achieve and what it will not achieve; and communicate clearly that this is one part of a package of measures along with hand hygiene, physical distancing, respiratory etiquette, adequate ventilation in indoor settings and other measures that are all necessary and all reinforce each other;
- inform/train people on when and how to use masks appropriately and safely (see mask management and maintenance sections);
- consider the feasibility of use, supply/access issues (cleaning, storage), waste management, sustainability, social and psychological acceptance (of both wearing and not wearing different types of masks in different contexts);
- continue gathering scientific data and evidence on the effectiveness of mask use (including different types of masks) in non-health care settings;
- evaluate the impact (positive, neutral or negative) of using masks in the general population (including behavioural and social sciences) through good quality research.

Mask use during physical activity

Evidence

There are limited studies on the benefits and harms of wearing medical masks, respirators and non-medical masks while exercising. Several studies have demonstrated statistically significant deleterious effects on various cardiopulmonary physiologic parameters during mild to moderate exercise in healthy subjects and in those with underlying respiratory diseases (134-140). The most significant impacts have been consistently associated with the use of respirators and in persons with underlying obstructive airway pulmonary diseases such as asthma and chronic obstructive pulmonary disease (COPD), especially when the condition is moderate to severe (136). Facial microclimate changes with increased temperature, humidity and perceptions of dyspnoea were also reported in some studies on the use of masks during exercise (134, 141). A recent review found negligeable evidence of negative effects of mask use during exercise but noted concern for individuals with severe cardiopulmonary disease (142).

Guidance

WHO advises that people should not wear masks during vigorous intensity physical activity (143) because masks may reduce the ability to breathe comfortably. The most important preventive measure is to maintain physical distancing of at least 1 meter and ensure good ventilation when exercising.

If the activity takes place indoors, adequate ventilation should be ensured at all times through natural ventilation or a properly functioning or maintained ventilation system (144). Particular attention should be paid to cleaning and disinfection of the environment, especially high-touch surfaces. If all the above measures cannot be ensured, consider temporary closure of public indoor exercise facilities (e.g., gyms).

Face shields for the general public

At present, face shields are considered to provide a level of eye protection only and should not be considered as an equivalent to masks with respect to respiratory droplet protection and/or source control. Current laboratory testing standards only assess face shields for their ability to provide eye protection from chemical splashes (145).

In the context of non-availability or difficulties wearing a non-medical mask (in persons with cognitive, respiratory or hearing impairments, for example), face shields may be considered as an alternative, noting that they are inferior to masks with respect to droplet transmission and prevention. If face shields are to be used, ensure proper design to cover the sides of the face and below the chin.

Medical masks for the care of COVID-19 patients at home

WHO provides guidance on how to care for patients with confirmed and suspected COVID-19 at home when care in a health facility or other residential setting is not possible (5).

- Persons with suspected COVID-19 or mild COVID-19 symptoms should wear a medical mask as much as possible, especially when there is no alternative to being in the same room with other people. The mask should be changed at least once daily. Persons who cannot tolerate a medical mask should rigorously apply respiratory hygiene (i.e., cover mouth and nose with a disposable paper tissue when coughing or sneezing and dispose of it immediately after use or use a bent elbow procedure and then perform hand hygiene).
- Caregivers of or those sharing living space with people with suspected COVID-19 or with mild COVID-19 symptoms should wear a medical mask when in the same room as the affected person.

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WHO continues to monitor the situation closely for any changes that may affect this interim guidance. Should any factors change, WHO will issue a further update. Otherwise, this interim guidance document will expire 1 year after the date of publication.

Annex: Updated guidance on non-medical (fabric) masks

Background

A non-medical mask, also called fabric mask, community mask or face covering, is neither a medical device nor personal protective equipment. Non-medical masks are aimed at the general population, primarily for protecting others from exhaled virus-containing droplets emitted by the mask wearer. They are not regulated by local health authorities or occupational health associations, nor is it required for manufacturers to comply with guidelines established by standards organizations. Non-medical masks may be homemade or manufactured. The essential performance parameters include good breathability, filtration of droplets originating from the wearer, and a snug fit covering the nose and mouth. Exhalation valves on masks are discouraged as they bypass the filtration function of the mask.

Non-medical masks are made from a variety of woven and non-woven fabrics, such as woven cotton, cotton/synthetic blends, polyesters and breathable spunbond polypropylene, for example. They may be made of different combinations of fabrics, layering sequences and available in diverse shapes. Currently, more is known about common household fabrics and combinations to make non-medical masks with target filtration efficiency and breathability (119, 146-150). Few of these fabrics and combinations have been systematically evaluated and there is no single design, choice of material, layering or shape among available non-medical masks that are considered optimal. While studies have focussed on single fabrics and combinations, few have looked at the shape and universal fit to the wearer. The unlimited combination of available fabrics and materials results in variable filtration and breathability.

In the context of the global shortage of medical masks and PPE, encouraging the public to create their own fabric masks may promote individual enterprise and community integration. Moreover, the production of non-medical masks may offer a source of income for those able to manufacture masks within their communities. Fabric masks can also be a form of cultural expression, encouraging public acceptance of protection measures in general. The safe re-use of fabric masks will also reduce costs and waste and contribute to sustainability (151-156).

This Annex is destined intended for two types of readers: homemade mask makers and factory-made masks manufacturers. Decision makers and managers (national/sub-national level) advising on a type of non-medical mask are also the focus of this guidance and should take into consideration the following features of non-medical masks: breathability, filtration efficiency (FE), or filtration, number and combination of fabric layers material used, shape, coating and maintenance.

Evidence on the effectiveness of non-medical (fabric) masks

A number of reviews have been identified on the effectiveness of non-medical masks (151-156). One systematic review (155) identified 12 studies and evaluated study quality. Ten were laboratory studies (157-166), and two reports were from a single randomized trial (72, 167). The majority of studies were conducted before COVID-19 emerged or used laboratory generated particles to assess filtration efficacy. Overall, the reviews concluded that cloth face masks have limited efficacy in combating viral infection transmission.

Homemade non-medical masks

Homemade non-medical masks made of household fabrics (e.g., cotton, cotton blends and polyesters) should ideally have a three-layer structure, with each layer providing a function (see Figure 1) (168). It should include:

1. an innermost layer (that will be in contact with the face) of a hydrophilic material (e.g., cotton or cotton blends of terry cloth towel, quilting cotton and flannel) that is non-irritating against the skin and can contain droplets (148)
2. a middle hydrophobic layer of synthetic breathable non-woven material (spunbond polypropylene, polyester and polyaramid), which may enhance filtration, prevent permeation of droplets or retain droplets (148, 150)
3. an outermost layer made of hydrophobic material (e.g. spunbond polypropylene, polyester or their blends), which may limit external contamination from penetrating through the layers to the wearer's nose and mouth and maintains and prevents water accumulation from blocking the pores of the fabric (148).

Although a minimum of three layers is recommended for non-medical masks for the most common fabric used, single, double or other layer combinations of advanced materials may be used if they meet performance requirements. It is important to note that with more tightly woven materials, breathability may be reduced as the number of layers increases. A quick check may be performed by attempting to breathe, through the mouth, through the multiple layers.

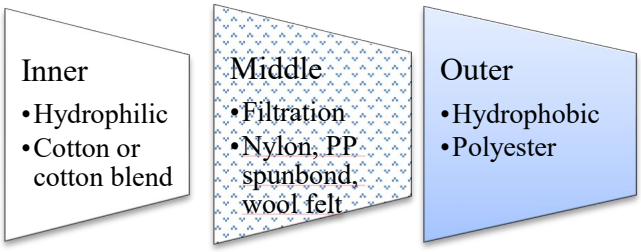

Figure 1. Non-medical mask construction using breathable fabrics such as cotton, cotton blends, polyesters, nylon and polypropylene spunbond that are breathable may impart adequate filtration performance when layered. Single- or double-layer combinations of advanced materials may be used if they meet performance requirements (72).

Assumptions regarding homemade masks are that individual makers only have access to common household fabrics and do not have access to test equipment to confirm target performance (filtration and breathability). Figure 1 illustrates a multi-layer mask construction with examples of fabric options. Very porous materials, such as gauze, even with multiple layers, may provide very low filtration efficiency (147). Higher thread count fabrics offer improved filtration performance (169). Coffee filters, vacuum bags and materials not meant for clothing should be avoided as they may contain injurious content when breathed in. Microporous films such as Gore-Tex are not recommended (170).

Factory-made non-medical masks: general considerations for manufacturers

The non-medical mask, including all components and packaging, must be non-hazardous, non-toxic and child-friendly (no exposed sharp edges, protruding hardware or rough materials). Factory-made non-medical masks must be made using a process that is certified to a quality management system (e.g., ISO 9001). Social accountability standards (e.g., SAI SA8000) for multiple aspects of fair labour practices, health and safety of the work force and adherence to UNICEF's Children's Rights and Business Principles are strongly encouraged.

Standards organizations' performance criteria

Manufacturers producing masks with consistent standardized performance can adhere to published, freely available guidance from several organizations including those from: the French Standardization Association (AFNOR Group), The European Committee for Standardization (CEN), Swiss National COVID-19 Task Force, the American Association of Textile Chemists and Colorists (AATCC), the South Korean Ministry of Food and Drug Safety (MFDS), the Italian Standardization Body (UNI) and the Government of Bangladesh.

Essential parameters

The essential parameters presented in this section are the synthesis of the abovementioned regional and national guidance. They include filtration, breathability and fit. Good performance is achieved when the three essential parameters are optimized at the preferred threshold (Figure 2).

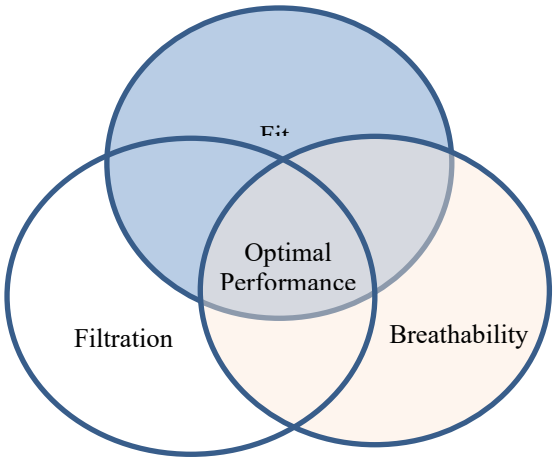

Figure 2. Illustration of the three essential parameters of filtration, breathability and fit.

The summary of the three essential parameters can be found in Table 1 and the additional performance considerations in Table 2. The minimum threshold is the minimum acceptable parameter, while the preferred threshold is the optimum.

Filtration and breathability

Filtration depends on the filtration efficiency (in %), the type of challenge particle (oils, solids, droplets containing bacteria) and the particle size (see Table 1). Depending on the fabrics used, filtration and breathability can complement or work against one another. The selection of material for droplet filtration (barrier) is as important as breathability. Filtration is dependent on the tightness of the weave, fibre or thread diameter. Non-woven materials used for disposable masks are manufactured using processes to create polymer fibres that are thinner than natural fibres such as cotton and that are held together by partial melting.

Breathability is the difference in pressure across the mask and is typically reported in millibars (mbar) or Pascals (Pa) or, normalized to the cm^2 in $mbar/cm^2$ or Pa/cm^2. Acceptable breathability of a medical mask should be below 49 Pa/cm^2. For non-medical masks, an acceptable pressure difference, over the whole mask, should be below 60 Pa/cm^2, with lower values indicating better breathability.

Non-medical fabric masks consisting of two layers of polypropylene spunbond and two layers of cotton have been shown to meet the minimum requirements for droplet filtration and breathability of the CEN CWA 17553 guidance. It is preferable not to select elastic material to make masks as the mask material may be stretched over the face, resulting in increased pore size and lower filtration through multiple usage. Additionally, elastic fabrics are sensitive to washing at high temperatures thus may degrade over time.

Coating the fabric with compounds like wax may increase the barrier and render the mask fluid resistant; however, such coatings may inadvertently completely block the pores and make the mask difficult to breathe through. In addition to decreased breathability unfiltered air may more likely escape the sides of the mask on exhalation. Coating is therefore not recommended.

Valves that let unfiltered air escape the mask are discouraged and are an inappropriate feature for masks used for the purpose of preventing transmission.

Table 1. Essential parameters (minimum and preferred thresholds) for manufactured non-medical mask

Essential Parameters	Minimum threshold	Preferred threshold
1. Filtration*		
1.1. filtration efficiency	70% @ 3 micron	> 70%, without compromising breathability
1.2. Challenge particle	Solid: sodium chloride (NaCl), Talcum powder, Holi powder, dolomite, Polystyrene Latex spheres Liquid: DEHS Di-Ethyl-Hexyl-Sebacat, paraffin oil	Based on availability
1.3. Particle size	Choose either sizes: 3 µm, 1 µm, or smaller	Range of particle sizes
2. Breathability		
2.1. Breathing resistance**	≤60 Pa/cm^2	Adult: ≤ 40 Pa/cm^2 Paediatric: ≤ 20 Pa/cm^2
2.2 Exhalation valves	Not recommended	N/A
3. Fit		
3.1. Coverage	Full coverage of nose and mouth, consistent, snug perimeter fit at the nose bridge, cheeks, chin and lateral sides of the face; adequate surface area to minimize breathing resistance and minimize side leakage	Same as current requirements
3.2 Face seal	Not currently required	Seal as good as FFR (respirator): Fit factor of 100 for N95 Maximum Total Inward Leakage of 25% (FFP1 requirement)
3.2. Sizing	Adult and child	Should cover from the bridge of the nose to below the chin and cheeks on either side of the mouth Sizing for adults and children (3-5, 6-9, 10-12, >12)
3.3Strap strength		> 44.5 N

* Smaller particle may result in lower filtration.
** High resistance can cause bypass of the mask. Unfiltered air will leak out the sides or around the nose if that is the easier path.

Fit: shape and sizing

Fit is the third essential parameter, and takes into consideration coverage, seal, sizing, and strap strength. Fit of masks currently is not defined by any standard except for the anthropometric considerations of facial dimensions (ISO/TS 16976-2) or simplified to height mask (South Korean standard for KF-AD). It is important to ensure that the mask can be held in place comfortably with as little adjustment of the elastic bands or ties as possible.

Mask shapes typically include flat-fold or duckbill and are designed to fit closely over the nose, cheeks and chin of the wearer. Snug fitting designs are suggested as they limit leaks of unfiltered air escaping from the mask (148). Ideally the mask should not have contact with the lips, unless hydrophobic fabrics are used in at least one layer of the mask (148). Leaks where unfiltered air moves in and out of the mask may be attributed to the size and shape of the mask (171).

Additional considerations

Optional parameters to consider in addition to the essential performance parameters include if reusable, biodegradability for disposal masks, antimicrobial performance where applicable and chemical safety (see Table 2).

Non-medical masks intended to be reusable should include instructions for washing and must be washed a minimum of five cycles, implying initial performance is maintained after each wash cycle.

Advanced fabrics may be biodegradable or compostable at the end of service life, according to a recognized standard process (e.g., UNI EN 13432, UNI EN 14995 and UNI / PdR 79).

Manufacturers sometimes claim their NM masks have antimicrobial performance. Antimicrobial performance may be due to coatings or additives to the fabric fibres. Treated fabrics must not come into direct contact with mucous membranes; the innermost fabric should not be treated with antimicrobial additives, only the outermost layer. In addition, antimicrobial fabric standards (e.g., ISO 18184, ISO 20743, AATCC TM100, AATCC 100) are generally slow acting. The inhibition on microbial growth may take full effect after 2- or 24-hour contact time depending on the standard. The standards have generally been used for athletic apparel and substantiate claims of odour control performance. These standards are not appropriate for non-medical cloth masks and may provide a false sense of protection from infectious agents. If claims are maid, manufacturers should specify which standard supports antimicrobial performance, the challenge organism and the contact time.

