

## EVIDENCE BRIEF

# COVID-19 Delta Variant: Risk Assessment and Implications for Practice

07/23/2021

## Key Messages

- Since March 2021, Alpha (B.1.1.7) was the dominant circulating strain of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) in Ontario; however, as of July 3, 2021, the majority (76.0%) of Coronavirus Disease 2019 (COVID-19) cases in Ontario are infected with Delta (B.1.617.2), signalling that Delta is now the dominant strain in Ontario.
- Emerging data indicate that Delta has increased transmissibility and increased severity, after controlling for other variables; a preliminary signal from England suggests an increased risk of reinfection with Delta.
- Vaccine effectiveness (VE) against hospitalization with Delta was similar to Alpha, but there is evidence of reduced VE for symptomatic disease after one vaccine dose, meaning two-dose vaccination coverage is important in the context of Delta.
- Several countries relevant to Ontario have adjusted public health measures in response to Delta, including planning for or implementing vaccine certificates or passports for some settings.
- The risk of Delta transmission in Ontario is moderate to high, and depends on the number of existing Delta cases and continued introductions into areas of the province with currently low Delta cases.

## Issue and Research Question

Current evidence points to higher transmissibility and secondary attack rates (SARs), and higher severity and risk of hospitalization, for the variant of concern (VOC) Delta.<sup>1</sup> Meanwhile, epidemiological and genomic data from Ontario indicate that Delta has replaced Alpha as the dominant strain of SARS-CoV-2 in the province.<sup>2,3</sup> Furthermore, with an effective reproduction number estimate of Delta close to 1 (threshold for exponential growth), all the gains in lowering COVID-19 case counts in the province recently have been from reducing Alpha transmission. Multiple jurisdictions globally are experiencing new surges as a result of the Delta variant. As Ontario entered Step Three of Roadmap to Reopen on July 16, 2021,<sup>4</sup> case declines will stagnate or even result in an increase in case counts, as reopening allows increased contact rates and more Delta transmission due to its high transmissibility. It is, therefore, important to consider the impact of Delta and related considerations for the province going into fall.

## Methods

This is an update to the [June 30, 2021 edition](#)<sup>5</sup> and focuses on literature on Delta published since June 30 up to July 23, 2021. Public Health Ontario (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 COVID-19 variants were included, as were non-English sources where these could be translated into English.

For the methods in retrieving and analyzing the epidemiological data for incidence of Delta and reproduction number of the VOCs, please refer to [Estimating the Prevalence and Growth of SARS-CoV-2 Variants in Ontario using Mutation Profiles](#).<sup>3</sup> Detailed description of the methods for estimating household secondary attack rate (SAR) are presented elsewhere.<sup>6</sup>

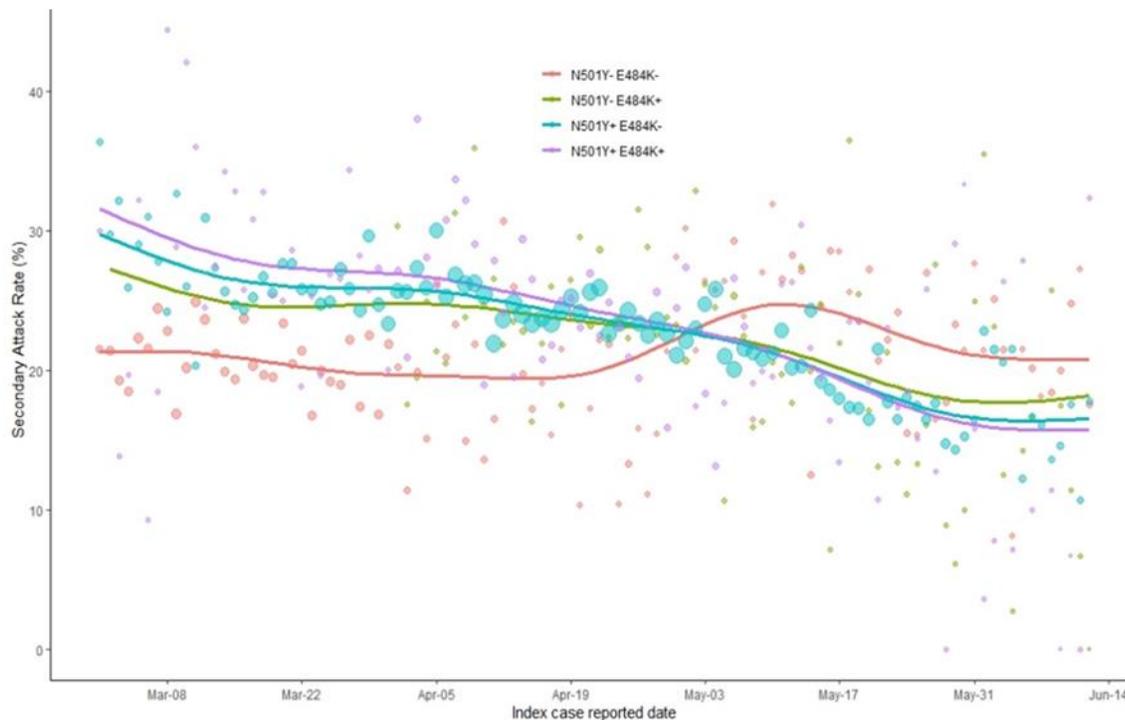
As the COVID-19 outbreak continues to evolve and the scientific evidence rapidly expands, the information provided in this document is only current as of the date of respective literature searches.

