ENHANCED EPIDEMIOLOGICAL SUMMARY

Confirmed Cases of COVID-19 Following Vaccination in Long-Term Care Homes & Retirement Homes in Ontario: December 14, 2020 to April 30, 2021

This report includes the most current information available from Public Health Case and Contact Management Solution (CCM) and vaccine uptake data extracted from the Ontario Ministry of Health’s COVaxON application for all public health units (PHUs) in Ontario as of May 3, 2021.

Purpose

This report provides a focused analysis of confirmed COVID-19 cases among vaccinated long-term care home (LTCH) and retirement home (RH) health care workers and residents in Ontario reported from the beginning of the immunization program on December 14, 2020 to April 30, 2021. Only cases experiencing symptoms of COVID-19 were included in the analysis. Information on how LTCH/RH health care workers and residents are defined is available in the Technical Notes along with additional information.

For a summary of all post-vaccination COVID-19 cases in Ontario, please see the enhanced epidemiological summary, Confirmed Cases of COVID-19 Following Vaccination in Ontario: December 14, 2020 to April 17, 2021. The interactive Ontario COVID-19 Data Tool is available on the Public Health Ontario website to explore recent COVID-19 data by public health unit, age group, sex, and trends over time along with the Daily Epidemiological Summary, Weekly Epidemiological Summary, and additional Epidemiological Reports.

Context

- Since the COVID-19 vaccination program began on December 14, 2020 to May 1, 2021, 235,011 LTCH/RH health care workers and residents received at least one vaccine dose. There has been a large decline in cases among LTCH/RH health care workers and residents since early February 2021, which has been sustained at a low level despite high levels of community transmission in the third wave in Ontario. Among partially and fully vaccinated LTCH/RH health care workers and residents, only 368 symptomatic COVID-19 cases were reported as of April 30, 2021.

- Compared to previously reported hospitalization and mortality rates among LTCH residents in Wave 1 and Wave 2, substantially fewer hospitalizations and deaths have been observed among vaccinated residents.
Highlights

- Between December 14, 2020 and April 30, 2021, there were 11,270 confirmed COVID-19 cases reported among LTCH/RH health care workers and residents, of which 3,643 were asymptomatic and 7,627 were symptomatic. Among symptomatic cases, 368 (4.8%) were fully or partially vaccinated prior to symptom onset.

- 70 (5.8%) of the 1,200 cases that received one dose prior to symptom onset were fully vaccinated breakthrough cases, and 298 (24.8%) were partially vaccinated.

- Among breakthrough health care worker and resident cases, 40.4% and 22.2% respectively were identified as having a variant of concern (VOC) or mutation of interest.
  - However, it is important to note that VOC screening was limited until early February, after which VOC screening became routine.

- No severe outcomes were reported among breakthrough health care worker cases. Of the total breakthrough resident cases, only 8 (15.4%) were hospitalized with no deaths reported.

Definition of Terms

The following definitions, which were modelled on proposed national case definitions, were used to describe COVID-19 infection following vaccination:

- **Case not yet protected by vaccination:** Individuals with a symptom onset date that was 0 to <14 days following the first dose of a COVID-19 vaccine. This time period from vaccination is not sufficient to develop immunity, therefore these individuals are not considered protected from vaccination.

- **Partially vaccinated case:** Individuals with a symptom onset date that was 14 or more days following the first dose of a COVID-19 vaccine or 0 to <7 days after receiving the second dose. This time period from vaccination may be sufficient to develop some degree of immunity, but these individuals are not considered fully protected as they have not yet received the second dose or have only recently received the second dose.

- **Breakthrough (i.e., fully vaccinated) case:** Individuals with a symptom onset date that was 7 or more days following receipt of the second dose of a COVID-19 vaccine. These individuals are considered fully protected from vaccination, however, as vaccine effectiveness is not 100%, it is expected that a small number of individuals become infected following complete vaccination.
Trends

Figure 1: Overall number of COVID-19 LTCH/RH health care workers and resident cases by reported date: Ontario, January 15, 2020 to April 30, 2021

Data Source: CCM

Notes: Includes all cases of COVID-19 in LTCH/RH residents and health care workers, regardless of vaccination status. On December 14, 2020, the COVID-19 vaccination program began. By mid-February 2021, individuals across LTCHs in Ontario were offered at least one dose of COVID-19 vaccine.
Figure 2: Overall number of COVID-19 outbreaks in LTCH/RH settings by outbreak date: Ontario, January 15, 2020 to April 30, 2021