Volatile additives are discouraged as these may pose a health risk when inhaled repeatedly during wear. Certification according to organizations including OEKO-TEX (Europe) or SEK (Japan), and additives complying with REACH (Europe) or the Environmental Protection Agency (EPA, United States of America) indicate that textile additives are safe and added at safe levels.

Table 2. Additional parameters for manufactured non-medical masks

Additional parameters	Minimum thresholds
If reusable, number of wash cycles	5 cycles
Disposal	Reusable If biodegradable (CFC-BIO), according to UNI EN 13432, UNI EN 14995
Antimicrobial (bacteria, virus, fungus) performance	ISO 18184 (virus) ISO 20743 (bacteria) ISO 13629 (fungus) AATCC TM100 (bacteria)
Chemical safety	Comply with REACH regulation, including inhalation safety

WHO reference number: WHO/2019-nCoV/IPC_Masks/2020.5

This is **Exhibit "HH"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

Public Health Ontario | Santé publique Ontario

FACT SHEET

Comparing SARS-CoV-2 Variants of Concern (VOCs)* as of May 31, 2021

This table compares characteristics of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Variants of Concern (VOCs). This table is current as of May 31, 2021 and will be updated as more information becomes available.

	B.1.1.7	B.1.351	B.1.617[†]	P.1
Public Health England name	VOC-20DEC-01	VOC-20DEC-02	VOC-21APR-02	VOC-21JAN-02
Nextstrain clade	20I/S:501Y.V1	20H/S:501Y.V2	21A/S:154K (for B.1.617.1) 21A/S:478K (for B.1.617.2)	20J/S:501Y.V3
World Health Organization label	Alpha	Beta	Delta (for B.1.617.2)	Gamma
Location first detected	United Kingdom (Kent)	South Africa (Eastern Cape)	India	Brazil (Manaus)
Detected in multiple countries?	Yes	Yes	Yes	Yes
Detected in Ontario?	Yes	Yes	Yes	Yes
Increased transmissibility?	Yes +55%[‡]	Yes +58%[‡]	Yes	Yes +58%[‡]
Increased disease severity?	Yes	Unknown[§]	Unknown[§]	Unknown[§]
Impact on molecular tests?	Yes[¶]	No	No	No
Impact on antigen tests?	No	No	Unknown[§] (but unlikely)	No

	B.1.1.7	B.1.351	B.1.617[†]	P.1
Impact on serological tests?	Unknown[§]	Unknown[§]	Unknown[§]	Unknown[§]
Immune escape?	No	Yes	Potential[#]	Yes
Impact on vaccine effectiveness?	No	Yes[**,††]	Potential impact[††]	Potential impact[††]
Notable mutations (key mutations in bold) [‡‡]	**Δ69-70[¶], N501Y[§§]** D614G, P681H/R	L18F, **K417N, E484K, N501Y,** D614G, A701V	**L452R**, D614G, G142D **P681R**, **E484Q**	L18F, **K417T, E484K, N501Y,** D614G

Abbreviations: Δ, deletion; VOC, variant of concern

For additional information on VOCs and interpreting this table, please refer to PHO's *Companion Guide to Variants of Concern (VOCs)*[1]

* VOCs are classified according to the national definitions for Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) variants established by the Canadian SARS-CoV-2 Variant Surveillance Group.[2]

† B.1.617 contains three sub-lineages (B.1.617.1; B.1.617.2; B.1.617.3) which differ by few potentially relevant mutations in the spike protein and their global prevalence of detection.[3] Designation of the sublineages in Canada may change as evidence on their attributes are being reviewed by the Canadian SARS-CoV-2 Variant Surveillance Group.[2]

‡ Based on the odds ratio of secondary household transmission using a household study of VOC transmission in Ontario (forthcoming). For methods, see (https://doi.org/10.1093/cid/ciab186).[4]

§ Unknown indicates that it is under investigation or there is currently no data for assessment.

¶ Spike (S) gene target failure (SGTF) is observed for variants with the Δ69-70 mutation using some SARS-CoV-2 molecular assays that target this region of the S gene. These are multiple gene target assays that will still detect SARS-CoV-2 via the additional targets.

Laboratory evidence suggests resistance to certain therapeutic monoclonal antibodies and/or slightly reduced neutralization by convalescent sera.

** Reduced effectiveness to AstraZeneca and Johnson & Johnson.

†† Laboratory evidence to suggest reduced effectiveness by AstraZeneca, Moderna mRNA-1273, and Pfizer-BioNTech vaccines.

‡‡ Mutations in other genes are not represented in this table.

§§ A small subset of B.1.1.7 variants have been found to have the E484K mutation.

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Ontario

This is **Exhibit "II"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

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SYNTHESIS

05/26/2021

COVID-19 B.1.617 Variant of Concern – What We Know So Far

Introduction

Public Health Ontario (PHO) is actively monitoring, reviewing and assessing relevant information related to Coronavirus Disease 2019 (COVID-19). "What We Know So Far" documents provide a rapid review of the evidence related to a specific aspect or emerging issue related to COVID-19.

Key Findings

- Lineage B.1.617 is a new variant of concern (VOC) of Severe Acute Respiratory Syndrome coronavirus 2 (SARS-CoV-2) and is associated with the notable mutations L452R and E484Q, which have the potential for greater transmissibility and reduced vaccine effectiveness.
- B.1.617 was first reported in India in late March 2021 and has spread to over 40 other countries around the world in less than two months' time. However, its geographic distribution and incidence trends are not fully understood due to inconsistent testing and sequencing in different regions of the world.
- Field evidence from the United Kingdom (UK), where most B.1.617.2 sequences outside of India have been reported, suggest higher transmissibility for this lineage. Data to date are insufficient to determine if B.1.617 causes more severe disease.
- Preliminary in-vitro studies suggest that B.1.617 has reduced neutralization by vaccine-induced sera and convalescent sera, while an observational study suggests a possible small reduction in effectiveness after full vaccination.

Background

On March 24, 2021, the Ministry of Health and Family Welfare of India reported a new variant that contains two mutations in the Spike gene of SARS-CoV-2: E484Q and L452R.[1] The discovery of this "double mutant" generated concern in India as it took place when the incidence of Coronavirus Disease 2019 (COVID-19) surged rapidly after a long decline from late September 2020 to mid-February 2021.

In less than a month's time, this variant was detected in several other countries including the UK, Singapore, Australia and the United States (US), and was named B.1.617.[2] Public health scientists internationally have noted that the E484Q and L452R mutations may enable B.1.617 to transmit more easily and render vaccines less effective.[3,4]

In the UK, sublineage B.1.617.1 was designated as a Variant Under Investigation (VUI-21APR-01) on April 1, 2021, given its mutation profile and increasing incidence in England, while sublineages B.1.617.2 (with

a different mutation profile) and B.1.617.3 (rapid spread not apparent) were under surveillance.[5] On May 6, 2021, sublineage B.1.617.2 was escalated in its designation to VOC (VOC-21APR-02) when its transmissibility was assessed to be at least equivalent to that of the VOC B.1.1.7. Meanwhile, B.1.617.3 became a VUI (VUI-21APR-03) as of April 27, 2021.[6]

On May 10, 2021, the World Health Organization characterized B.1.617 as a VOC lineage which contains three sublineages: B.1.617.1, B.1.617.2 and B.1.617.3. The designation was based on early evidence of rapid increases in prevalence observed in multiple countries (for B.1.617.1 and B.1.617.2), preliminary laboratory findings of reduced effectiveness of monoclonal therapeutic antibody Bamlanivimab, and potentially slight reduction in neutralization abilities of vaccinee sera.[7]

On May 14, 2021, the Canadian SARS-CoV-2 Variant Surveillance Group classified B.1.617 as a VOC, noting that the designation of the sublineages may change as evidence on their attributes is reviewed (See Appendix A for the Canadian definitions of variant of concern).[8]

Methods

From January 17 to May 26, 2021, PHO Library Services conducted daily searches of primary and preprint literature using the MEDLINE database (search strategies available upon request). In addition, we performed grey literature searches daily using news feeds in the Shared Library Services Partnership. English-language peer-reviewed and non-peer-reviewed (preprint) records that described "double mutant" or B.1.617 were included.

Prior to posting, PHO subject-matter experts reviewed the content of this document.

As the COVID-19 outbreak continues to evolve and the scientific evidence rapidly expands, the information provided in this document is only current as of the date of respective literature searches.

Jurisdictional scan of involving data from England involved keyword searches conducted on May 17 and 18, 2021 in the Google search engine for literature related to COVID-19 epidemiology, vaccination programs, and public health measures in England. A formal database search was not conducted due to time constraints; thus, some relevant articles may not be included.

Epidemiology

- The first B.1.617 genome noted in the global database (GISAID) dates back to October 5, 2020. It was first detected in the UK on February 22, 2021 and in the US on February 23, 2021.[9] As of May 17, 2021, the three sublineages of B.1.617 (B.1.617.1, B.1.617.2 and B.1.617.3) have been reported in 50 countries from Asia, Europe, North America and Australia.[5,9,10] The relative frequency of B.1.617 and the sublineages in different countries is unknown due to the different sequencing capacities and strategies.

- B.1.617 was first detected in India where the majority of this lineage (412 reports as of April 22, 2021) was reported.[10,11] On March 24, 2021, the Indian SARS-CoV-2 Consortium on Genomics reported that about 15%–20% of samples from Maharashtra carry the E484Q and L452R mutations, and there was an increase in the percentage of samples carrying these two mutations since December 2020. Subsequently, B.1.617 was classified as a VOC in India.[1] B.1.617 was found in 61% of 361 cases sequenced between January and March, 2021 in Maharashtra, India. However, the scale of testing was too small to conclude if this lineage was driving the surge in COVID-19 cases in Maharashtra.[9,12]

- In the UK, B.1.617.1 was first detected in mid-February 2021. Its daily incidence rose quickly in April to peak at 15 cases in mid-April, then declined quickly in late April to <4 cases as of early May 2021.[13] B.1.617.3 was first detected in late March 2021 and its daily incidence has remained low, peaking at 3 cases a day in mid-April and dropping to a case occasionally.[13] On the other hand, the daily incidence of B.1.617.2 had remained low from first detection in mid-March 2021 before slowly increasing in early April, after which it rose quickly to 235 cases a day in early May 2021.[13] The proportion of specimens belonging to the B.1.617.2 sublineage among all variants sequenced in the UK increased from 1% in the first week of April 2021, to 26% in the first week of May 2021, and reached 58% by the week of May 16, 2021.[14] (See What's Happening in England? for further epidemiological context and response measures).

- In the US, B.1.617.1 comprised 0.2% (95% confidence interval [CI]: 0.1%–0.2%) of VOCs and variants of interest (VOIs) sequences collected through the Centers for Disease Control and Prevention's national genomic surveillance; B.1.617.2 0.5% (95% CI: 0.3%–0.7%); and <10 observations of B.1.617.3 between April 11 and 24, 2021.[15]

- In Canada, B.1.617 and the sublineages have been reported in one territory and all provinces.[16] The first patient identified in Quebec was reported to have been vaccinated against COVID-19 two months prior.[17]

Genomic Features

B.1.617 contains three sublineages: B.1.617.1; B.1.617.2 and B.1.617.3 with different mutation profiles (see Appendix B). Common spike gene mutations of concern across the sublineages are L452R, P681R and D614G. In addition, B.1.617.1 and B.1.617.3 carry the amino acid mutations E484Q and G142D[7] (the latter may also be found in some B.1.617.2 sequences[18]).

- L452R: this amino acid mutation occurs in the receptor-binding domain and has been associated with **immune escape** from therapeutically relevant monoclonal antibodies and convalescent sera,[9,19,20] and **enhanced receptor binding affinity and transmissibility**.[5] A preprint by Jacobson et al. reported on the detection of L452R in **breakthrough infections** by SARS-CoV-2 after vaccination; however, the risk ratios were not elevated for this mutation when community prevalence was taken into consideration.[21] It is also found in other variants including B.1.427 and B.1.429 (both first detected in California and are estimated to have increased transmissibility by up to 24%),[18,22] and B.1.526.1 (first detected in New York).[18]

- P681R: this mutation occurs near the furin cleavage site and is similar to P681H. The P681R/H mutation is also found in B.1.1.7 and has been shown to optimise spike cleavage by furin with **potentially enhanced transmissibility**.[19]

- D614G: this mutation occurs in the receptor-binding domain and is **linked to increased transmissibility, infectivity and viral loads**.[23-26]

- E484Q: this amino acid mutation has **not been associated with any change in receptor-binding avidity**,[19] unlike mutation E484K which is found in VOCs B.1.351 and P.1, and which have been linked to immune escape and potentially decreased vaccine effectiveness.[27] Findings of a preprint by Chen et al. suggest that **clinical effectiveness of some monoclonal antibodies may be compromised** by the E484Q mutation.[28] Another preprint by Ranjan et al. finds lower binding energy against antibody (CR3022) and higher binding affinity for angiotensin-converting enzyme 2 (ACE2) receptor by the E484Q and L452R mutations, compared to wild-type (not defined), and suggests **reduced vaccine efficacy**.[29]

- G142D: this mutation is associated with **immune escape from some monoclonal antibodies** but further studies are required to determine the impact on the effectiveness of vaccine and convalescent serum.[19]

Potential Public Health Impacts

Data on potential public health impacts are mostly for B.1.617.1 and B.1.617.2; there have been very few cases of B.1.617.3 globally.

Transmissibility

Epidemiological data from India and the UK, as well as two modelling studies from the UK, indicate that **B.1.617.1 and B.1.617.2 may be more easily transmitted** than non-variant strains of SARS-CoV-2.