## Ontario Epidemiological Context

- SARS-CoV-2 cases that tested negative for the mutations N501Y and E484K (N501Y-/E484K-) include the Delta sublineage. As of July 19, 2021, PHO estimated the cases with that mutation profile represent 83.1% of all reported cases in Ontario.<sup>3</sup> As of June 14, the Ontario COVID-19 Genomics Network moved to sequencing 100% of eligible samples, enabling provincial estimates of the prevalence of VOCs. For the week of June 27 to July 3, the proportion of Delta was 76%.<sup>2</sup>
- From July 13 to 19, 2021, the  $R_e$ 's for the four mutation profiles are estimated as follows (note that the  $R_e$  for Delta is hovering around the threshold for exponential growth):<sup>3</sup>
  - N501Y+/E484K- (likely Alpha): 0.74
  - N501Y+/E484K+ (likely Beta [B.1.351, first identified in South Africa] or Gamma [P.1, first detected in Brazil]): 1.07
  - N501Y-/E484K+ (does not correspond to a VOC currently identified in Ontario): 0.76
  - N501Y-/E484K- (likely Delta): 0.96
- Household SAR refers to the probability that an individual with SARS-CoV-2 will transmit the disease to a household contact.<sup>7</sup> Starting early March 2021, SARs among household members of index cases reported between March 1 and June 12, 2021 were on the decline for mutation profiles that likely represent Alpha, Beta and Gamma, as well as those that do not correspond to a VOC currently identified in Ontario (see

- [Figure 1](#)). This decline could likely be due to increased coverage of the population by vaccination against COVID-19.
  - The red line, which represents strains of SARS-CoV-2 with neither N501Y nor E484K detected, was not parallel with other mutation profiles until mid-May when the SAR for this mutation profile began to decrease and become parallel with the other mutation profiles. This decline could also be the result of an increase in vaccination coverage. Note that earlier in the surveillance period, this line (N501Y-/E484K-) would have represented non-VOC (i.e., pre-Alpha) specimens. Now, these profiles are a signal for Delta.<sup>8</sup>

**Figure 1: Household Secondary Attack Rates Based on COVID-19 Mutation Profiles in Ontario, by Index Case Reported Date, March 1 to June 12, 2021**



Data Source: Case and Contact Management Solution (CCM)

See also [Technical Notes](#) for data caveats and methods.

## Transmissibility

In the literature, the transmissibility of Delta is estimated to be higher than other VOCs, as reflected by a higher effective reproduction number (97% higher than non-VOCs based on epidemiological data from the Global Initiative On Sharing All Influenza Data [GISAID] hCoV-19 database)<sup>9</sup> and higher household secondary attack rates for Delta (64% higher adjusted odds of household transmission among index cases with Delta compared to Alpha, based on sequenced data in England),<sup>10</sup> (see also [Ontario Epidemiological Context](#) above). Recently published evidence, including a peer-reviewed statistical analysis of potential Delta by mutation profile from France,<sup>11</sup> and a preprint of sequenced Delta infection contacts from China,<sup>12</sup> provides further support for higher transmissibility of Delta compared to Alpha or other non-VOCs.

New data published since the last PHO evidence brief provides further support of high transmissibility of Delta:

- Alizon et al. analyzed the results of RT-PCR VOC screening tests on 9,030 SARS-CoV-2–positive samples collected from 13 metropolitan regions in France between May 31 and June 21, 2021 (93% came from non-hospitalized persons). Delta (variants carrying the L452R+/E484K-/E484Q- mutation profile; n=381) was found to be more transmissible by 79% (95% CI: 52%–110%) than Alpha (variants testing negative for L452R/E484K/E484Q; n=4,478). However, the authors noted that the sample of Delta cases might be biased by the national policy of Delta surveillance.<sup>11</sup>