Data Source: CCM

Note: On April 23, 2021 the outbreak definition for confirmed outbreaks was updated to two or more lab-confirmed COVID-19 cases in residents and/or staff. Prior to this date, a single laboratory confirmed case of COVID-19 in a resident or staff was considered a confirmed COVID-19 outbreak.
Figure 3: Number of COVID-19 LTCH/RH health care workers and resident cases post-vaccination by days between vaccination and symptom onset: Ontario, December 14, 2020 to April 30, 2021

Data Source: CCM/COVax
## Case Characteristics

### Table 1: Number of COVID-19 LTCH health care workers and resident cases post-vaccination by vaccine category: Ontario, December 14, 2020 to April 30, 2021

<table>
<thead>
<tr>
<th>Vaccine Category</th>
<th>Number of health care workers cases</th>
<th>Percent of health care workers cases</th>
<th>Number of resident cases</th>
<th>Percent of resident cases</th>
<th>Total LTCH/RH cases</th>
<th>Percent of LTCH/RH cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breakthrough case</td>
<td>18</td>
<td>4.6%</td>
<td>52</td>
<td>6.4%</td>
<td>70</td>
<td>5.8%</td>
</tr>
<tr>
<td>Partially vaccinated case</td>
<td>87</td>
<td>22.4%</td>
<td>211</td>
<td>26.0%</td>
<td>298</td>
<td>24.8%</td>
</tr>
<tr>
<td>Vaccinated but not protected</td>
<td>284</td>
<td>73.0%</td>
<td>548</td>
<td>67.6%</td>
<td>832</td>
<td>69.3%</td>
</tr>
<tr>
<td>Total vaccinated</td>
<td>389</td>
<td>100.0%</td>
<td>811</td>
<td>100.0%</td>
<td>1,200</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Data Source: CCM/COVax
Table 2. Confirmed cases of COVID-19 among vaccinated LTCH/RH residents by vaccine category: Ontario, December 14, 2020 to April 30, 2021

<table>
<thead>
<tr>
<th>Number of cases</th>
<th>52</th>
<th>211</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender: Male</td>
<td>17</td>
<td>81</td>
</tr>
<tr>
<td>Gender: Female</td>
<td>35</td>
<td>127</td>
</tr>
<tr>
<td>Gender: Unknown</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Ages: &lt;60 years</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Ages: 60-69 years</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Ages: 70-79 years</td>
<td>14</td>
<td>33</td>
</tr>
<tr>
<td>Ages: 80-89 years</td>
<td>15</td>
<td>68</td>
</tr>
<tr>
<td>Ages: ≥90 years</td>
<td>19</td>
<td>97</td>
</tr>
</tbody>
</table>

**Data Source:** CCM/COVax
# Variants of Concern

Table 3a. Confirmed COVID-19 cases with a mutation or VOC detected among vaccinated LTCH/RH health care workers: Ontario, December 14, 2020 to April 30, 2021

<table>
<thead>
<tr>
<th>Variant of concern or mutation of interest</th>
<th>Breakthrough cases</th>
<th>Percent of all breakthrough cases</th>
<th>Partially vaccinated</th>
<th>Percent of all partially vaccinated cases</th>
<th>Total</th>
<th>Percent of all breakthrough and partially vaccinated cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lineage B.1.1.7*</td>
<td>0</td>
<td>0.0%</td>
<td>21</td>
<td>24.1%</td>
<td>21</td>
<td>20.0%</td>
</tr>
<tr>
<td>Lineage B.1.3.5.1</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Lineage P.1</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>VOC associated mutation**</td>
<td>4</td>
<td>22.2%</td>
<td>1</td>
<td>1.1%</td>
<td>5</td>
<td>4.8%</td>
</tr>
<tr>
<td>No VOC or mutation of interest detected</td>
<td>1</td>
<td>5.6%</td>
<td>1</td>
<td>1.1%</td>
<td>2</td>
<td>1.9%</td>
</tr>
<tr>
<td>Not reported</td>
<td>13</td>
<td>72.2%</td>
<td>64</td>
<td>73.6%</td>
<td>77</td>
<td>73.3%</td>
</tr>
<tr>
<td>Total</td>
<td>18</td>
<td>100.0%</td>
<td>87</td>
<td>100.0%</td>
<td>105</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