B.1.617.1

- In India, the **proportion of B.1.617.1** among the sequenced viruses uploaded to GISAID **has increased to about 50% in late March 2021** before starting to decline in April 2021.[30]

B.1.617.2

- In India, the **proportion of B.1.617.2** among the sequenced viruses uploaded to GISAID **has been increasing since early March to become the dominant variant reported in mid-April 2021**.[30]

- In the UK, the Scientific Advisory Group for Emergencies (SAGE) reported on May 13, 2021 with high confidence that **B.1.617.2 can be up to 50% more transmissible than the VOC B.1.1.7**.[31] This is based on an observed rise in the number of sequenced cases of B.1.617.2 and of the proportion of spike-gene (S-gene)–positives being B.1.617.2 in a small number of areas.[32] S-gene–positives are specimens with cycle threshold values ≤ 30 in all S, N and ORF1ab gene targets of a specific 3-target assay (TaqPath assay) used in some laboratories. The proportion of B.1.617.2 in S-gene–positives rose from 72.2% (570/754) in the second half of April to 93% (368/397) in early May of 2021,[32] and to 97.3% in the week of May 11, 2021.[33] This happened when the proportion of B.1.1.7 among all VOCs and VOIs was declining, so local contact and behaviour patterns alone could not account for the rapid rise in B.1.617.2. However, many of these increases were detected in a small number of local regions, some of which had a higher proportion of specimens tested in laboratories using the TaqPath assay. The B.1.617.2 sublineage may also have been overrepresented as a result of targeted contact tracing in outbreak settings.[32]

- A modelling study by the Centre for Mathematical Modelling of Infectious Diseases COVID-19 Working Group **estimated the reproduction number (R) of B.1.617.2 as 1.64 (95% CI: 1.61–1.67)**. The working group used data on imported and local cases between February 1 and April 27, 2021 and assumed the same generation interval for B.1.617.2 and other strains. Imported cases of B.1.617.2 were estimated from three data sources: reported cases in India, proportion of sequenced cases that were B.1.617.2, and reported imported cases into the UK from India. The authors noted that the estimates may not generalize to other areas in the UK.[34]

- Another modelling study by the Joint Universities Pandemic and Epidemiological Research Consortium using S-gene–positives as proxy of B.1.617.2 **estimated that B.1.617.2 may have a transmission advantage of >1.4 compared to S-gene negatives**. The authors used primarily community-based COVID-19 testing data and there were significant delays in sequencing results. The authors also noted that the conclusion of increased transmissibility of B.1.617.2 could not be made due to the following factors: S-gene positives may contain other VOCs, wild-type, even

some B.1.1.7; different population and behavioural patterns and superspreading events could not be ruled out; travelling status of cases were not available; uneven geographic distribution of laboratories that test for S-gene positives.[35]

- A cluster analysis by Public Health England found that the size of COVID-19 **clusters initiated by travellers from India** tended to be larger if the index cases were infected with B.1.617.2 vs. B.1.1.7. However, the **difference in cluster sizes was not statistically significant (P=0.19)** after adjusting for the number of travellers at the origin of each cluster.[33]

SECONDARY ATTACK RATES

Data from the UK between March 29 and May 4, 2021 estimate **higher secondary attack rates for contacts of individuals infected with B.1.617.2 than those infected with B.1.1.7 or B.1.617.1**.[33]

- For contacts of cases with travel history:
    - B.1.617.2: 2.9% (174/5,908); 95% CI: 2.5%–3.4%
    - B.1.617.1: 2.2% (56/2,509); 95% CI: 1.7%–2.9%
    - B.1.1.7: 1.7% (452/26,934); 95% CI: 1.5%–1.8%
- For contacts of cases with no or unknown travel history:
    - B.1.617.2: 13.5% (537/3,977); 95% CI: 12.5%–14.6%
    - B.1.617.1: 11.0% (33/301); 95% CI: 7.9%–15.0%
    - B.1.1.7: 8.1% (5,587/68,713); 95% CI: 7.9%–8.3%

UK contact tracing data between March 29 and May 4, 2021 estimate **higher secondary attack rates among household and non-household contacts of the 1,446 cases with B.1.617.2 compared to those of cases with B.1.1.7 and with no or unknown travel history**.[33]

- For household contacts of cases with no or unknown travel history:
    - B.1.617.2: 15.0% (490/3,274); 95% CI: 13.8%–16.2%
    - B.1.1.7: 8.9% (5,019/56,374); 95% CI: 8.7%–9.1%
- For non-household contacts of cases with no or unknown travel history:
    - B.1.617.2: 6.7% (47/703); 95% CI: 5.1%–8.8%
    - B.1.1.7: 4.6% (568/12,339); 95% CI: 4.2%–5.0%

Serial Interval and Incubation Period

Contact tracing data from the UK between March 29 and May 5, 2021 estimate that the median serial interval (time between symptom-onset or testing date of index cases and symptom-onset household contacts) is 4 days for both B.1.617.2 (n=618; range 2–10 days) and B.1.1.7 (n=5,376; range 2–12 days). For non-household contacts, the median incubation period (time between exposure and symptom-onset) is 5 days for B.1.617.2 (n=160; range 2–7 days) and 4 days for B.1.1.7 (n=888; range 2–10 days).[33] In progress are longitudinal sampling studies to provide a clearer picture by overcoming some of the challenges in recall error.

Disease Severity

In India, anecdotal evidence from clinicians suggests that B.1.617 is less virulent (most patients do not require hospitalization).[12] However, a sharp rise in death rates was observed at the time of increasing incidence of B.1.617, but patient-level data are not available to determine if the increase death rates was due to higher transmission and/or suboptimal access to health care services.[30]

In the UK, there have been 12 deaths out of 5,599 cases due to B.1.617.2 as of May 25, 2021, with a case fatality rate of 0.2% (95% CI: 0.1%–0.4%), compared to 2.0% (95% CI: 1.9%–2.0%) for B.1.1.7. The actual case fatality rate may change as a high proportion of recent cases have not completed a follow up of 28 days. Meanwhile, there have been no deaths reported out of 406 cases of B.1.617.1 and 14 cases of B.1.617.3.[33]

From February 1 to May 25, 2021, 0.8% (34/5,599) of the patients with B.1.617.2 who presented to emergency departments were admitted, compared to 1.5% (2,079/136,048) of those with B.1.1.7 and 0.5% (2/406) of those with B.1.617.1.[33] There is insufficient information to date to determine if any sublineages of B.1.617 would result in more severe infections, as most cases were very recent.[36]

Impact on Testing

There is no evidence to date that indicates reduced effectiveness of molecular tests in use for diagnosing B.1.617.[30] While the detection capability of antigen tests for B.1.617 detection has not been assessed, it is unlikely that their performance would be affected. However, it is unclear at this time if B.1.617 and the sublineages may impact on serological tests.

Immunity and Reinfection

As of 25 May, 2021, 2 cases of re-infection with B.1.617.1 and 54 cases of re-infection with B.1.617.2 have been reported in the UK, as expected with any prevalent variant.[33] Also, the SARS-CoV-2 Immunity and Reinfection Evaluation (The SIREN study), which monitors COVID-19 infections among National Health Service health care workers in the UK, reported only one reinfection (VOC status not reported) between April 22 and May 21, 2021.[14]

On the other hand, SAGE speculates on some **potential reduction in protection offered by natural infection or vaccine due to the observed antigenic distance between B.1.617.2 and wild-type virus**, which is less than that for B.1.351, similar to that for B.1.617.1; greater than that for B.1.1.7.[37] Four preprints of in vitro neutralization experiments also report on **reduced neutralization of B.1.617 or the sublineages B.1.617.1 and B.1.617.2 by convalescent sera**.

- Edara et al. reported that 19/24 (79%) of convalescent sera were able to neutralize live virus of B.1.617.1 despite a significant 6.8-fold reduction in neutralization titre, compared to that against the WA1/2020 wild-type.[38]
- Planas et al. reported 6-fold reduction in neutralization titres against live virus of B.1.617.2 compared to B.1.1.7 by convalescent sera of a cohort of unvaccinated individuals (n=56) at 6 months post-infection.[39]
- Hoffmann et al. reported an approximately 2-fold reduction in neutralization titre against pseudovirus bearing B.1.617 S protein by convalescent sera (n=15), compared to the Wuhan-1 wild-type. The authors suggest that B.1.617 might evade with moderate efficiency humoral immunity in convalescent patients.[40]

- Tada et al. reported approximately 2-fold reduction in neutralization titre against pseudovirus bearing L452R/E4384Q/P681R S protein by convalescent sera (n=8), compared to the wild-type with D614G mutation.[41]

Vaccine Effectiveness

REAL-WORLD EXPERIENCE FROM THE UK: B.1.617.2

Lopez Bernal et al. compared the vaccine effectiveness against symptomatic COVID-19 in individuals tested for COVID-19 in the UK up to May 16, 2021. The authors reported that **after only one dose, vaccine effectiveness against symptomatic COVID-19 with B.1.617.2 was reduced by approximately 20% compared to that for B.1.1.7**: 33.2% (95% CI: 8.3%–51.4%) vs. 49.2% (95% CI: 42.6%–55.0%) for the Pfizer vaccine, 32.9% (95% CI: 19.3%–44.3%) vs. 51.4% (95% CI: 47.3%–55.2%) for the ChAdOx1 (i.e., AstraZeneca) vaccine. However, the **reduction in vaccine effectiveness after two doses of vaccine was very small**: 87.9% (78.2%–93.2%) vs. 93.4% (95% CI: 90.4%–95.5%) for the Pfizer vaccine; 59.8% (95% CI: 28.9%–77.3%) vs. 66.1% (95% CI: 54.0%–75.0%) for the ChAdOx1 vaccine. The study included 12,675 sequenced COVID-19 variant cases (11,621 cases with B.1.1.7 and 1,054 cases with B.1.617.2). The authors noted that shorter follow-up time after two doses of ChAdOx1 (i.e., AstraZeneca) vaccine may explain the lower vaccine effectiveness.[42]

Experience from Bolton, UK (where clusters of B.1.617.2 are have been detected) **suggests that COVID-19 vaccines are effective against B.1.617.2**, as nearly 90% of the 25 people hospitalized with COVID-19 as of May 19, 2021 were not fully vaccinated.[43] (COVID-19 vaccines used in the UK include Pfizer BNT162b2 mRNA, Moderna mRNA-1273, and Oxford/AstraZeneca.)[44]

IN VITRO NEUTRALIZATION ASSAYS

Findings from seven preprints and one peer-reviewed study, however, **suggest potential slight to moderate reduction in effectiveness** of four COVID-19 vaccines (Pfizer-BioNTech BNT162b2 mRNA, Moderna mRNA-1273, AstraZeneca, and Covaxin) compared to the wild-type or the B.1.1.7 strains. Three of the studies looked at B.1.617 while the other four focused on sublineage B.1.617.1.

B.1.617

- Hoffmann et al. reported approximately **3-fold reduction in neutralization ability by sera from fully-vaccinated Pfizer vaccinees** (n=15) against pseudovirus with B.1.617 S protein, compared to the Wuhan-1 wild-type.[40]

- Yadav et al. reported a **2-fold reduction in neutralization ability by sera from Covaxin vaccinees** (n=28; vaccination status not reported) against live virus of B.1.617, compared to the B.1 (D614G) prototype and VOC B.1.1.7.[45]

- Tada et al. reported approximately **4-fold reduction in neutralization ability by sera from Pfizer vaccinees** (n=6; vaccination status not reported) **and Moderna vaccinees** (n=3; vaccination status not reported) against pseudovirus with L452R, E484Q and P681R spike mutations, compared to the wild-type with D614G mutation.[41]

B.1.617.1

- Ferreira et al. reported **significant reduction in neutralization ability** (actual titre not reported) compared to the Wuhan-1 D614G wild-type, when pseudovirus bearing spike mutations in L452R and E484Q (proxy of B.1.617.1) were tested with sera from Pfizer vaccinees (n=9; vaccination status not reported).[46]

- Edara et al. reported that **all sera from Moderna fully-vaccinated vaccinees (n=15) and Pfizer fully-vaccinated vaccinees (n=10) were able to neutralize live virus** of B.1.617.1 despite a **significant 6.8-fold reduction in neutralization ability** compared to that against the WA1/2020 wild-type.[38]

- Yadav et al. reported that 22/43 (51%) of sera from fully-vaccinated Covishield vaccinees without prior COVID-19 infection did not show any neutralizing antibodies against B.1.617.1. A **significant 2-fold reduction in neutralization ability** against B.1.617.1 was observed compared to the B.1 (D614G) prototype. With a geometric mean titre of 21.92 ± 4.42 (95% CI: 24.4–62.64) against B.1.617.1, the authors speculate that the vaccine are likely to protect against severe infection and death from that sublineage.[47]

- Shi et al. reported that **all sera from Pfizer fully-vaccinated vaccinees (n=20) were able to neutralize pseudovirus** bearing mutations in G142D, E154K, L452R, E484Q, D614G, P618R, Q1071H, H1101D and D111 as proxy of B.1.617.1, despite a 0.26 times reduction in plaque reduction neutralization testing ($PRNT_{50}$) compared to that of the wild-type WA1/2020.[48]

B.1.617.2

- Planas et al. reported that 94% of sera (n=16) at 8 weeks after two doses of **Pfizer** vaccine were **able to neutralize live virus of B.1.617.2, despite a 3-fold reduction in neutralization titres compared to that for B.1.1.7**. Even at 16 weeks after vaccination, neutralization ability was retained by 85% of the sera. On the other hand, **only 8% of sera (n=12) from vaccinees with one dose of AstraZeneca vaccine were able to neutralize the virus**. However, even one dose of vaccine (9 with Pfizer, 9 with AstraZeneca, 3 with Moderna) was observed to increase the median neutralizing titres in convalescent sera (n=23) by 130-fold against both B.1.1.7 and B.1.617.2 even at 12 months after infection, suggesting a **single dose of vaccine could boost cross-neutralizing antibody responses**.[39]

What's Happening in England?

Epidemiological Context

- The 7-day rolling average daily cases of COVID-19 rose slowly from late February 2020 to plateau around 4,500 to 4,800 in April 2020, then declined to stay below 700 during late-June to late-July 2020. Daily cases started to climb in September 2020 and plateaued around 21,000 and 24,600 from mid-October to mid-November 2020, dipped quickly to around 14,500 in late November before shooting to the peak of 61,239 in early January 2021. Since then, daily cases have been declining rapidly to around 12,000 in mid-February, then slowly to a low of 1,847 at the end of April 2021, and hovering around 1,900 to 2,100 for the first week of May. As of May 15, 2021, the 7-day rolling average number of daily new COVID-19 cases in England was 1,563 (22 cases per 100,000). As of May 14, 2021, the cumulative number of cases in England was 4.4 million.[49]

- The 7-day average daily admission to hospitals due to COVID-19 rose sharply from late March 2020 to a peak at 3,116 in early April 2020, then dropped slowly to a low of 97 in late August 2020. Daily admission then rose to a high of 1,777 in mid-November 2020 and peaked at 4,232 in mid-January 2021. Daily admission was at 234 at the start of April and hovered around 100 and 120 for the first week of May in 2021.[50]

- In the past 7 days (as of May 17, 2021) the areas with the greatest rates of cases per 100,000 were the Yorkshire and The Humber regions (2151 cases or 39.1 per 100,000) and the North West region (2764 cases or 37.7 per 100,000)[51]

- On April 9, 2021, B.1.617.2 made up 0.1% of COVID-19 cases in England, and by May 7, 2021, the lineage made up 19.6% of cases.[52] UK experts expect B.1.617.2 to become the dominant lineage by the end of the week of May 18, 2021, if not already.[53] As of May 17, 2021, there were 2,323 confirmed cases of B.1.617 in the UK, which represents a 77% increase from just five days earlier.[54]

- North West and South Central England have the highest proportions of B.1.617.2 cases, but cases are being reported across the country.[54]

- In Blackburn and Bolton (North West England) where the B.1.617 variant are spreading the fastest,[55] the number of cases among those under 60 years of age has increased significantly more than among those over 60 (who are more likely to be vaccinated) suggesting the effectiveness of vaccines.[56] The majority of the cases in Bolton were individuals in their teens, 20s and 30s, most of whom had not been vaccinated against Covid-19.[57]

Vaccine Context

- As of May 18, 2021, 57.9 million doses of the COVID-19 vaccine had been administered; 70.2% of the population had received at least one dose of the COVID-19 vaccine and 39.6% were fully vaccinated.[58]

- As of May 13, 2021, the vaccine is currently being offered to: individuals aged 36 and over and individuals who will turn 36 before July 1, 2021, individuals at high risk from COVID-19 (clinically extremely vulnerable), individuals who live or work in care homes, health and social care workers, individuals with a condition that puts them at higher risk (clinically vulnerable), individuals with a learning disability, and individuals who are a main carer for someone at high risk from COVID-19.[44]

- To address the rising cases of B.1.617.2, the government announced on May 14, 2021 that it would shorten the interval for second doses from 12 weeks to 8 weeks for the country's top 9 priority groups.[59] England is also accelerating COVID-19 vaccinations in regions with a high proportion of B1.617.2 cases.