- Li et al. analyzed the data on contacts of COVID-19 cases with Delta in China, where all contacts were quarantined and tested daily for COVID-19. On reviewing the viral loads and time from exposure to first detection by PCR of the 167 secondary infections that were identified from May 21 to June 18, 2021 and traced to index cases epidemiologically or genetically, the authors postulate that Delta may be more transmissible than clade 19A/19B from 2020 due to its higher viral load early in the infection.<sup>12</sup>
  - The time interval from exposure to initial PCR-positivity in the quarantined population (n=34) was 4.00 (IQR 3.00–5.00) days, peaking at 3.71 days for Delta, vs. 6.00 (IQR 5.00–8.00) days, peaking at 5.61 days for a group of quarantined contacts (n=29) in the 2020 wave.
  - The relative viral loads of Delta cases (n=62) were 1,260 times higher than those of cases with the 19A/19B strains in 2020 (n=63).
    - Ct values = 24.00 (IQR 19.00–29.00) for ORF1ab gene) vs. 34.31 (IQR 31.00–36.00) on the day when viruses were first detected.
  - Virus could not be grown in culture (i.e., live infectious virus) from samples with Ct values >30 (< 6 x 10<sup>5</sup> copies/mL).

## Disease Severity and Implications for Health Systems

Analyses from England and Scotland show an apparent increased risk (aHR = 1.8–2.26) of hospitalization for infection with Delta compared with Alpha.<sup>13,14</sup> Also, data from Singapore show higher risk (aHR = 4.90) of severe outcomes (requiring oxygen support, admission to ICU, or death)<sup>15</sup> (see [June edition](#) for details). In this update, we report on a preprint from Ontario suggest the potential for more severe illness with Delta compared to other VOCs.

- Fisman et al conducted a retrospective cohort study of COVID-19 cases identified from the Ontario provincial Case and Contact Management database (excluding residents in long-term care homes) with report dates between February 7 and June 22, 2021 and at least 14 days of follow-up. Out of the 211,197 cases analyzed, 5,615 were probable Delta (identified by whole genome sequencing [WGS], or tested negative for N501Y and any other mutation; n=5,615); 162,497 were N501Y+ VOCs (including Alpha, Beta, Gamma by WGS). The majority of cases were <60 years of age (87.8% for probable Delta, 86.1% for N501Y+ VOCs) and without comorbidities (94.9% for probable Delta, 95.4% for N501Y+ VOCs). The authors noted that the clear and significant elevated risks for probable Delta were remarkable given the young age and lower likelihood for comorbidities, and the relative small number of probable Delta cases (2.7%). Also, as early Delta infections may likely be misclassified as non-VOC, the virulence for Delta could be higher. While vaccination status of the cases was not available, weekly reduction of risks of hospitalization (0.5%), admission to intensive care unit (ICU) (2%) and deaths (5.1%) were observed.<sup>16</sup>
  - Adjusted odds ratio (95% CI) for probable Delta vs. N501Y+ VOCs (adjusted for age, sex, comorbidities and temporal trend):
    - Hospitalization: 2.20 (1.93–2.53) vs. 1.59 (1.49–1.69)
    - ICU admission: 3.87 (2.98–4.99) vs. 2.05 (1.82–2.34)

- Death: 2.37 (1.50–3.30) vs. 1.61 (1.40–1.87)

## Reinfection

While there was previously very limited information on reinfection with the Delta variant, the UK recently published data which provides information about the risk of reinfection with Delta. Preliminary national surveillance data from the UK suggest an increased risk of reinfection with Delta compared to Alpha.

- Public Health England analyzed community-based COVID-19 testing data from the UK between April 12 and June 27, 2021. Preliminary results from multivariable logistic regression, adjusting for age, sex, region of residence, vaccination status, ethnicity and week of testing, find a higher risk of reinfection with Delta compared to Alpha:<sup>17</sup>
  - aOR of reinfection ( $\geq 90$  days from prior infection): 1.46 (95% CI: 1.03–2.05;  $P = 0.031$ ); 897 possible reinfections/68,688 cases.
  - aOR of reinfection ( $\geq 180$  days from prior infection): 2.37 (95% CI: 1.43–3.93;  $P = 0.001$ ); 654 possible reinfections/68,445 cases.
- A cohort of 35,684 National Health Service health care workers in England who are undergoing bi-weekly PCR testing for COVID-19 shows an overall increase in PCR positives in June 2021 (5.4 PCR positives per 1,000 tested between June 28 and July 11, 2021), compared to 0.1 PCR positives per 1,000 tested between May 17 and 30, 2021. Since April 2021, 42/51 (82%) of the potential reinfections occurred  $\geq 14$  days after the second dose of vaccine.<sup>17</sup>

## Vaccine Effectiveness (Delta vs Alpha)

Epidemiological evidence from the UK, Canada and India shows that while VE against severe outcomes (e.g., hospitalization, death) of Delta infection is retained, VE against symptomatic infection with Delta may be reduced, and such reduction is more pronounced after one dose of vaccine. Recently published data supports overall good VE with some reduced VE for the outcome of symptomatic disease.