**Data Source:** CCM/COVax

Note: Interpret the VOC and mutation data 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. VOC data presented from the Investigation Subtype field only. Changes to the VOC testing algorithm may impact counts and trends. *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 a positive N501Y and negative E484K mutation. **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).
Table 3b. Confirmed COVID-19 cases with a mutation or VOC detected among vaccinated LTCH/RH residents: Ontario, December 14, 2020 to April 30, 2021

<table>
<thead>
<tr>
<th>Variant of concern or mutation of interest</th>
<th>Breakthrough cases</th>
<th>Percent of all breakthrough cases</th>
<th>Partially vaccinated</th>
<th>Percent of all partially vaccinated cases</th>
<th>Total</th>
<th>Percent of all breakthrough and partially vaccinated cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lineage B.1.1.7*</td>
<td>11</td>
<td>21.2%</td>
<td>29</td>
<td>13.7%</td>
<td>40</td>
<td>15.2%</td>
</tr>
<tr>
<td>Lineage B.1.3.5.1</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Lineage P.1</td>
<td>3</td>
<td>5.8%</td>
<td>0</td>
<td>0.0%</td>
<td>3</td>
<td>1.1%</td>
</tr>
<tr>
<td>VOC associated mutation**</td>
<td>7</td>
<td>13.5%</td>
<td>3</td>
<td>1.4%</td>
<td>10</td>
<td>3.8%</td>
</tr>
<tr>
<td>No VOC or mutation of interest detected</td>
<td>2</td>
<td>3.8%</td>
<td>2</td>
<td>0.9%</td>
<td>4</td>
<td>1.5%</td>
</tr>
<tr>
<td>Not reported</td>
<td>29</td>
<td>55.8%</td>
<td>177</td>
<td>83.9%</td>
<td>206</td>
<td>78.3%</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>100.0%</td>
<td>211</td>
<td>100.0%</td>
<td>263</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Data Source: CCM/COVax

Note: Interpret the VOC and mutation data 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 VOC data presented from the Investigation Subtype field only. Changes to the VOC testing algorithm may impact counts and trends. *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 a positive N501Y and negative E484K mutation. **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).
### Table 4. Confirmed COVID-19 case outcomes among vaccinated LTCH/RH health care workers and residents: Ontario, December 14, 2020 to April 30, 2021

<table>
<thead>
<tr>
<th>Vaccine Category</th>
<th>Number of hospitalized cases</th>
<th>Percent of hospitalized cases*</th>
<th>Number of ICU admissions</th>
<th>Percent of ICU admissions*</th>
<th>Number of deaths</th>
<th>Percent of deaths*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health care workers: Breakthrough case</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Health care workers: Partially vaccinated</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Health care workers: Not protected</td>
<td>2</td>
<td>0.7%</td>
<td>1</td>
<td>0.4%</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Health care workers: Total</td>
<td>2</td>
<td></td>
<td>1</td>
<td></td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Residents: Breakthrough case</td>
<td>8</td>
<td>15.4%</td>
<td>1</td>
<td>1.9%</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Residents: Partially vaccinated cases</td>
<td>31</td>
<td>14.7%</td>
<td>1</td>
<td>0.5%</td>
<td>33</td>
<td>15.6%</td>
</tr>
<tr>
<td>Residents: Not protected</td>
<td>72</td>
<td>13.1%</td>
<td>1</td>
<td>0.2%</td>
<td>114</td>
<td>20.8%</td>
</tr>
<tr>
<td>Residents: Total</td>
<td>111</td>
<td></td>
<td>3</td>
<td></td>
<td>147</td>
<td>-</td>
</tr>
</tbody>
</table>

**Data Source:** CCM/COVax

*Percentage estimates were calculated using the total number of cases for each vaccine category among residents and health care works respectively as denominators.
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 May 3, 2021 at 1 p.m. Data in this report includes the most current information extracted from COVaxON as of May 3, 2021 at approximately 7:00 a.m. Only cases reported from December 14, 2020 to April 30, 2021 with documented vaccine information are included.

Data Caveats

- COVaxON and CCM are dynamic reporting systems, which allow ongoing updates to data previously entered. As a result, data extracted from COVaxON and CCM represent a snapshot at the time of extraction and may differ from previous or subsequent reports.

- The data represent vaccination and case information reported and recorded in COVaxON or CCM. As a result, all counts may be subject to varying degrees of underreporting due to a variety of factors.