Public Health Measures

- As of May 17, 2021, the English government started loosening restrictions for a variety of public health measures, including indoor settings such as hospitality and organized sports.[55]

- The government recommends that particular caution be used in certain areas of England (i.e., Bolton Metropolitan Borough and Blackburn with Darwen Borough) where variants are spreading the fastest.[55]

- In a press conference on May 14, 2021, the prime minister stated that if the B.1.617 variant turns out to be only marginally more transmissible, the country can continue to move forwards with their re-opening plan; however, if it is significantly more transmissible the roadmap to re-opening may have to be delayed or adapted (particular Step 4 in June[60] which involves removing all legal limits on social contact[61]).

Actions Taken to Control the Spread of Variants

- A press release from May 13, 2021 stated that due to the recent surge in B.1.617.2 cases in select regions, "a new Surge Rapid Response Team is being deployed in Bolton, additional surge testing will shortly launch in areas such as Formby, and enhanced contact tracing is in place across England".[62] Additionally, in areas where clusters of cases have been identified additional contact tracing, increased genomic sequencing of positive cases, increased community engagement and support for individual to get tested and self-isolate, and ensure access to vaccination and encourage uptake.

- England has also accelerated genomic sequencing, enhanced contact tracing and implemented surge testing in the North West in efforts to rapidly break chains of B.1.617.2 transmission.[63]

Ontario Context

- Currently, all positive SARS-CoV-2 specimens in Ontario with a cycle threshold (Ct) value ≤35 are tested for presence of the N501Y and E484K mutations, and only specimens positive for E484K mutation with Ct value ≤30 will be sequenced.[64] It is unclear at this time whether the current E484K assay will detect the E484Q mutation associated with B.1.617.

- Approximately 90%–95% of positive specimens that undergo VOC testing in Ontario have either N501Y and/or E484K mutations.[65] As these mutations are not associated with the B.1.617 lineage, the vast majority of specimens in Ontario are highly unlikely to be B.1.617. A proportion of non-VOC specimens are routinely sent for sequencing, in addition to all travel-related positive specimens, as part of Ontario's ongoing surveillance for emerging variants.

- As of May 19, 2021, there have been 260 cases with B.1.617 detected in Ontario (an increase from 45 as of May 12). Of the 260 cases, 203 were tested by the National Microbiology Laboratory as part of international travel arrival quarantine procedures, while 57 were detected by PHO, most of whom were associated with out-of-country travel.[66]

Risk Assessment and Practice Implications

Overall risk assessment: The risk of B.1.617 transmission in Ontario is moderate to high and depends on the number of existing B.1.617 cases and continued introductions into the province. Given the rapid emergence of B.1.617, PHO's level of confidence in the existing primary literature, preprint literature and grey literature is low but building up quickly with emergence of new evidence. This overall risk assessment may change as new evidence emerges.

- **Transmissibility:** The risk of increased transmissibility by B.1.617 is high, with a relatively low degree of uncertainty.

- **Disease severity:** The risk of B.1.617 causing severe disease is unknown.

- **Immunity and re-infection:** The risk of re-infection with B.1.617 in convalescent patients is low, with a high degree of uncertainty.

- **Vaccine effectiveness:** The risk of B.1.617 causing lowered vaccine effectiveness is moderate, with a moderate degree of uncertainty.

- **Surveillance:** The risk of B.1.617 cases not being detected in Ontario's surveillance program is moderate, with a moderate degree of uncertainty.

Surveillance testing (including genomic sequencing of a sufficient sample of positive cases) will help us better understand the epidemiology of B.1.617. Currently, there is no indication that individual or societal public health measures such as case and contact management, vaccination rollout and non-pharmaceutical interventions such as physical distancing in Ontario need to be changed. However, ongoing monitoring of single-dose vaccine effectiveness and the impact of England's shortened second-dose schedule will help to inform Ontario's second-dose roll-out. Heightened surveillance, close monitoring of case rate indicators, and local assessment of transmissibility are also needed to inform public health measures and Ontario's new recovery plan.[67]

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Appendix A

For the purposes of this document, the definition of variants of interest (VOI) and variants of concern (VOC) as proposed by the Canadian SARS-CoV-2 Variants Expert Working Group (CSVEWG) are used.[8]

Variant of Interest (VOI)

A SARS-CoV-2 variant is a variant of interest (VOI) if it:

- has a genome with mutations associated with changes in epidemiology, antigenicity, or virulence, or changes that potentially have a negative impact on available diagnostics, vaccines, therapeutics or public health measures; AND is known to cause community transmission/multiple COVID-19 cases/clusters in Canada or has been detected in multiple countries; OR
- is otherwise assessed to be a VOI by WHO; OR
- is otherwise assessed to be a VOI by the CSVEWG.

Variant of Concern (VOC)

A variant is a VOC if, through a comparative assessment, it:

- has been demonstrated to be associated with one or more of the following:
    - increased transmissibility or detrimental change in COVID-19 epidemiology;
    - increased virulence or change in clinical disease presentation;
    - decreased effectiveness of available diagnostics, vaccines, therapeutics or public health measures; OR
- is otherwise assessed to be a VOC by WHO; OR
- is otherwise assessed to be a VOC by the CSVEWG.

Appendix B

Notable mutations in the spike protein (non-synonymous) found in the B.1.617 sublineages[§7]

Amino acid substitution or deletion	B.1.617.1	B.1.617.2	B.1.617.3
D614G	**Yes**	**Yes**	**Yes**
D950N	No	**Yes**	**Yes**
E484Q	**Yes**	No	**Yes**
G142D	**Yes**	**Yes**	No
E154K	**Yes**	No	No
L452R	**Yes**	**Yes**	**Yes**
P681R	**Yes**	**Yes**	**Yes**
Q1071H	**Yes**	No	No
T19R	No	**Yes**	**Yes**
T478K	No	**Yes**	No
Δ157/158	No	**Yes**	No

§ Characteristic spike mutations detected in more than 60% of sequences.[7]

Citation

Ontario Agency for Health Protection and Promotion (Public Health Ontario). COVID-19 B.1.617 variant of concern – what we know so far. Toronto, ON: Queen's Printer for Ontario; 2021.

Disclaimer

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Ontario

This is **Exhibit "JJ"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

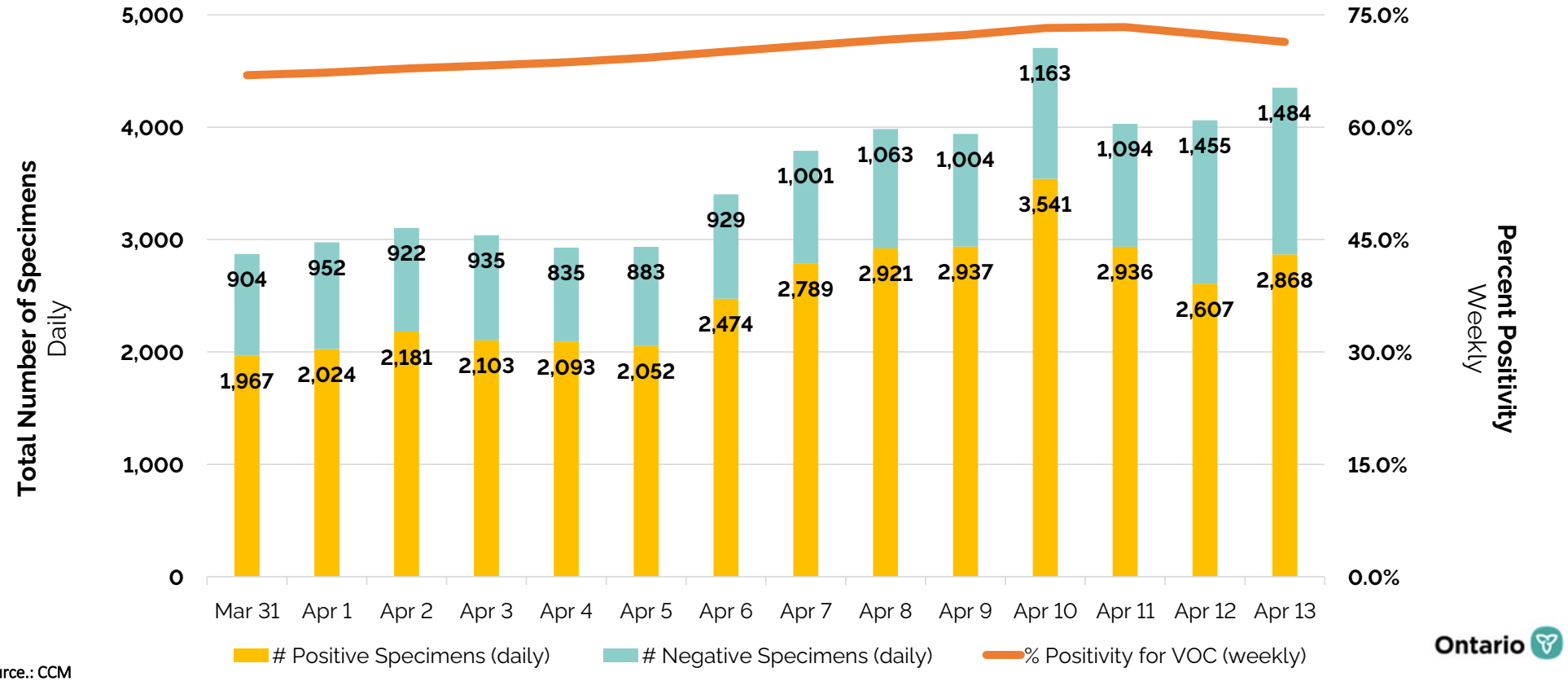
Variant COVID-19 Cases

As of April 19, 2021

The % positivity for VOCs (weekly) is leveling out around 70%.

64,643
cases with a mutation or VOC detected

71.4% Weekly Percent Positivity (April 13)
70.1 % Previous week (April 6)



Source.: CCM

This is **Exhibit "KK"** referred to
in the Affidavit of DR. DAVID McKEOWN,
affirmed this 5th day of July, 2021.

Ryan Cookson

A Commissioner for the Taking of Affidavits

Public Health Ontario | Santé publique Ontario

DAILY EPIDEMIOLOGICAL SUMMARY

COVID-19 in Ontario: January 15, 2020 to July 3, 2021

This report includes the most current information available from CCM as of **July 3, 2021**.

Please visit the interactive Ontario COVID-19 Data Tool to explore recent COVID-19 data by public health unit, age group, sex, and trends over time.

A weekly summary report is available with additional information to complement the daily report.

This **daily** report provides an epidemiologic summary of recent COVID-19 activity in Ontario. The change in cases is determined by taking the cumulative difference between the current day and the previous day.

Highlights

- There are a total of 545,803 confirmed cases of COVID-19 in Ontario reported to date.
- Compared to the previous day, this represents:
    - An increase of 213 confirmed cases (percent change of +1.9%)
    - An increase of 9 deaths (percent change of 0.0%)
    - An increase of 286 resolved cases (percent change of +9.2%)

In this document, the term 'change in cases' refers to cases publicly reported by the province for a given day. Data corrections or updates can result in case records being removed and or updated from past reports and may result in subset totals for updated case counts (i.e., age group, gender) differing from the overall updated case counts.

The term public health unit reported date in this document refers to the date local public health units were first notified of the case.

Case Characteristics

Table 1a. Summary of recent confirmed cases of COVID-19: Ontario

	Change in cases July 2, 2021	Change in cases July 3, 2021	Percentage change July 3, 2021 compared to July 2, 2021	Cumulative case count as of July 3, 2021
Total number of cases	209	213	+1.9%	545,803
Number of deaths	9	9	0.0%	9,214
Number resolved	262	286	+9.2%	534,558

Note: The number of cases publicly reported by the province each day may not align with case counts reported to public health on a given day; public health unit reported date refers to the date local public health was first notified of the case. Data corrections or updates can result in case records being removed and or updated from past reports.
Data Source: CCM

Table 1b. Summary of recent confirmed cases of COVID-19 by age group and gender: Ontario

	Change in cases July 2, 2021	Change in cases July 3, 2021	Cumulative case count as of July 3, 2021
Gender: Male	109	111	271,959
Gender: Female	96	95	270,054
Ages: 19 and under	57	51	87,920
Ages: 20-39	83	64	204,406
Ages: 40-59	42	53	155,746
Ages: 60-79	19	37	72,521
Ages: 80 and over	7	8	25,110

Note: Not all cases have a reported age or gender reported. Data corrections or updates can result in case records being removed and or updated from past reports and may result in subset totals (i.e., age group, gender) differing from past publicly reported case counts.
Data Source: CCM

Table 2. Summary of recent confirmed cases of COVID-19 in school aged children by age group, August 30, 2020 to July 3, 2021: Ontario

	Change in cases July 2, 2021	Change in cases July 3, 2021	Cumulative case count from August 30, 2020 to July 3, 2021
Ages: 4 to 8	18	11	16,260
Ages: 9 to 13	8	14	20,360
Ages: 14 to 17	8	10	20,720

Note: Includes all confirmed cases of COVID-19 for specified ages, regardless of school attendance. Data corrections or updates can result in case records being removed and or updated from past reports and may result in subset totals (i.e., age group) differing from past publicly reported case counts.
Data Source: CCM

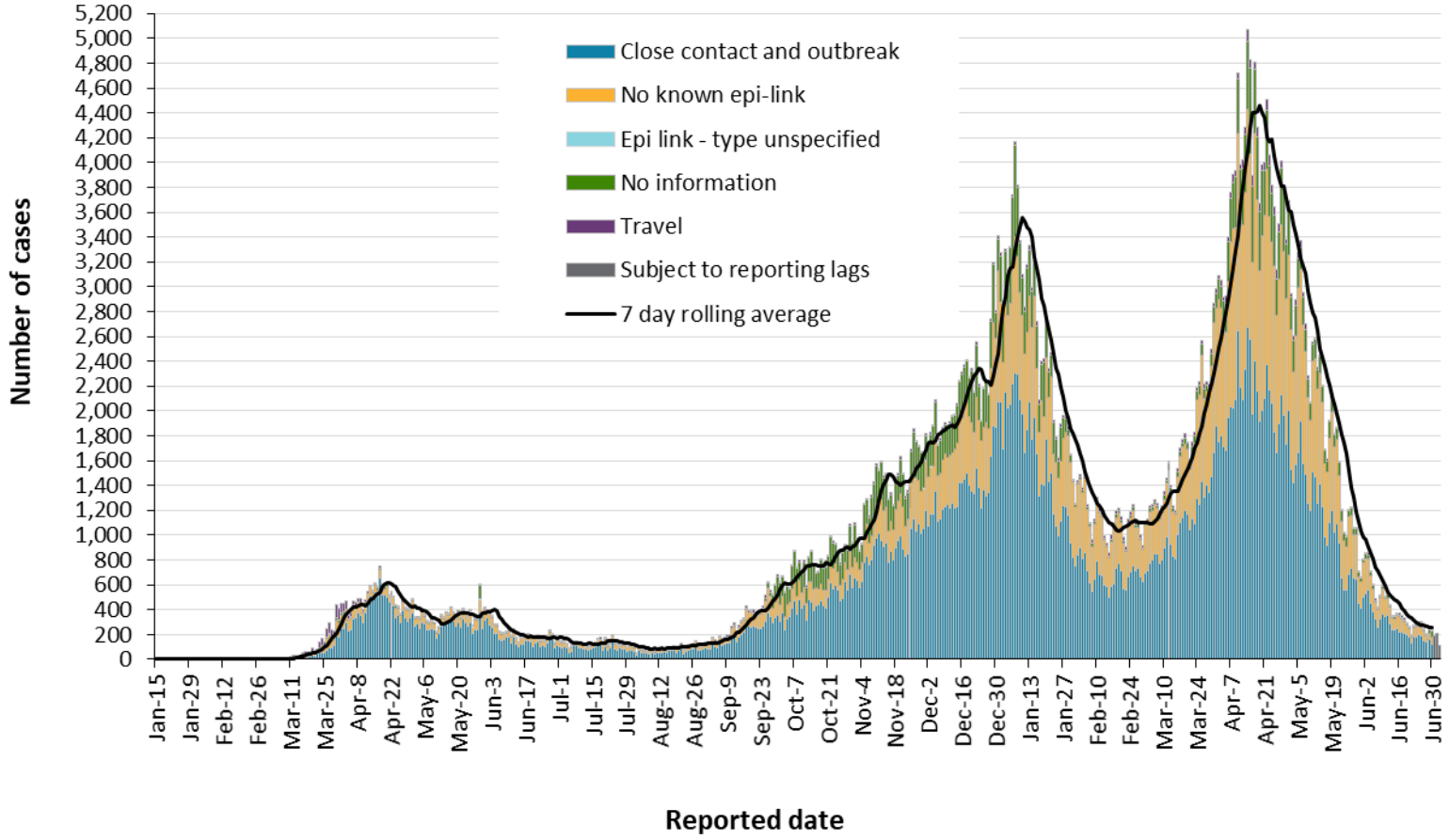
Table 3. Summary of recent confirmed cases of COVID-19 in long-term care homes: Ontario