- As of July 10, 78.6% of Canadians aged 12 years and older have received  $\geq 1$  dose of COVID-19 vaccine, and 50.0% were fully vaccinated.<sup>18</sup> COVID-19 infection was reported in only 0.08% of fully-vaccinated people (symptom onset  $\geq 7$  days after the second dose) vs. 0.14% of partially vaccinated people (symptom onset  $\geq 14$  days after the first dose). Most of the Delta cases were identified in those who were unvaccinated or partially vaccinated,<sup>19</sup> suggesting that COVID-19 vaccines are highly protective, including infections caused by Delta.
- A summary of four preprints on real-world experience of VE against infection with Delta is given below. Two UK-based and one Ontario-based preprints compared VE against infection with Delta vs. Alpha: two focused on symptomatic infection,<sup>20,21</sup> and two on hospitalization.<sup>20,22</sup> In addition, one India-based preprint compared the clinical outcomes of infection with Delta between vaccinated and unvaccinated patients.<sup>23</sup>

## VE against Symptomatic Infection

- In a test-negative case-control study using Ontario data, Nasreen et al. estimated that the effectiveness of three COVID-19 vaccines against symptomatic infection with Delta was lower than with Alpha after one dose of either mRNA vaccines, but was similar for the AstraZeneca

vaccine. Full vaccination with two doses of the Pfizer-BioNTech vaccine offered a similar level of protection against symptomatic infection with Delta and Alpha. Included in the analysis were community-dwelling Ontarians aged >16 years who had symptoms consistent with, or a severe outcome attributable to, COVID-19 and who were tested for SARS-CoV-2 between December 14, 2020 and May 30, 2021 (excluding those with a positive test result prior to this period). Alpha cases were those with N501Y+/E484K- mutation profile or identified by WGS (n = 36,832). Delta cases were identified by WGS or inferred from the N501Y-/E484K- profile collected after April 1, 2021 with >75% probability of being a Delta variant based on the date of specimen collection and the geographic region (n = 991). As a result, the authors noted that a small proportion of Delta cases may have been non-VOCs. The authors also noted that while VE could be impacted by variation in VOC distribution over time, availability of certain vaccine products and eligibility criteria for vaccination, sensitivity analysis yielded very similar results to the primary analysis.<sup>20</sup>

- Adjusted VE (95% CI)  $\geq$  14 days after 1 dose:
  - Pfizer-BioNTech: 56% (45% to 64%) for Delta (157 tested positive out of 786 vaccinated) vs. 66% (64% to 68%) for Alpha (1,792 tested positive out of 33,271 vaccinated).
  - Moderna: 72% (57% to 82%) for Delta (25 tested positive out of 654 vaccinated) vs. 83% (80% to 86%) for Alpha (180 tested positive out of 31,659 vaccinated).
  - AstraZeneca: 67% (44% to 80%) for Delta (17–21 tested positive out of 646 vaccinated) vs. 64% (60% to 68%) for Alpha (4,033 tested positive out of 298,589 vaccinated).
- Adjusted VE (95% CI)  $\geq$  21 days after 1 dose:
  - Pfizer-BioNTech: 61% (51% to 70%) for Delta vs. 69% (67% to 71%) for Alpha.
  - Moderna: 70% (52% to 81%) for Delta vs. 84% (80% to 86%) for Alpha.
  - AstraZeneca: 70% (46% to 83%) for Delta vs. 72% (68% to 76%) for Alpha.
- Adjusted VE (95% CI)  $\geq$  7 days after dose 2:
  - Pfizer-BioNTech: 87% (64% to 95%) for Delta (number tested positive not reported due to small count) vs. 89% (86% to 91%) for Alpha (83 tested positive out of 31,562 vaccinated).
  - Moderna: 100% (0 cases) for Delta (out of 629 vaccinated) vs. 92% (86% to 96%) for Alpha (7–11 tested positive out of 31,490 vaccinated).
- Adjusted VE (95% CI)  $\geq$  14 days after dose 2:
  - Pfizer-BioNTech: 85% (59% to 94%) for Delta vs. 89% (87% to 91%) for Alpha.
  - Moderna: 100% (0 cases) for Delta vs. 91% (84% to 95%) for Alpha.
- Lopez Bernal et al. compared the vaccination status of sequenced COVID-19 cases in the UK between October 26, 2020 and May 16, 2021 and reported absolute reductions in VE (95% CI)

against symptomatic infection with Delta compared to Alpha by 18% and 8% after one and two vaccine dose(s) respectively:<sup>21</sup>

- 30.7% (25.2%–35.7%) for Delta vs. 48.7% (45.5%–51.7%) for Alpha  $\geq$  21 days after the first dose up to the day before the second dose of either Pfizer-BioNTech or AstraZeneca vaccine.
- 79.6% (76.7%–82.1%) for Delta vs. 87.5% (85.1%–89.5%) for Alpha  $\geq$  14 days after the second dose of either vaccine.