- Linking COVaxON and CCM data is dependent on availability of personal identifiers reported in both databases. For example, if a client was reported in both COVaxON and CCM, but personal identifiers (e.g. such as health card number, date of birth) were not available, then sufficient information would not have been available to identify the client and the client would not have been included in the linkage. Methods for processing COVaxON vaccine uptake data are described in the Technical Notes of the COVID-19 Vaccine Uptake Report.

- The definitions for partially vaccinated and breakthrough cases used in this report were modelled after proposed national definitions, and do not necessarily align with those used in other jurisdictions. Further, the definitions may be revised over time.

- Only cases meeting the confirmed case classification as listed in the MOH COVID-19 case definition are included in the report counts from CCM.

- The following COVID-19 cases were excluded as the timing of infection (i.e. date of symptom onset) relative to vaccination (i.e. date of dose administration) could not be determined.
  - Cases reported as asymptomatic and where no symptom information was reported. Asymptomatic cases were identified as those where no symptom information was reported or where symptom onset date was not available.
  - Cases were no symptoms onset date was reported.
  - Cases reported as re-positive or remote positive.
  - Cases of confirmed reinfection, as defined in the provincial case definitions, are counted as unique investigations.
  - Reported date is the date the case was reported to the public health unit.
Hospitalization includes all cases for which a hospital admission date was reported 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.

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.

The outbreak date 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 resident’ 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) 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.

‘Long-term care home health care workers’ includes cases that reported ‘Yes’ to any of the following occupational risk factors: health care worker, doctor, nurse, dentist, dental hygienist, midwife, other medical technicians, personal support worker, respiratory therapist, first responder; and reported to be part of an outbreak assigned as a long-term care home (via the outbreak number). It also includes cases who responded ‘Yes’ to the occupational risk factor - long term care home. Cases that also reported ‘Yes’ to ‘Resident of nursing home or other chronic care facility’ and/or ‘Resident of Long-Term Care home’ are excluded.

‘Retirement home resident’ includes cases that reported ‘Yes’ for the risk factor ‘Resident of Retirement home’ (whether or not they are linked to a local outbreak) and did not have ‘Yes’ selected for any health care worker risk factor.

‘Retirement home health care workers’ includes cases that reported ‘Yes’ to any of the following occupational risk factors: health care worker, doctor, nurse, dentist, dental hygienist, midwife, other medical technicians, personal support worker, respiratory therapist, first responder; and reported to be part of an outbreak assigned as a retirement home (via the outbreak number) and did not report ‘No’ to the occupational risk factor - Retirement Home. It also includes cases
who reported ‘Yes’ to the occupational risk factor for retirement homes. Cases who reported ‘Yes’ for the risk factor ‘Resident of Retirement home’ are excluded.

- **PANGO lineage B.1.1.7:** This lineage was first detected in England in September, 2020. Early evidence suggests that the N501Y mutation may increase SARS-CoV-2 transmissibility. The PANGO lineage B.1.1.7 is assigned to genome sequences with at least 5 of the 17 defining B.1.1.7 SNPs.

- **PANGO lineage B.1.351 (also known as 501Y.V2):** This lineage was first detected October, 2020 in South Africa and has several mutations of concern, including spike (S) gene: N501Y, K417N, and E484K. Early evidence suggests that these mutations may increase SARS-CoV-2 transmissibility and decrease vaccine efficacy. The PANGO lineage B.1.351 will be assigned to genome sequences at least 5 of the 9 defining B.1.351 SNPs.

- **PANGO lineage P.1 (also known as 501Y.V3):** This lineage was first detected January, 2021 in Brazil and has several mutations of concern, including spike (S) gene N501Y, K417T, and E484K. Early evidence suggests that these mutations may increase SARS-CoV-2 transmissibility and decrease vaccine efficacy. The PANGO lineage P.1 is assigned to genome sequences with more than 10 of the 17 defining P.1 SNPs.

- **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](https://www.publichealthontario.ca/en/laboratory-services/test-information-index/covid-19-voc)

- **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. Starting March 22, 2021, these specimens are tested for the E484K mutation as well. Specimens that are positive for the N501Y mutation only are not being forwarded for further genomic analysis. Specimens that are E484K positive (with or without N501Y) are forwarded for 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 these samples may then undergo genomic analyses to identify the VOC. 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.

- **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 and P.1)**
Citation


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