Long-term care home cases	Change in cases July 2, 2021	Change in cases July 3, 2021	Cumulative case count as of July 3, 2021
Residents	1	1	15,400
Health care workers	1	0	7,195
Deaths among residents	0	1	3,971
Deaths among health care workers	0	0	10

Note: Information on how long-term care home residents and health care workers are identified is available in the technical notes. Also, the change in cases in these categories may represent existing case records that have been updated.
Data Source: CCM

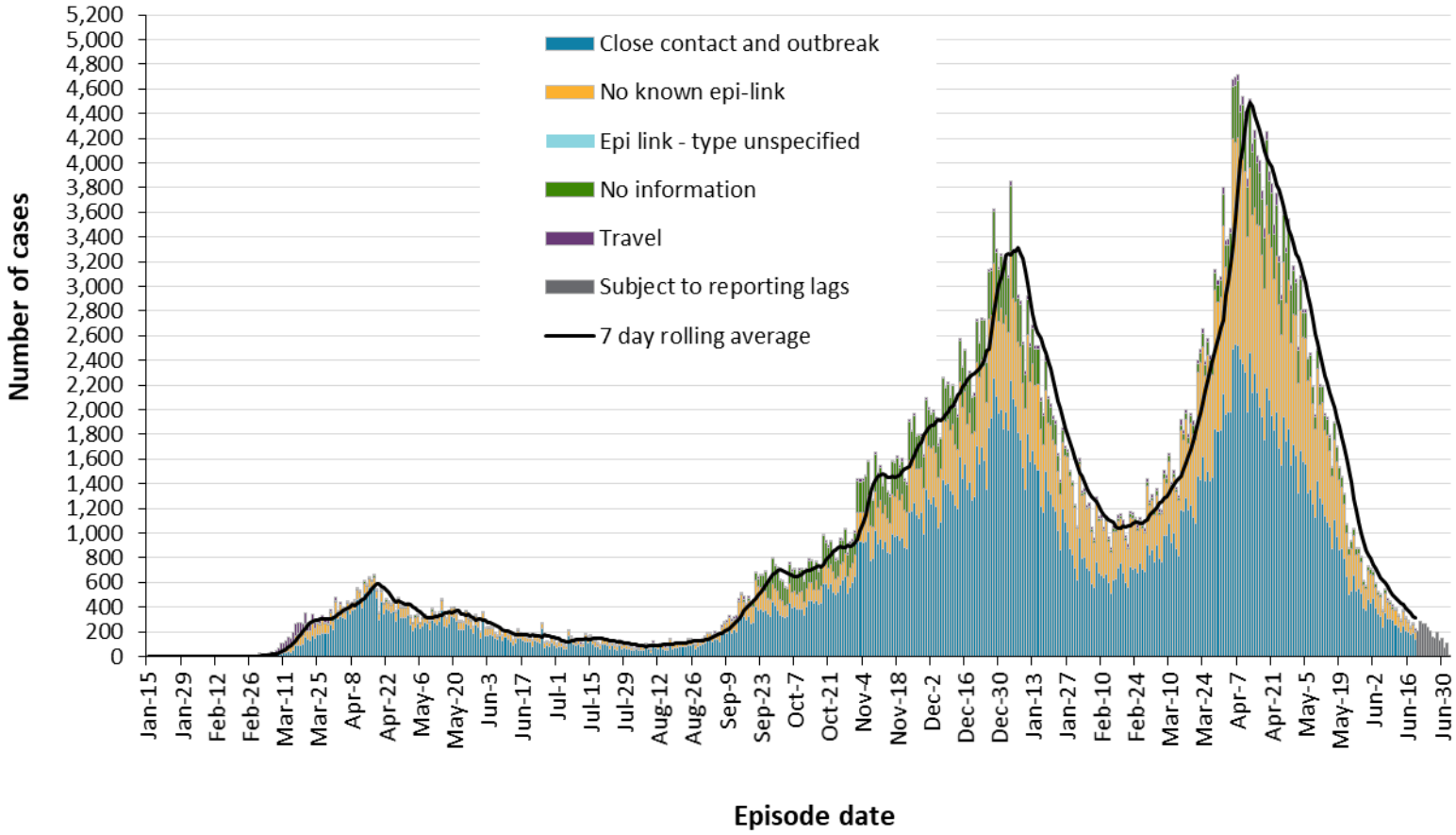
Time

Figure 1. Confirmed cases of COVID-19 by likely acquisition and public health unit reported date: Ontario, January 15, 2020 to July 3, 2021



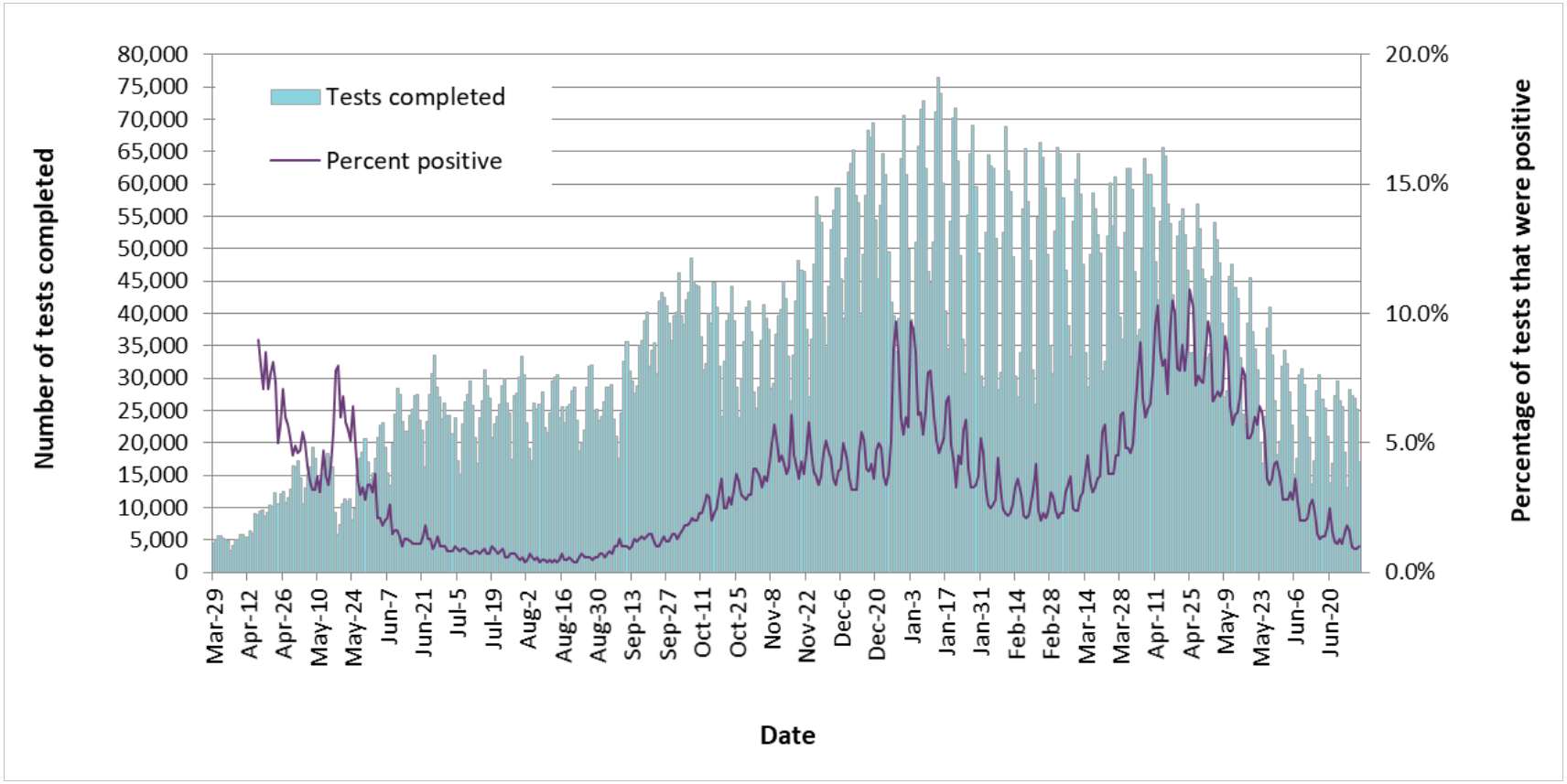
Data Source: CCM

Figure 2. Confirmed cases of COVID-19 by likely acquisition and approximation of symptom onset date: Ontario, January 15, 2020 to July 3, 2021



Note: Not all cases may have an episode date and those without one are not included in the figure. Episode date is defined and available in the technical notes.
Data Source: CCM

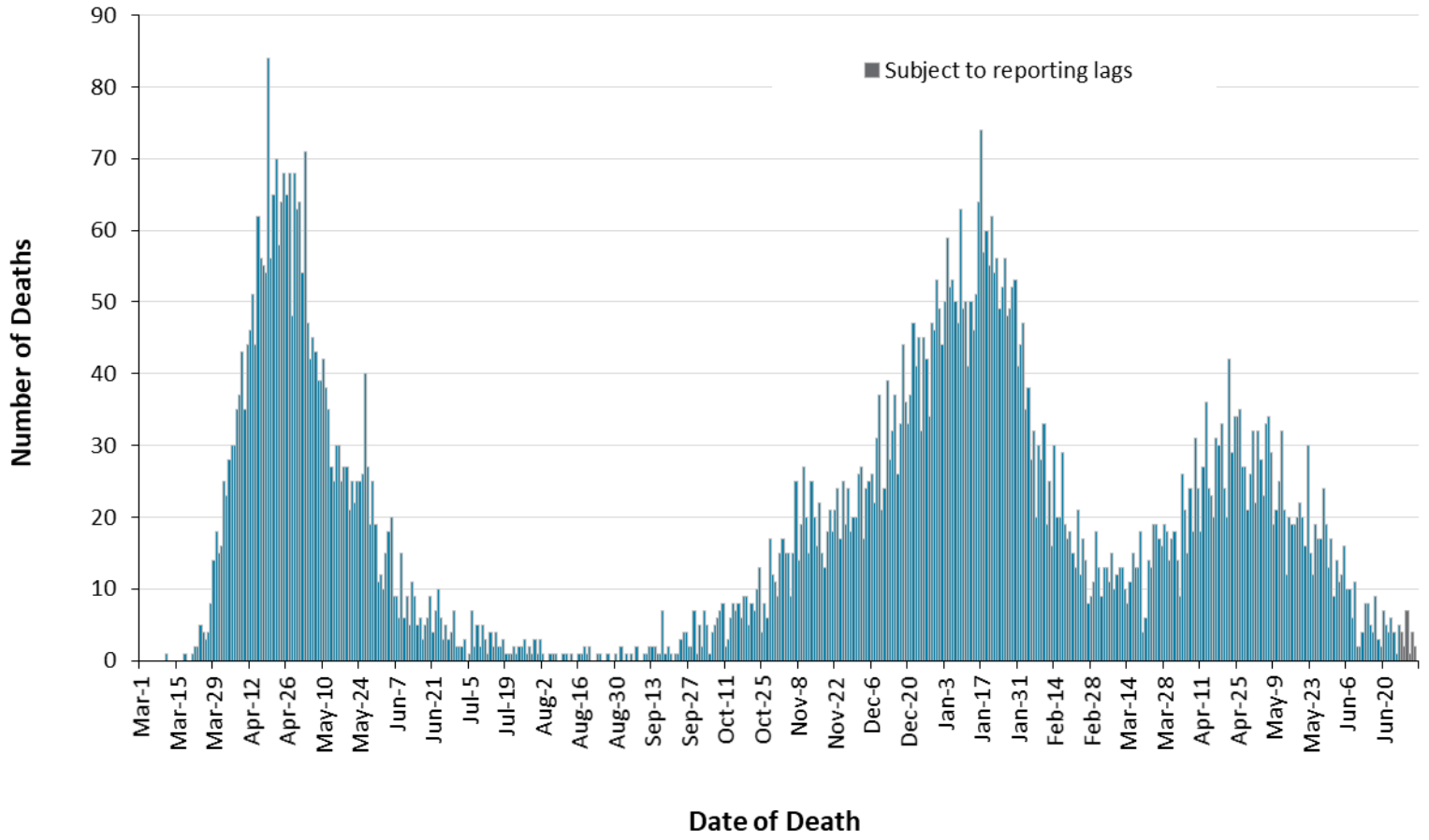
Figure 3. Number of COVID-19 tests completed and percent positivity: Ontario, March 29, 2020 to July 2, 2021



Note: The number of tests performed does not reflect the number of specimens or persons tested. More than one test may be performed per specimen or per person. As such, the percentage of tests that were positive does not necessarily translate to the number of specimens or persons testing positive.
Data Source: The Provincial COVID-19 Diagnostics Network, data reported by member microbiology laboratories.