## VE against Hospitalization or Severe Outcomes

- In the test-negative case-control study by Nasreen et al. mentioned above, the effectiveness of three COVID-19 vaccines against hospitalization or death due to COVID-19 were estimated to be similar or better with Delta than with Alpha. The authors noted that the risk of severe outcomes may have been underestimated due to missing data if these outcomes occurred after completion of case follow-up time by the public health system, or if the public health system capacity for COVID-19 case investigation was exceeded.<sup>20</sup>
  - Adjusted VE (95% CI)  $\geq$  14 days after 1 dose:
    - Pfizer-BioNTech: 78% (65% to 86%) for Delta (31 tested positive out of 136 vaccinated) vs. 80% (78% to 82%) for Alpha (572 tested positive out of 5,949 vaccinated).
    - Moderna: 96% (72% to 99%) for Delta (number tested positive not reported due to small count) vs. 79% (74% to 83%) for Alpha (94 tested positive out of 5,471 vaccinated).
    - AstraZeneca: 88% (60% to 96%) for Delta (number tested positive not reported due to small count) vs. 85% (81% to 88%) for Alpha (70 tested positive out of 5,447 vaccinated).
  - Adjusted VE (95% CI)  $\geq$  21 days after 1 dose:
    - Pfizer-BioNTech: 78% (64% to 87%) for Delta vs. 85% (83% to 86%) for Alpha.
    - Moderna: 95% (67% to 99%) for Delta vs. 80% (74% to 85%) for Alpha.
    - AstraZeneca: 87% (56% to 96%) for Delta vs. 90% (86% to 93%) for Alpha.
  - Adjusted VE (95% CI)  $\geq$  7 days after dose2:
    - Pfizer-BioNTech: 100% (0 cases) for Delta (out of 105 vaccinated) vs. 95% (92% to 97%) for Alpha (18 tested positive out of 5,395 vaccinated).
    - Moderna: 100% (0 cases) for Delta (out of 105 vaccinated) vs. 94% (89% to 97%) for Alpha (12–16 tested positive out of 5,390 vaccinated).
  - Adjusted VE (95% CI)  $\geq$  14 days after dose 2:
    - Pfizer-BioNTech: 100% (0 cases) for Delta vs. 96% (93% to 98%) for Alpha.

- Moderna: 100% (0 cases) for Delta vs. 94% (90% to 97%) for Alpha.
- Stowe et al. compared the vaccination status of individuals in England hospitalized within 14 days of a positive COVID-19 test between April 12 and June 4, 2021;<sup>22</sup> PHE updated the data to June 11 and reported similar VE (95% CI) against hospitalization with Delta compared to Alpha:<sup>14</sup>
  - 80% (69%–88%) for Delta vs. 78% (64%–87%) for Alpha  $\geq$  21 days after the first dose up to 13 days after the second dose of either Pfizer-BioNTech or AstraZeneca vaccine.
  - 96% (91%–98%) for Delta vs. 93% (80%–97%) for Alpha  $\geq$  14 days after the second dose of either vaccine.
- V et al. compared the clinical outcomes of 1,161 COVID-19 patients admitted between April 24 and May 31, 2021 to a hospital designated for COVID-19 in Hyderabad, India. Among these patients, 666 were unvaccinated while 495 had received at least one dose of the Covishield (ChAdOx1) or Covaxin (BBV-152) vaccine. Delta was the dominant strain in the samples sequenced from the unvaccinated group (94/104 sequenced; 90.4%) and the vaccinated group (93/97 sequenced; 95.9%), comparable to the prevalence of Delta in the community during that period. The authors found that at least one dose of either vaccine was able to reduce disease severity. However, no significant differences were observed in the incidence of acute kidney injury, requirement for renal replacement therapy, thrombotic complications, or mortality during hospitalization between those with at least one dose of either vaccines and the unvaccinated group.<sup>23</sup>
  - Severe disease (oxygen saturation < 90%) or requiring ICU care at admission for the vaccinated vs. unvaccinated: 16/495 (3.2%) vs. 48/666 (7.2%); P = 0.0039
  - Requirement of ventilatory support for the vaccinated vs. unvaccinated: 14/495 (2.8%) vs. 39/666 (5.9%); P = 0.0153

## Relevant Jurisdictions Experiencing Delta Surge

As of July 20, at least 124 countries across all six World Health Organization regions have reported Delta cases,<sup>24</sup> and it is expected to become the dominant variant globally.<sup>25</sup> In the United States, Delta was estimated to make up 83.2% of all circulating SARS-CoV-2 lineages during the biweekly period of July 4 to 17, 2021, up from 31.9% a month ago from June 6 to 19, 2021.<sup>26</sup> The European Centre for Disease Prevention and Control projected that 90% of COVID-19 cases would be due to Delta by the end of August.<sup>27</sup> Described below is information for several countries with contexts relevant to Ontario in terms of epidemiology and vaccination program progress.