Severity

Figure 4. Confirmed deaths among COVID-19 cases by date of death: Ontario, March 1, 2020 to July 3, 2021



Note: Cases without a death date are not included in the figure.
Data Source: CCM

Table 4. Confirmed cases of COVID-19 by severity: Ontario

	Cumulative case count as of July 3, 2021	Percentage of all cases
Cumulative deaths reported (please note there may be a reporting delay for deaths)	9,214	1.7%
Deaths reported in ages: 19 and under	4	<0.1%
Deaths reported in ages: 20-39	82	<0.1%
Deaths reported in ages: 40-59	581	0.4%
Deaths reported in ages: 60-79	2,937	4.0%
Deaths reported in ages: 80 and over	5,609	22.3%
Ever in ICU	5,378	1.0%
Ever hospitalized	27,962	5.1%

Note: Not all cases have an age reported. Data corrections or updates can result in case records being removed and/or updated and may result in totals differing from past publicly reported case counts.
Data Source: CCM

Geography

Table 5. Summary of recent confirmed cases of COVID-19 by public health unit and region: Ontario

Public Health Unit Name	Change in cases July 2, 2021	Change in cases July 3, 2021	Cumulative case count	Cumulative rate per 100,000 population
Northwestern Health Unit	0	0	1,091	1,244.4
Thunder Bay District Health Unit	-2	0	3,337	2,225.3
TOTAL NORTH WEST	-2	0	4,428	1,863.4
Algoma Public Health	0	0	400	349.5
North Bay Parry Sound District Health Unit	1	1	607	467.8
Porcupine Health Unit	5	6	2,080	2,492.8
Public Health Sudbury & Districts	2	2	2,150	1,080.3
Timiskaming Health Unit	0	0	208	636.3
TOTAL NORTH EAST	8	9	5,445	973.5
Ottawa Public Health	11	9	27,682	2,624.7
Eastern Ontario Health Unit	-7	0	4,610	2,208.8
Hastings Prince Edward Public Health	0	0	1,133	672.4
Kingston, Frontenac and Lennox & Addington Public Health	-1	2	1,551	729.1
Leeds, Grenville & Lanark District Health Unit	0	0	1,752	1,011.7
Renfrew County and District Health Unit	1	0	744	684.9
TOTAL EASTERN	4	11	37,472	1,945.2

Public Health Unit Name	Change in cases July 2, 2021	Change in cases July 3, 2021	Cumulative case count	Cumulative rate per 100,000 population
Durham Region Health Department	6	6	25,237	3,542.5
Haliburton, Kawartha, Pine Ridge District Health Unit	5	1	2,171	1,149.1
Peel Public Health	12	17	109,517	6,819.4
Peterborough Public Health	1	1	1,593	1,076.5
Simcoe Muskoka District Health Unit	6	3	12,384	2,065.4
York Region Public Health	4	4	52,625	4,293.1
TOTAL CENTRAL EAST	34	32	203,527	4,542.4
Toronto Public Health	20	42	165,100	5,291.1
TOTAL TORONTO	20	42	165,100	5,291.1
Chatham-Kent Public Health	0	0	1,884	1,772.1
Grey Bruce Health Unit	20	25	1,658	976.0
Huron Perth Public Health	2	5	1,936	1,385.3
Lambton Public Health	3	0	3,605	2,752.7
Middlesex-London Health Unit	2	9	12,585	2,479.7
Southwestern Public Health	1	1	3,884	1,836.4
Windsor-Essex County Health Unit	11	-4	16,862	3,969.1
TOTAL SOUTH WEST	39	36	42,414	2,508.6
Brant County Health Unit	-1	0	3,854	2,483.2
City of Hamilton Public Health Services	8	10	21,284	3,594.3
Haldimand-Norfolk Health Unit	1	1	2,681	2,350.1

Public Health Unit Name	Change in cases July 2, 2021	Change in cases July 3, 2021	Cumulative case count	Cumulative rate per 100,000 population
Halton Region Public Health	22	12	17,421	2,814.0
Niagara Region Public Health	20	6	16,247	3,438.6
Region of Waterloo Public Health and Emergency Services	47	49	17,726	3,033.4
Wellington-Dufferin-Guelph Public Health	9	5	8,204	2,630.3
TOTAL CENTRAL WEST	106	83	87,417	3,068.0
TOTAL ONTARIO	**209**	**213**	**545,803**	**3,671.9**

Notes: Health units with data corrections or updates could result in records being removed from totals, leading to negative or zero counts.
Data Source: CCM

Outbreaks

Table 6. Summary of recent confirmed COVID-19 outbreaks reported in long-term care homes, retirement homes and hospitals by status: Ontario

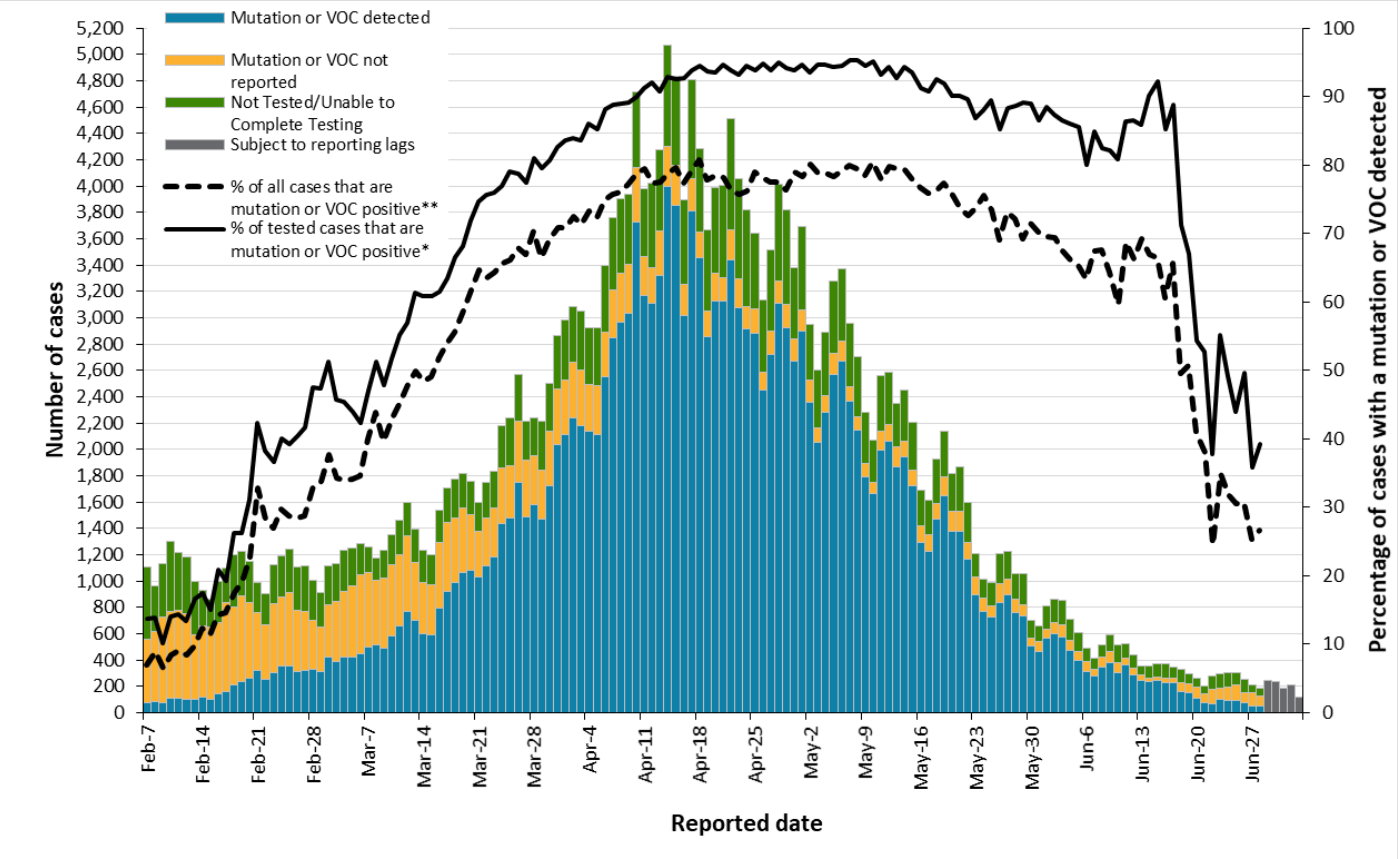
Institution type	Change in outbreaks July 2, 2021	Change in outbreaks July 3, 2021	Number of ongoing outbreaks	Cumulative number of outbreaks reported
Long-term care homes	0	1	4	1,486
Retirement homes	0	0	3	871
Hospitals	2	0	7	575

Note: Ongoing outbreaks include all outbreaks that are 'Open' in CCM without a 'Declared Over Date' recorded, or where the outbreak started more than five months ago, even for outbreaks where the Outbreak Status value selected in CCM is 'OPEN'. The start of the outbreak is determined by the onset date of first case, or if missing the outbreak reported date, or else if that is also missing, then the outbreak created date.
Data Source: CCM

Variant COVID-19 Cases

The laboratory detection of a variant of concern (VOC) is a multi-step process. Samples that test positive for SARS-CoV-2 and have a cycle threshold (Ct) value ≤ 35 can be tested for mutations common to variants of concern. If positive for the mutation of interest with a Ct value of ≤ 30, these samples may then undergo genomic analyses to identify the VOC lineage. VOC lineages may still be confirmed using genomic analysis despite specific S gene mutation(s) being documented as 'unable to complete' due to poor sequence quality at the genome position. For more information about whole genome sequencing, please see the SARS CoV-2 Whole Genome Sequencing in Ontario report.

Figure 5. Number of confirmed COVID-19 cases and percent positive for mutations or VOCs: Ontario, February 7, 2021 to July 3, 2021



Note: Data used to calculate the number of cases tested for mutations common to VOCs or lineages using genomic analyses are obtained using information from the Laboratory object in CCM in addition to the data from the Investigation Subtype field. Therefore, comparisons to counts using only information from the Investigation Subtype field may not align. The percent of cases due to a VOC may be higher than described in this report.
*The denominator includes only confirmed COVID-19 cases that were able to be tested for VOCs (e.g. those identified as 'Detected' or 'Not Detected'). Mutations tested for routinely are the N501Y and E484K mutations. Mutations common to the B.1.617.2 lineage are not included in the current VOC mutation test. However, cases identified as B.1.617.2 after whole genome sequencing is completed are included in the VOC detected category.
**The denominator includes all confirmed COVID-19 cases, including those that were unable to be tested for VOCs (e.g. those identified as 'Detected', 'Not Detected' and 'Not Tested/Unable to Complete Testing').
Data Source: CCM

Table 7. Summary of confirmed COVID-19 cases with a mutation or VOC detected: Ontario

	Change in cases July 2, 2021	Change in cases July 3, 2021	Cumulative case count up to July 3, 2021
Variant of Concern			
Lineage B.1.1.7 (Alpha)*	34	32	143,899
Lineage B.1.351 (Beta)**	0	0	1,415
Lineage P.1 (Gamma) ***	3	0	4,631
Lineage B.1.617.2 (Delta)†	32	14	2,041
Mutations			
N501Y and E484K	-1	4	4,709
N501Y (E484K unknown)‡	-4	3	13,957
E484K (N501Y negative)	5	3	5,810
E484K (N501Y unknown)	-3	-4	452
Mutation not detected§	19	7	11,693

Note: Interpret the VOC and mutation trends with caution due to the varying time required to complete VOC testing and/or genomic analysis following the initial positive test for SARS-CoV-2. Due to the nature of the genomic analysis, test results may be completed in batches. Data corrections or updates can result in case records being removed and/or updated and may result in totals differing from past publicly reported case counts. Data for calculating the change in cases and the cumulative case counts uses data from the Investigation Subtype field only. Changes to the VOC testing algorithm may impact counts and trends. Further details can be found in the data caveats section.

*Includes all confirmed COVID-19 cases where lineage B.1.1.7 was identified by genomic analysis and those presumed to be B.1.1.7 based on positive N501Y and negative E484K mutation in the Investigation Subtype field

**Includes B.1.351 cases identified by genomic analysis and those presumed to be B.1.351 based on 'Mutation K417N+ and N501Y+ and E484K+' in the Investigation Subtype field

***Includes P.1 cases identified by genomic analysis and those presumed to be P.1 based on 'Mutation K417T+ and N501Y+ and E484K+' in the Investigation Subtype field

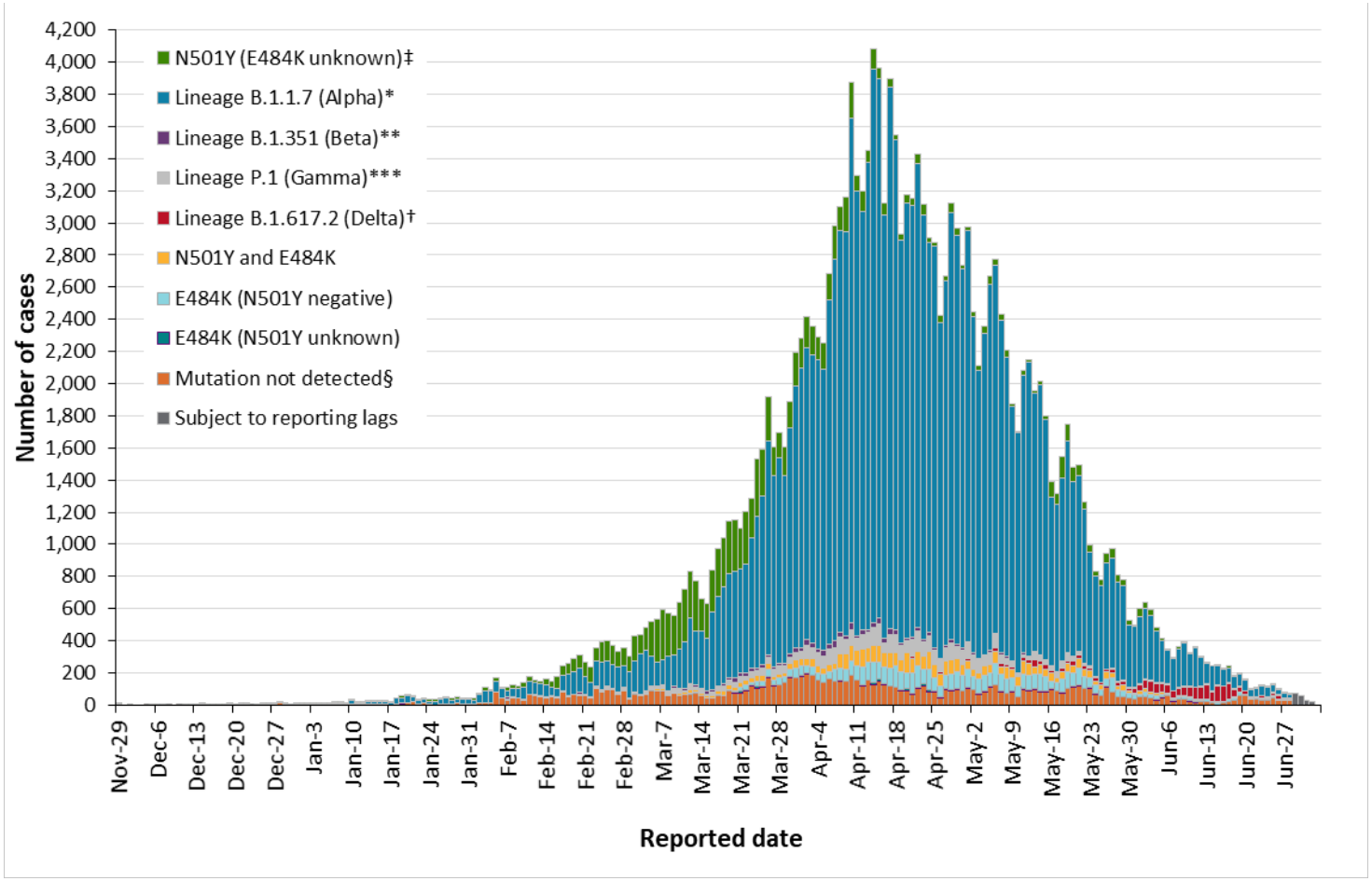
†Includes B.1.617.2 cases identified by genomic analysis. Mutations common to B.1.617.2 are not included in the current VOC mutation test.

‡The category 'N501Y (E484K unknown)' mainly consists of results from before the introduction of the E484K test. Counts will shift from this category into a VOC lineage category as E484K tests or genomic analysis are completed.

§Includes cases identified as 'Mutation not detected' or 'Mutation N501Y- and E484K-' in the Investigation Subtype field only.