### England

#### EPIDEMIOLOGY

- As of July 16, 2021 the rate of cases in a 7-day period per 100,000 people was 510.9 (an increase from 240.2 on July 1, 2021).<sup>28</sup>
- On July 9, 2021 there were 176 weekly deaths (an increase from 97 on June 25, 2021).<sup>28</sup>

- A report from July 9, 2021 reported that the Delta variant accounted for approximately 99% of sequenced and 97% genotyped cases from June 27 to July 3, 2021.<sup>29</sup>
- In a cross-sectional survey of adults in England between June 24 and July 5, 2021 in which 47,729 throat and nose swabs were tested by RT-PCR for SARS-CoV-2, 237 (0.59%) tested positive. The doubling time was estimated at 6.1 days (95% CI: 4.0–12.3 days), up from 15 days between June 8 and 23, 2021.<sup>30</sup>

## VACCINATION

- As of July 19, 2021, 69% of the population had received at least one dose of a COVID-19 vaccine<sup>31</sup> and 54% were fully vaccinated.<sup>32</sup>

## PUBLIC HEALTH MEASURES

- On July 19, 2021 (after delaying re-opening for a few weeks) nearly all remaining COVID-19 restrictions were lifted despite rising COVID-19 cases. For example, concert halls, theaters, sports arenas, nightclubs and other entertainment venues can now open with no capacity limits. Workers are encouraged to go back to the office, and there is no longer a legal requirement to wear masks; however, they are encouraged to be worn in crowded and enclosed spaces.<sup>33</sup> Organizations and large events are encouraged to use the National Health System (NHS) COVID-19 Pass in high-risk settings to help limit the risk of infection in their venues.<sup>34</sup>

## France

### EPIDEMIOLOGY

- As of July 20, 2021, weekly confirmed COVID-19 cases per 100,000 people were 102.7 (an increase from 20.3 on July 1, 2021).<sup>35</sup>
- On July 16, 2021 there were 6,971 patients in hospitals (a decrease from 8,232 on July 1, 2021).<sup>36</sup>
- As of July 20, 2021, weekly deaths per 100,000 people were 0.18 (a decrease from 0.34 on July 1, 2021).<sup>37</sup>
- According to the European Centre for Disease Prevention and Control (ECDC) SARS-CoV-2 Variants Dashboard, as of the week of June 28, 2021, 91.7% of cases were the Delta variant.<sup>38</sup>

### VACCINATION

- As of July 21, 2021, 56% of the population had received at least one dose of a COVID-19 vaccine and 42% were fully vaccinated.<sup>39</sup>

## PUBLIC HEALTH MEASURES

- The French government announced on June 30, 2021 that lifting of COVID-19 restrictions in certain regions (e.g., the Landes region) would be delayed until July 6, 2021 due to the high presence of the Delta variant in that region.<sup>40,41</sup>
- On July 12, 2021, the President of France announced that COVID-19 passes (also known as a Health Pass) will be mandatory for individuals who want to attend certain public places.<sup>2</sup>
- Starting July 21, 2021 the COVID-19 pass will be required at all places of leisure and culture that have more than 50 people.<sup>42</sup> Starting early August the COVID-19 pass will be required to enter cafés, restaurants, shopping centers, hospitals<sup>41</sup>, retirement homes, medico-social establishments, and any travel by plane, train and coach for long-distance journeys. Other places may be added to this list at a later date if necessary.
  - To obtain a COVID-19 pass, individuals must have proof that they are fully vaccinated, recently recovered from the virus or have documentation of a recent negative COVID-19 test.

## Italy

### EPIDEMIOLOGY

- As of July 20, 2021, weekly confirmed COVID-19 cases per 100,000 people were 32.1 (an increase from 8.4 on July 1, 2021).<sup>35</sup>
- On July 16, 2021 there were 1,249 patients in hospitals (a decrease from 1,761 on July 1, 2021).<sup>36</sup>
- As of July 20, 2021, weekly deaths per 100,000 people were 0.13 (a decrease from 0.37 on July 1, 2021).<sup>37</sup>
- As of June 22, 2021 the Delta variant accounted for 22.7% of cases and was identified in 16 regions with a range between 0 and 70.6%.<sup>43</sup>

### VACCINATION

- As of July 21, 2021, 61% of the population had received at least one dose of a COVID-19 vaccine and 45% were fully vaccinated.<sup>39</sup>

### PUBLIC HEALTH MEASURES

- According to a media report from July 19, 2021, Italy is expected to tighten COVID-19 restrictions for unvaccinated individuals in response to a surge in COVID-19 infections.<sup>44</sup> Individuals who are not fully vaccinated could be barred from being served indoors at restaurants and bars and from entering stadiums, museums, theatres, cinemas, swimming pools and gyms. The government also hopes that the requirement to use Green Passes when travelling within the country (by plane/train) will encourage individuals to get vaccinated. These proposed restrictions are expected to be approved this week and could take effect starting July 26, 2021.

## Netherlands

### EPIDEMIOLOGY

- As of July 20, 2021, weekly confirmed COVID-19 cases per 100,000 people were 408.8 (a significant increase from 25.2 on July 1, 2021).<sup>35</sup>
- On July 16, 2021 there were 190 patients in hospitals (an increase from 159 on July 1, 2021)<sup>36</sup>
- As of July 20, 2021, weekly deaths per 100,000 people were 0.09 (an increase from 0.08 on July 1, 2021).<sup>37</sup>
- According to the ECDC SARS-CoV-2 Variants Dashboard, as of the week of June 28, 2021, 91.7% of cases were of the Delta variant.<sup>38</sup>

### VACCINATION

- As of July 21, 2021, 67% of the population had received at least one dose of a COVID-19 vaccine and 46% were fully vaccinated.<sup>39</sup>

### PUBLIC HEALTH MEASURES

- Due to the recent rise in COVID-19 infections, the government has implemented additional measures starting July 10, 2021.<sup>45</sup> Most of these recent cases were reported to be due to individuals who became infected in places where large groups of people socialized. The new measures effective from July 10 to August 13, 2021 include increased restrictions for catering, closing all discos and night clubs, and requiring Corona tickets at some cultural and sporting events (For more information see [COVID-19 Public Health Measures Related to the Delta Variant](#).<sup>46</sup>)
  - Corona tickets are available to those who: 1) are vaccinated (must be 14 days after full vaccination), 2) have recovered (proof that you recovered from COVID-19 less than 6 months ago), or 3) have test proof (a negative test result less than 40 hours before the event).<sup>45</sup>
  - On July 15, 2021 a media release reported that despite requiring a Corona ticket 1,000 coronavirus infections were linked to the event.<sup>47</sup> The event was an outdoor festival, which took place in Utrecht in early July, and was attended by 20,000 people over two days. While all cases were linked to the festival, it is unclear if they contracted COVID-19 at the festival or at before/after events. It was also suggested that the allowing to COVID-19 tests as much as 40 hours before the event was too long and should have been shortened to 24 hours.

## Israel

### EPIDEMIOLOGY

- As of July 20, 2021, weekly confirmed COVID-19 cases per 100,000 people were 78.9 (an increase from 18.6 on July 1, 2021).<sup>35</sup>

- A media report from July 4, 2021, reported that the Delta variant is now responsible for more than 90% of Israel's cases (up from 60% two weeks prior).<sup>48</sup>
- On July 16, 2021 there were 178 patients in hospitals (an increase from 64 on July 1, 2021).<sup>36</sup>
- As of July 20, 2021, weekly deaths per 100,000 people were 0.14 (compared to 0.00 on July 1, 2021).<sup>37</sup>

## VACCINATION

- As of July 21, 2021, 64% of the population had received at least one dose of a COVID-19 vaccine and 58% were fully vaccinated.<sup>39</sup>

## PUBLIC HEALTH MEASURES

- While the indoor mask mandate was dropped on June 15, 2021, the masking requirement was re-introduced due to rising infections. As of June 25, 2021, masks are now required anywhere except outdoors, and in your home.<sup>49</sup> The Ministry of Health also recommends wearing masks in large outdoor gatherings.
  - Masking is not required for children under the age of seven, those who are unable to wear a mask for medical reasons, when in an enclosed room without another individual present, two workers who share a room regularly, and when engaging in physical activity.<sup>49</sup>
- As of July 16, 2021 Israel has implemented a travel ban for a number of countries with the highest risk of COVID-19 (e.g., Argentina, Brazil, South Africa, India, Mexico, Russia, Belarus, Uzbekistan).<sup>50</sup> Effective July 16, 2021, all travelers arriving in Israel from abroad (regardless of destination and/or vaccination status) are required to enter isolation for 24 hours or until they receive their test results from the COVID-19 test they took at border control (whichever is earlier).
- On July 17, 2021 the Prime Minister and the Ministers of Economy and Health, provided guidance regarding the new "Happy Pass" which is expected to take effect July 21, 2021.<sup>51</sup> The Happy Pass is an outline describing how to safely hold mass gatherings.<sup>52</sup> The rules will apply to indoor gatherings where food and drinks are served and individuals both sit and stand. Starting July 21, 2021, access to weddings/events with more than 100 guests will be reserved to individuals who are vaccinated, recovered or holders of a recent negative coronavirus test.