Data Source: CCM

Figure 6. Confirmed COVID-19 cases with a mutation or VOC detected by public health unit reported date: Ontario, November 29, 2020 to July 3, 2021



Note: Reported date is based on the date the case was reported, not the date that the VOC or mutation was identified. Further details on testing for variants of concern can be found in the technical notes. Interpret the VOC and mutation trends with caution due to the varying time required to complete testing and/or genomic analysis following the initial positive test for SARS-CoV-2. Data for calculating the change in cases and the cumulative case count uses data from the Investigation Subtype field only. Data for cases with a B.1.1.7, B.1.351, P.1 and B.1.617.2 lineage detected or any of the mutations listed above are determined using the

Investigation Subtype field only. Changes to the VOC testing algorithm may impact counts and trends. Further details can be found in the data caveats section. As of March 22, 2021, positive specimens with a Ct ≤ 35 are tested for both the N501Y and E484K mutation, with all E484K positive specimens with a Ct ≤ 30 forwarded for further genomic analysis. If found to be positive for the N501Y mutation only, no further genomic analysis are performed as these are presumed to be B.1.1.7. As of May 26, 2021, cases where an E484K mutation is detected will no longer be reflexed for sequencing as VOC testing labs switched to a representative sampling method where only a proportion of all positives with a Ct ≤ 30 are forwarded for further genomic analysis.

*Includes all confirmed COVID-19 cases where lineage B.1.1.7 was identified by genomic analysis and those presumed to be B.1.1.7 based on positive N501Y and negative E484K mutation in the Investigation Subtype field

**Includes B.1.351 cases identified by genomic analysis and those presumed to be B.1.351 based on 'Mutation K417N+ and N501Y+ and E484K+' in the Investigation Subtype field

***Includes P.1 cases identified by genomic analysis and those presumed to be P.1 based on 'Mutation K417T+ and N501Y+ and E484K+' in the Investigation Subtype field

†Includes B.1.617.2 cases identified by genomic analysis. Mutations common to B.1.617.2 are not included in the current VOC mutation test.

‡The category 'N501Y (E484K unknown)' mainly consists of results from before the introduction of the E484K test. Counts will shift from this category into a VOC lineage category as E484K tests or genomic analysis are completed.

§Includes cases identified as 'Mutation not detected' or 'Mutation N501Y- and E484K-' in the Investigation Subtype field only.

Data Source: CCM

Technical Notes

Data Sources

- The data for this report were based on information successfully extracted from the Public Health Case and Contact Management Solution (CCM) for all PHUs by PHO as of **July 3, 2021 at 1 p.m**. for cases reported from February 1, 2021 onwards and as of **July 2, 2021 at 9 a.m.** for cases reported up to January 31, 2021.

- VOC data for this report were based on information successfully extracted from CCM for all PHUs by PHO as of **July 3, 2021 at 1 p.m.** for cases reported from April 1, 2021 onwards and as of **July 2, 2021 at 9 a.m.** for cases reported up to March 31, 2021.

- CCM is a dynamic disease reporting system, which allows ongoing updates to data previously entered. As a result, data extracted from CCM represent a snapshot at the time of extraction and may differ from previous or subsequent reports.

- Ontario population projection data for 2020 were sourced from Ministry, IntelliHEALTH Ontario. Data were extracted on November 26, 2019.

- COVID-19 test data were based on information from The Provincial COVID-19 Diagnostics Network, reported by member microbiology laboratories.

Data Caveats

- The data only represent cases reported to public health units and recorded in CCM. As a result, all counts will be subject to varying degrees of underreporting due to a variety of factors, such as disease awareness and medical care seeking behaviours, which may depend on severity of illness, clinical practice, changes in laboratory testing, and reporting behaviours.

- Data cleaning for older cases is incorporated on Mondays and may impact the case count published on Tuesdays

- Lags in CCM data entry due to weekend staffing may result in lower case counts than would otherwise be recorded.

- Only cases meeting the confirmed case classification as listed in the MOH Case Definition – Coronavirus Disease (COVID-19) document are included in the report counts from CCM

- Cases of confirmed reinfection, as defined in the provincial case definitions, are counted as unique investigations.

- Case classification information may be updated for individuals with a positive result issued from a point-of-care assays.

- The number of tests performed does not reflect the number of specimens or persons tested. More than one test may be performed per specimen or per person. As such, the percentage of tests that were positive does not necessarily translate to the number of specimens or persons testing positive.

- Reported date is the date the case was reported to the public health unit.

- Case episode date represents an estimate of disease onset. This date is calculated based on the earliest date of symptom onset, specimen collection/test date, or the date reported to the public health unit.

- Resolved cases are determined only for COVID-19 cases that have not died. Cases that have died are considered fatal and not resolved. The following cases are classified as resolved:

    - Cases that are reported as 'recovered' in CCM

    - Cases that are not hospitalized and are 14 days past their episode date

    - Cases that are currently hospitalized (no hospital end date entered) and have a status of 'closed' in CCM (indicating public health unit follow-up is complete) and are 14 days past their symptom onset date or specimen collection date

- Hospitalization includes all cases for which a hospital admission date was reported or hospitalization/ICU was reported as 'Yes' at the time of data extraction. It includes cases that have been discharged from hospital as well as cases that are currently hospitalized. Emergency room visits are not included in the number of reported hospitalizations.

- ICU admission includes all cases for which an ICU admission date was reported at the time of data extraction. It is a subset of the count of hospitalized cases. It includes cases that have been treated or that are currently being treated in an ICU.

- Orientation of case counts by geography is based on the diagnosing health unit (DHU). DHU refers to the case's public health unit of residence at the time of illness onset and not necessarily the location of exposure. Cases for which the DHU was reported as MOH-PHO (to signify a case that is not a resident of Ontario) have been excluded from the analyses.

- Likely source of acquisition is determined by examining the epidemiologic link and epidemiologic link status fields in CCM. If no epidemiologic link is identified in those fields the risk factor fields are examined to determine whether a case travelled, was associated with a confirmed outbreak, was a contact of a case, had no known epidemiological link (sporadic community transmission) or was reported to have an unknown source/no information was reported. Some cases may have no information reported if the case is untraceable, was lost to follow-up or referred to FNIHB. Cases with multiple risk factors were assigned to a single likely acquisition source group which was determined hierarchically in the following order:

    - For cases with an episode date *on or after* April 1, 2020: Outbreak-associated > close contact of a confirmed case > travel > no known epidemiological link > information missing or unknown

    - For cases with an episode date *before* April 1, 2020: Travel > outbreak-associated > close contact of a confirmed case > no known epidemiological link > information missing or unknown

- Deaths are determined by using the outcome field in CCM. Any case marked 'Fatal' is included in the deaths data. The CCM field Type of Death is not used to further categorize the data.

    - The date of death is determined using the outcome date field for cases marked as 'Fatal' in the outcome field.

- COVID-19 cases from CCM for which the Classification and/or Disposition was reported as ENTERED IN ERROR, DOES NOT MEET DEFINITION, IGNORE, DUPLICATE or any variation on these values have been excluded. The provincial case count for COVID-19 may include some duplicate records, if these records were not identified and resolved.

- Ongoing outbreaks include all outbreaks that are 'Open' in CCM without a 'Declared Over Date' recorded, or where the outbreak started more than five months ago, even for outbreaks where the Outbreak Status value selected in CCM is 'OPEN'. The start of the outbreak is determined by the onset date of first case, or if missing the outbreak reported date, or else if that is also missing, then the outbreak created date.

- 'Long-term care home residents' includes cases that reported 'Yes' to the risk factor 'Resident of a long-term care home'; or 'Yes' to the risk factor 'Resident of nursing home or other chronic care facility' and reported to be part of an outbreak assigned as a long-term care home (via the Outbreak number or case comments field); or were reported to be part of an outbreak assigned as a long-term care home (via the outbreak number or case comments field) with an age over 70 years and did not report 'No' to the risk factors 'Resident of long-term care home' or 'Resident of nursing home or other chronic care facility'. 'Long-term care home residents' excludes cases that reported 'Yes' to any of the health care worker occupational risk factors.

- The 'health care workers' variable includes cases that reported 'Yes' to any of the occupation of health care worker, doctor, nurse, dentist, dental hygienist, midwife, other medical technicians, personal support worker, respiratory therapist, first responder.

- 'Health care workers associated with long-term care outbreaks' includes 'health care workers' reported to be part of an outbreak assigned as a long-term care home (via the outbreak number or case comments field). Excludes cases that reported 'Yes' to risk factors 'Resident of long-term care home' or 'Resident of nursing home or other chronic care facility' and 'Yes' to the calculated 'health care workers' variable.

- Percent change is calculated by taking the difference between the current period (i.e., daily count or sum of the daily count over a 7-day period) and previous period (i.e., daily count or sum of the daily count over a 7-day period), divided by the previous period.

- Public Health Ontario conducts testing and genomic analyses for SARS-CoV-2 positive specimens using the criteria outlined here: https://www.publichealthontario.ca/en/laboratory-services/test-information-index/covid-19-voc

- Lineage nomenclature is dynamic. PANGO lineage naming and assignment may change as more samples are sequenced and analyzed.

- Variant status may be updated based on scientific evidence. Variants designated as a VOC in Canada is available on the Public Health Agency of Canada's SARS-CoV-2 Variants webpage.

- Changes to the VOC testing algorithm may occur over time and trends should be interpreted with caution. Since February 3, 2021 all PCR positive SARS-Co-V-2 specimens with Ct values ≤ 35 are tested for a N501Y mutation. As of March 22, 2021, positive specimens with a Ct ≤ 35 are tested for both the N501Y and E484K mutation, with all E484K positive specimens with a Ct ≤ 30 forwarded for further genomic analysis. If found to be positive for the N501Y mutation only, no further genomic analysis are performed as these are presumed to be B.1.1.7. As of May 26, 2021, cases where a E484K mutation is detected will no longer be reflexed for sequencing as

VOC testing labs switched to a representative sampling method where only a proportion of all positives with a Ct ≤ 30 are forwarded for further genomic analysis.

- The laboratory detection of a variant of concern is a multi-step process. Samples that test positive for SARS-CoV-2 and have a cycle threshold (Ct) value ≤ 35 can be tested for mutations common to variants of concern. If positive for the mutation of interest with a Ct value of ≤30, these samples may then undergo genomic analyses to identify the VOC lineage. VOC lineages may still be confirmed using genomic analysis despite specific S gene mutation(s) being documented as 'unable to complete' due to poor sequence quality at the genome position.

- VOC testing data are analyzed for cases with a reported date on or after February 07, 2021. VOC testing data are based on CCM information reported within the laboratory object for select Logical Observation Identifiers Names and Codes (LOINC) and supplemented with information from the Investigation Subtype field. A confirmed Case Investigation is assigned a VOC test value (e.g., VOC test detected, VOC test not detected) based on the following hierarchy:

    - If multiple laboratory results are identified, a VOC test value is assigned based on the following hierarchy: Detected > Not Detected > Unable to complete

    - If a laboratory result is 'Not Detected' or 'Unable to complete', but data on the Investigation Subtype field is listed as a lineage or mutation common to a VOC, then the VOC test value is set to 'Detected'

- If a VOC is identified through genomic analysis cases initially classified as a mutation may be updated and moved to the appropriate lineage (B.1.1.7, B.1.351, P.1 and B.1.617.2)

- LOINCs are a set of internationally used result description codes. In the absence of a standard LOINC, Ontario Health can create local result codes, which are identified with an 'XON' prefix. LOINCs incorporate details of the result value (e.g. test method, target detected - such as IgG, DNA, isolate etc.) and are unique to each result.

- VOC testing data in this report are assigned on a per case basis. Multiple laboratory results may be associated to a single case investigation, but for analysis purposes are only counted once.

    - The percent of cases that test VOC positive is calculated by taking the number of VOC test positive, divided by the total number of confirmed COVID-19 cases for a given reported date.

- The VOC percent positive may be higher than described in this report. As testing algorithms change, the VOC percent positivity may not be reflective of the exact number of COVID-19 cases due to VOCs

- Only CCM case investigations with a CONFIRMED classification have their laboratory records with VOC testing information included in the percent positivity calculations

Appendix A

Table A1. Weekly rates of confirmed COVID-19 cases per 100,000 population over recent rolling 7-day periods, by reported date and public health unit: Ontario, June 18 to June 30, 2021

Public Health Unit Name	June 18 to June 24	June 19 to June 25	June 20 to June 26	June 21 to June 27	June 22 to June 28	June 23 to June 29	June 24 to June 30	% change from June 18 – June 24 to June 24 - June 30
NORTH WEST								
Northwestern Health Unit	8.0	6.8	6.8	9.1	8.0	8.0	5.7	-28.8%
Thunder Bay District Health Unit	4.7	4.7	4.7	4.7	4.7	4.0	2.0	-57.4%
NORTH EAST								
Algoma Public Health	1.7	0.9	0.9	0.9	0.0	0.0	0.0	-100.0%
North Bay Parry Sound District Health Unit	43.9	43.2	47.0	45.5	37.8	32.4	30.8	-29.8%
Porcupine Health Unit	91.1	98.3	87.5	87.5	91.1	95.9	82.7	-9.2%
Public Health Sudbury & Districts	15.6	17.1	12.1	10.6	9.5	9.0	4.0	-74.4%
Timiskaming Health Unit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	N/A
EASTERN								
Ottawa Public Health	9.8	8.0	7.1	7.2	6.1	5.6	4.6	-53.1%
Eastern Ontario Health Unit	2.4	1.4	1.9	1.9	1.9	1.9	1.0	-58.3%
Hastings Prince Edward Public Health	0.6	0.6	0.6	1.2	1.2	1.8	1.8	+200.0%
Kingston, Frontenac and Lennox & Addington Public Health	4.7	3.8	1.4	1.4	0.9	0.9	1.4	-70.2%

Public Health Unit Name	June 18 to June 24	June 19 to June 25	June 20 to June 26	June 21 to June 27	June 22 to June 28	June 23 to June 29	June 24 to June 30	% change from June 18 – June 24 to June 24 - June 30
Leeds, Grenville & Lanark District Health Unit	1.2	1.7	1.7	2.3	2.3	2.9	3.5	+191.7%
Renfrew County and District Health Unit	2.8	3.7	3.7	2.8	3.7	3.7	2.8	0.0%
CENTRAL EAST								
Durham Region Health Department	10.0	8.7	8.1	8.3	9.4	8.7	8.0	-20.0%
Haliburton, Kawartha, Pine Ridge District Health Unit	7.4	6.4	6.9	4.8	5.3	5.3	4.8	-35.1%
Peel Public Health	13.9	12.8	11.8	10.2	10.2	10.3	9.5	-31.7%
Peterborough Public Health	8.1	7.4	6.1	4.1	2.7	4.1	6.1	-24.7%
Simcoe Muskoka District Health Unit	6.7	6.2	6.0	6.3	6.2	6.7	6.2	-7.5%
York Region Public Health	6.9	6.3	5.7	5.1	4.9	4.4	4.2	-39.1%
TORONTO								
Toronto Public Health	10.2	10.3	10.1	9.6	9.3	8.5	8.5	-16.7%
SOUTH WEST								
Chatham-Kent Public Health	1.9	1.9	2.8	3.8	3.8	4.7	5.6	+194.7%
Grey Bruce Health Unit	46.5	71.2	77.1	82.4	84.8	97.1	106.5	+129.0%
Huron Perth Public Health	7.9	7.2	7.9	7.2	6.4	9.3	8.6	+8.9%
Lambton Public Health	29.0	32.1	30.5	27.5	26.0	24.4	17.6	-39.3%
Middlesex-London Health Unit	6.5	5.9	6.5	6.9	8.3	8.9	9.7	+49.2%