## Ontario Risk Assessment

- **Overall, the risk of B.1.617.2 or Delta transmission in Ontario is moderate to high. It is the predominant variant and transmission will depend on the number and spread of existing cases and continued introductions into areas of the province.**
  - While mutation profiles estimated that 83.1% of all reported cases in Ontario could include cases due to Delta, the prevalence can rise sharply with outbreaks of high case numbers,<sup>53,54</sup> driven by close contact<sup>55,56</sup> due to Delta's higher transmissibility, pockets of population with suboptimal vaccine coverage and slightly reduced VE.
- The overall risk assessment may change as new evidence emerges (see [Table 1](#)).

**Table 1. Risk Assessment for Delta**

Issue	Risk level	Degree of Uncertainty
<b>Increased Transmissibility</b>	<p><b>High</b></p> <p>Data from India, the UK, France, China and Ontario suggest Delta can be up to 79% more transmissible than Alpha. SARs of Delta are higher than Alpha.</p>	<b>Low</b>
<b>Disease Severity</b>	<p><b>Moderate</b></p> <p>Increased risk of hospitalization based on sequenced cases in UK, comparison of S-gene–positive (proxy for Delta) with S-gene–negative (proxy for Alpha) in Scotland, and sequenced and PCR-screened cases in Ontario.</p> <p>Increased risk of ICU admission and death based on sequenced data from Singapore, and sequenced and PCR-screened cases from Ontario.</p> <p>Increased risk of ventilatory support based on sequenced data from Singapore.</p> <p>A greater proportion of cases admitted to hospital were unvaccinated compared to fully-vaccinated with two doses of COVID-19 vaccine.</p>	<b>Low</b>
<b>Re-infection</b>	<b>Moderate</b>	<b>High</b>
<b>Lowered Vaccine Effectiveness</b>	<p><b>Moderate</b></p> <p>Possible reduction in protection against symptomatic infection following one dose based on data from the UK and Ontario.</p> <p>VE against hospitalization for Delta is high and similar compared to Alpha based on data from the UK and Ontario.</p>	<b>Moderate</b>
<b>Impacts on Testing/ Surveillance</b>	<p><b>Low</b></p> <p>The risk of Delta cases not being detected in Ontario’s surveillance program is low.</p>	<b>Low</b>

## Practice Implications

- The Delta variant is a recently emerged global VOC that has impacted multiple jurisdictions worldwide and has replaced Alpha as the dominant SARS-CoV-2 strain in Ontario. It is a more transmissible strain with evidence of increased severity. There are some jurisdictions which are adjusting public health measures in response to the Delta variant and a surge, including through the introduction of mandatory vaccination or vaccine passports/certificates.
- Completion of the two-dose vaccination series will be important to protect Ontarians from the more severe and transmissible Delta variant. Vaccination should target those who have not had a first dose, and continue with second doses promptly particularly in areas and settings that have

seen high incidence of SARS-CoV-2 overall and Delta specifically. Timely administration of second doses may represent a balance between increased VE afforded by a two-dose vaccine schedule and the possibility of a longer duration of protection afforded by longer intervals between doses. What interval between doses in a COVID-19 vaccine series provides the most optimal duration of protection is currently unknown, but an area of emerging evidence.

- Ontario populations which are un- or under-vaccinated, including ineligible for vaccination, remain at-risk for serious disease associated with the Delta variant. Efforts should be invested to enhance vaccine uptake as much as possible in the province. Further, based on projected approvals for vaccines for those < 12 years old by approximately September 2021,<sup>57</sup> planning should start for rapid roll-out of vaccine in younger age groups in the fall to increase overall coverage in the population before winter.
- Assessment of appropriate epidemiologic, vaccination and health system indicators will be important to understand how Delta is spreading in Ontario. It is anticipated that some public health measures, such as community masking, may be useful to maintain disease control in the context of the more transmissible Delta strain.

## Technical Notes

Below are the data caveats and methods for [Figure 1](#).

- Index cases included case reported dates from March 1 to June 12, 2021; congregate settings are excluded.
- Index cases are the first case in the household based on symptom onset date (or specimen collection date, if symptom onset date was not available); secondary cases were those with a symptom onset 1 to 14 days after the index case.
- Household sizes are reported in Case and Contact Management solution and was used to calculate SARs by dividing the number of secondary cases by the total number of household secondary contacts (i.e., household size minus one).
- The points are the mean household SAR for a given day, per mutation profile; the size of the points represent the number of households used to calculate the mean. The lines are the predictive values generated by a general additive model, with mutation profile and index case reported date as predictors of SAR.
  - N501Y+ and E484K- (blue) mutation detected are likely to be lineage Alpha.
  - N501Y+ and E484K+ (purple) mutation detected are likely to be lineage Gamma or Beta.
  - N501Y- and E484K+ (green) does not correspond to a variant of concern currently identified in Ontario.
  - N501Y- and E484K- (red) are cases with neither mutation detected and includes Delta.

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## For Further Information

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## Public Health Ontario

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