Public Health Unit Name	June 18 to June 24	June 19 to June 25	June 20 to June 26	June 21 to June 27	June 22 to June 28	June 23 to June 29	June 24 to June 30	% change from June 18 – June 24 to June 24 - June 30
Southwestern Public Health	7.6	8.0	5.7	7.1	5.2	5.7	6.6	-13.2%
Windsor-Essex County Health Unit	10.1	8.7	8.7	9.7	9.2	8.0	8.0	-20.8%
CENTRAL WEST								
Brant County Health Unit	7.1	7.7	9.0	7.7	7.7	7.7	7.1	0.0%
City of Hamilton Public Health Services	18.6	16.4	16.7	16.0	18.2	16.5	15.4	-17.2%
Haldimand-Norfolk Health Unit	7.0	7.0	7.0	7.0	7.9	9.6	7.0	0.0%
Halton Region Public Health	7.4	7.8	7.6	7.3	6.6	7.3	9.7	+31.1%
Niagara Region Public Health	14.4	15.0	14.0	14.2	14.4	12.5	12.9	-10.4%
Region of Waterloo Public Health and Emergency Services	66.1	64.2	66.1	65.5	65.4	63.8	61.3	-7.3%
Wellington-Dufferin-Guelph Public Health	12.8	14.4	16.0	15.7	17.0	18.0	18.3	+43.0%
TOTAL ONTARIO	**13.2**	**13.0**	**12.7**	**12.4**	**12.3**	**12.1**	**11.7**	**-11.4%**

Note: Rates are based on the sum of the daily case counts during the date ranges specified in each column.
Data Source: CCM

Table A2. Summary of confirmed COVID-19 cases with a mutation or VOC by public health unit: Ontario as of July 3, 2021

Public Health Unit Name	Cumulative count for Lineage B.1.1.7 (Alpha)*	Cumulative count for Lineage B.1.351 (Beta)**	Cumulative count for Lineage P.1 (Gamma)***	Cumulative count for Lineage B.1.617.2 (Delta)†	Cumulative count for mutations‡
Algoma Public Health	68	0	12	2	28
Brant County Health Unit	665	2	88	28	495
Chatham-Kent Public Health	113	5	14	0	110
City of Hamilton Public Health Services	4,964	65	101	66	2,100
Durham Region Health Department	9,500	65	261	56	1,207
Eastern Ontario Health Unit	648	44	17	2	273
Grey Bruce Health Unit	306	0	5	52	56
Haldimand-Norfolk Health Unit	368	3	22	8	402
Haliburton, Kawartha, Pine Ridge District Health Unit	443	0	17	33	313
Halton Region Public Health	5,075	29	159	72	606
Hastings Prince Edward Public Health	77	0	8	2	406
Huron Perth Public Health	234	0	11	17	67
Kingston, Frontenac and Lennox & Addington Public Health	439	2	35	3	129
Lambton Public Health	433	0	17	13	129
Leeds, Grenville & Lanark District Health Unit	293	18	0	0	42
Middlesex-London Health Unit	3,358	2	96	20	187

Public Health Unit Name	Cumulative count for Lineage B.1.1.7 (Alpha)*	Cumulative count for Lineage B.1.351 (Beta)**	Cumulative count for Lineage P.1 (Gamma)***	Cumulative count for Lineage B.1.617.2 (Delta)†	Cumulative count for mutations‡
Niagara Region Public Health	4,233	4	17	17	1,084
North Bay Parry Sound District Health Unit	230	28	2	7	13
Northwestern Health Unit	56	0	1	0	16
Ottawa Public Health	6,647	488	50	21	478
Peel Public Health	30,574	132	1,405	504	3,580
Peterborough Public Health	613	4	7	8	161
Porcupine Health Unit	1,065	2	0	35	8
Public Health Sudbury & Districts	615	11	5	1	341
Region of Waterloo Public Health and Emergency Services	3,094	11	71	437	302
Renfrew County and District Health Unit	224	8	6	1	12
Simcoe Muskoka District Health Unit	3,848	31	159	61	831
Southwestern Public Health	659	2	14	15	165
Thunder Bay District Health Unit	104	0	2	5	74
Timiskaming Health Unit	83	1	0	0	0
Toronto Public Health	45,108	373	1,483	429	8,296
Wellington-Dufferin-Guelph Public Health	2,074	1	61	53	192
Windsor-Essex County Health Unit	1,826	5	17	3	130

Public Health Unit Name	Cumulative count for Lineage B.1.1.7 (Alpha)*	Cumulative count for Lineage B.1.351 (Beta)**	Cumulative count for Lineage P.1 (Gamma)***	Cumulative count for Lineage B.1.617.2 (Delta)†	Cumulative count for mutations‡
York Region Public Health	15,862	79	468	70	2,695
TOTAL ONTARIO	**143,899**	**1,415**	**4,631**	**2,041**	**24,928**

Note: Interpret the VOC and mutation trends with caution due to the varying time required to complete VOC testing and/or genomic analysis following the initial positive test for SARS-CoV-2. Due to the nature of the genomic analysis, test results may be completed in batches. Data corrections or updates can result in case records being removed and/or updated and may result in totals differing from past publicly reported case counts. Data for calculating the change in cases and the cumulative case count uses data from the Investigation Subtype field only. Changes to the VOC testing algorithm may impact counts and trends. Further details can be found in the data caveats section.

*Includes all confirmed COVID-19 cases where lineage B.1.1.7 was identified by genomic analysis and those presumed to be B.1.1.7 based on positive N501Y and negative E484K mutation.

**Includes B.1.351 cases identified by genomic analysis and those presumed to be B.1.351 based on 'Mutation K417N+ and N501Y+ and E484K+' in the Investigation Subtype field

***Includes P.1 cases identified by genomic analysis and those presumed to be P.1 based on 'Mutation K417T+ and N501Y+ and E484K+' in the Investigation Subtype field

†Includes B.1.617.2 cases identified by genomic analysis. Mutations common to B.1.617.2 are not included in the current VOC mutation test.

‡Mutations includes all confirmed COVID-19 cases with the following mutations detected, reported from the Investigation Subtype field: N501Y and E484K, N501Y (E484K unknown), E484K (N501Y negative), E484K (N501Y unknown).

If a VOC is identified through genomic analysis, the change in cases and/or cumulative case counts for mutations will fluctuate as the case is moved to one of the listed lineages.

Data Source: CCM

Table A3. Weekly percent positivity for cases positive for mutations or VOCs over recent rolling 7-day periods using all confirmed cases as the denominator, by reported date and public health unit: Ontario, June 16 to June 28, 2021

Public Health Unit Name	June 16 to June 22	June 17 to June 23	June 18 to June 24	June 19 to June 25	June 20 to June 26	June 21 to June 27	June 22 to June 28
Algoma Public Health	50.0	50.0	50.0	100.0	100.0	100.0	0.0
Brant County Health Unit	91.7	85.7	63.6	66.7	42.9	41.7	33.3
Chatham-Kent Public Health	0.0	0.0	0.0	0.0	33.3	25.0	25.0
City of Hamilton Public Health Services	36.8	36.3	29.1	26.8	26.3	23.2	23.1
Durham Region Health Department	63.9	59.5	52.1	50.0	39.7	42.4	35.8
Eastern Ontario Health Unit	50.0	60.0	60.0	66.7	50.0	50.0	50.0
Grey Bruce Health Unit	20.0	12.1	11.4	13.2	21.4	20.7	19.4
Haldimand-Norfolk Health Unit	42.9	62.5	37.5	50.0	50.0	62.5	55.6
Haliburton, Kawartha, Pine Ridge District Health Unit	46.7	71.4	57.1	50.0	30.8	33.3	40.0
Halton Region Public Health	54.5	50.9	50.0	47.9	36.2	33.3	26.8
Hastings Prince Edward Public Health	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Huron Perth Public Health	57.1	44.4	36.4	30.0	18.2	20.0	22.2
Kingston, Frontenac and Lennox & Addington Public Health	70.0	63.6	70.0	75.0	66.7	33.3	0.0
Lambton Public Health	36.8	33.3	26.3	28.6	30.0	27.8	26.5

Public Health Unit Name	June 16 to June 22	June 17 to June 23	June 18 to June 24	June 19 to June 25	June 20 to June 26	June 21 to June 27	June 22 to June 28
Leeds, Grenville & Lanark District Health Unit	100.0	100.0	100.0	66.7	66.7	75.0	75.0
Middlesex-London Health Unit	65.9	59.4	48.5	36.7	36.4	34.3	38.1
Niagara Region Public Health	18.1	13.8	5.9	7.0	4.5	4.5	5.9
North Bay Parry Sound District Health Unit	73.7	73.3	77.2	76.8	73.8	71.2	69.4
Northwestern Health Unit	16.7	14.3	14.3	0.0	0.0	0.0	0.0
Ottawa Public Health	64.6	59.8	61.2	54.8	50.7	48.7	43.8
Peel Public Health	62.4	60.1	57.4	54.9	52.1	47.0	48.8
Peterborough Public Health	75.0	71.4	66.7	63.6	55.6	66.7	50.0
Porcupine Health Unit	61.6	59.5	56.6	52.4	46.6	47.9	48.7
Public Health Sudbury & Districts	81.8	90.0	90.3	88.2	83.3	81.0	78.9
Region of Waterloo Public Health and Emergency Services	24.2	15.0	5.2	2.7	3.1	3.4	3.7
Renfrew County and District Health Unit	66.7	33.3	33.3	25.0	25.0	0.0	25.0
Simcoe Muskoka District Health Unit	61.5	51.5	37.5	35.1	27.8	26.3	27.0
Southwestern Public Health	50.0	55.6	75.0	76.5	83.3	80.0	72.7
Thunder Bay District Health Unit	20.0	28.6	14.3	14.3	14.3	14.3	14.3
Timiskaming Health Unit	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Public Health Unit Name	June 16 to June 22	June 17 to June 23	June 18 to June 24	June 19 to June 25	June 20 to June 26	June 21 to June 27	June 22 to June 28
Toronto Public Health	61.2	59.1	55.5	52.6	52.2	48.2	47.8
Wellington-Dufferin-Guelph Public Health	23.7	14.3	15.0	17.8	16.0	16.3	15.1
Windsor-Essex County Health Unit	41.7	38.3	30.2	24.3	18.9	22.0	20.5
York Region Public Health	52.1	50.5	44.0	37.7	30.0	28.6	30.0
TOTAL ONTARIO	**48.9**	**44.7**	**39.0**	**35.8**	**32.8**	**30.8**	**29.6**

Note: Data for calculating the number of cases tested for mutations common to VOCs or lineages using genomic analyses are obtained using information from the Laboratory object in CCM in addition to the data from the Investigation subtype field. Therefore, comparisons to counts using only information from the Investigation Subtype field may not align. The percent of cases due to a VOC may be higher than described in this report. While all confirmed COVID-19 cases are included in the denominator, not all cases were able to be tested for VOCs. Percent positivity is based on the sum of the daily cases that test positive divided by the number of cases reported during the date ranges specified in each column.
Data Source: CCM

Table A4. Weekly percent positivity for cases positive for mutations or VOCs over recent rolling 7-day periods using cases tested for mutations or VOCs as the denominator, by reported date and public health unit: Ontario, June 16 to June 28, 2021

Public Health Unit Name	June 16 to June 22	June 17 to June 23	June 18 to June 24	June 19 to June 25	June 20 to June 26	June 21 to June 27	June 22 to June 28
Algoma Public Health	100.0	100.0	100.0	100.0	100.0	100.0	0.0
Brant County Health Unit	100.0	92.3	70.0	72.7	54.5	50.0	44.4
Chatham-Kent Public Health	0.0	0.0	0.0	0.0	50.0	33.3	33.3
City of Hamilton Public Health Services	61.4	62.1	53.3	54.2	52.0	46.8	41.7
Durham Region Health Department	86.8	83.0	74.0	72.1	65.7	64.1	57.1
Eastern Ontario Health Unit	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Grey Bruce Health Unit	21.4	13.5	13.0	15.5	25.7	24.8	23.3
Haldimand-Norfolk Health Unit	75.0	83.3	75.0	80.0	80.0	100.0	83.3
Haliburton, Kawartha, Pine Ridge District Health Unit	53.8	71.4	57.1	50.0	36.4	42.9	50.0
Halton Region Public Health	65.2	63.6	63.9	63.9	50.0	50.0	40.7
Hastings Prince Edward Public Health	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Huron Perth Public Health	80.0	66.7	50.0	42.9	33.3	33.3	40.0
Kingston, Frontenac and Lennox & Addington Public Health	87.5	77.8	77.8	85.7	66.7	50.0	0.0
Lambton Public Health	100.0	90.9	90.9	80.0	80.0	76.9	75.0

Public Health Unit Name	June 16 to June 22	June 17 to June 23	June 18 to June 24	June 19 to June 25	June 20 to June 26	June 21 to June 27	June 22 to June 28
Leeds, Grenville & Lanark District Health Unit	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Middlesex-London Health Unit	84.4	70.4	57.1	47.8	50.0	44.4	51.6
Niagara Region Public Health	68.4	60.0	28.6	29.4	23.1	23.1	26.7
North Bay Parry Sound District Health Unit	91.3	91.7	95.7	95.6	95.7	97.7	97.1
Northwestern Health Unit	50.0	50.0	50.0	0.0	0.0	0.0	0.0
Ottawa Public Health	93.6	92.8	94.0	90.2	88.4	84.1	84.8
Peel Public Health	84.3	79.9	75.7	73.4	71.7	68.1	67.8
Peterborough Public Health	85.7	83.3	80.0	77.8	62.5	66.7	50.0
Porcupine Health Unit	97.8	97.8	97.7	97.7	97.1	100.0	100.0
Public Health Sudbury & Districts	94.7	96.4	96.6	96.8	95.2	94.4	93.8
Region of Waterloo Public Health and Emergency Services	31.5	20.3	7.1	3.6	4.3	4.6	5.0
Renfrew County and District Health Unit	100.0	100.0	100.0	100.0	100.0	0.0	100.0
Simcoe Muskoka District Health Unit	70.6	58.6	45.5	41.9	38.5	37.0	41.7
Southwestern Public Health	61.1	66.7	80.0	81.3	90.9	85.7	80.0
Thunder Bay District Health Unit	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Timiskaming Health Unit	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Public Health Unit Name	June 16 to June 22	June 17 to June 23	June 18 to June 24	June 19 to June 25	June 20 to June 26	June 21 to June 27	June 22 to June 28
Toronto Public Health	81.9	78.8	74.9	69.8	68.9	64.7	65.4
Wellington-Dufferin-Guelph Public Health	31.0	20.0	22.2	22.9	20.5	22.2	21.1
Windsor-Essex County Health Unit	87.0	90.0	81.3	75.0	77.8	75.0	66.7
York Region Public Health	70.4	70.8	63.8	53.7	44.7	43.9	45.0
TOTAL ONTARIO	**68.1**	**63.2**	**56.3**	**51.7**	**48.8**	**46.3**	**44.8**

Note: Data for calculating the number of cases tested for mutations common to VOCs or lineages using genomic analyses are obtained using information from the Laboratory object in CCM in addition to the data from the Investigation subtype field. Therefore, comparisons to counts using only information from the Investigation Subtype field may not align. The percent of cases due to a VOC may be higher than described in this report.
Percent positivity is based on the sum of the daily cases that test positive divided by the number of cases that were tested for mutations common to VOCs or lineages (e.g. those identified as 'Detected' or 'Not Detected') during the date ranges specified in each column.
Data Source: CCM

Citation

Ontario Agency for Health Protection and Promotion (Public Health Ontario). Epidemiologic summary: COVID-19 in Ontario – January 15, 2020 to July 3, 2021. Toronto, ON: Queen's Printer for Ontario; 2021.

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For Further Information

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Public Health Ontario

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