Public Health Ontario | Santé publique Ontario

ENHANCED EPIDEMIOLOGICAL SUMMARY

Genomic Surveillance of Emerging SARS-CoV-2 Variant, BA.2.20, in Ontario

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Introduction

This report summarizes cases identified as emerging SARS-CoV-2 sub-lineage BA.2.20 through whole genome sequencing (WGS) completed by Public Health Ontario as of April 28, 2022 and partner laboratories in the Ontario COVID-19 Genomics Network as of April 27, 2022. The Ontario COVID-19 Genomics Network (OCGN) performs WGS on randomly selected SARS-CoV-2 samples as part of representative genomic surveillance as well as targeted sequencing of specific samples.

Background

SARS-CoV-2, the causative virus of COVID-19, experiences frequent changes to its genome as it spreads through populations. Accumulation of these genomic mutations can result in new lineages of the virus, which is a common occurrence. These new lineages will differ slightly in genome sequence and are termed variants. Although many variants will have no difference in the ability to spread or cause disease, some variants have mutations which may enhance virulence, transmissibility, and/or allow the virus to escape natural or vaccine-induced immunity.

SARS-CoV-2 Variant of Concern (VOC), B.1.1.529 (Omicron) first emerged in South Africa in late November 2021. Since then, it has swiftly spread across the globe to replace B.1.617.2 (Delta) as the dominant lineage in many jurisdictions.[1,2] As of May 4, 2022, multiple sub-lineages of B.1.1.529 (Omicron) have been identified, including BA.1, BA.2, BA.3, BA.4, and BA.5, based on whole genome sequencing.[3] The BA.2 sub-lineage specifically has been detected in at least 118 countries, including Canada and the United States.[4] In Ontario, BA.2 was the most prevalent sub-lineage (90.7%), followed by BA.1.1 (8.7%), as of April 16, 2022. Over the past twelve weeks, the weekly growth rate of BA.2 was 1.67 times that of BA.1.1.[5]

An emerging sub-lineage of BA.2 has been increasingly co-circulating primarily in Ontario and in some American states.[6] On April 19, 2022, this circulating sub-lineage was designated as BA.2.20 by the Pango designation group. BA.2.20 differs from the parent BA.2 lineage by two additional, defining mutations. One mutation is in the Spike gene, A22005C causing an amino acid change N148T, and the second is in the ORF9b gene, C28498T which does not cause an amino acid change. At this time, the impact of these mutations on transmission, risk of severe disease, reinfection and breakthrough infection is unknown.

For this report, the presence of the N148T mutation in the Spike protein was used as a proxy to identify cases belonging to BA.2.20 as bioinformatics tools are in the process of being updated. Approximately 99% of sequenced BA.2 genomes with N148T mutation also contain C28498T, per WGS data from PHO.

The N148T mutation has been observed in other SARS-CoV-2 lineages, B.1.636, B.1.1.343, B.1.1.63, B.1.556, B.1.1.462, B.56, B.1.81, B.1.1.7 and AL.1 at low prevalence (<1.0%).[7] None of the previous reports investigated the role of this mutation in these lineages. Further studies are required to consider the functional significance of N148T.

Highlights

- BA.2.20 represents a new SARS-CoV-2 sub-lineage that has been primarily growing in Ontario. This concerted growth in a defined geography led to its formal designation by the Pango group.
- The proportion of BA.2.20 cases has remained stable, at approximately 5.5%, over the past four weeks.
- To date, 996 cases in Ontario have been identified as BA.2.20.
    - The first case had a sample collection date of February 14, 2022.
- The highest proportion of BA.2.20 cases was among the 20-39 age group (38.9%), followed by 40-59 (30.9%).
- The public health unit with the highest proportion of BA.2.20 cases was Toronto Public Health (18.8%), followed by Middlesex-London Health Unit (12.7%).
- Overall, 1.9% of BA.2.20 cases were identified through the border testing program led by the Public Health Agency of Canada.
- The majority of BA.2.20 cases occurred in individuals who had received one booster dose, i.e. post-booster dose (62.0%), followed by individuals who had completed their vaccination series, i.e. post-series completion (23.0%).
- The OCGN will continue to monitor the growth and characteristics of BA.2.20 through genomic surveillance.

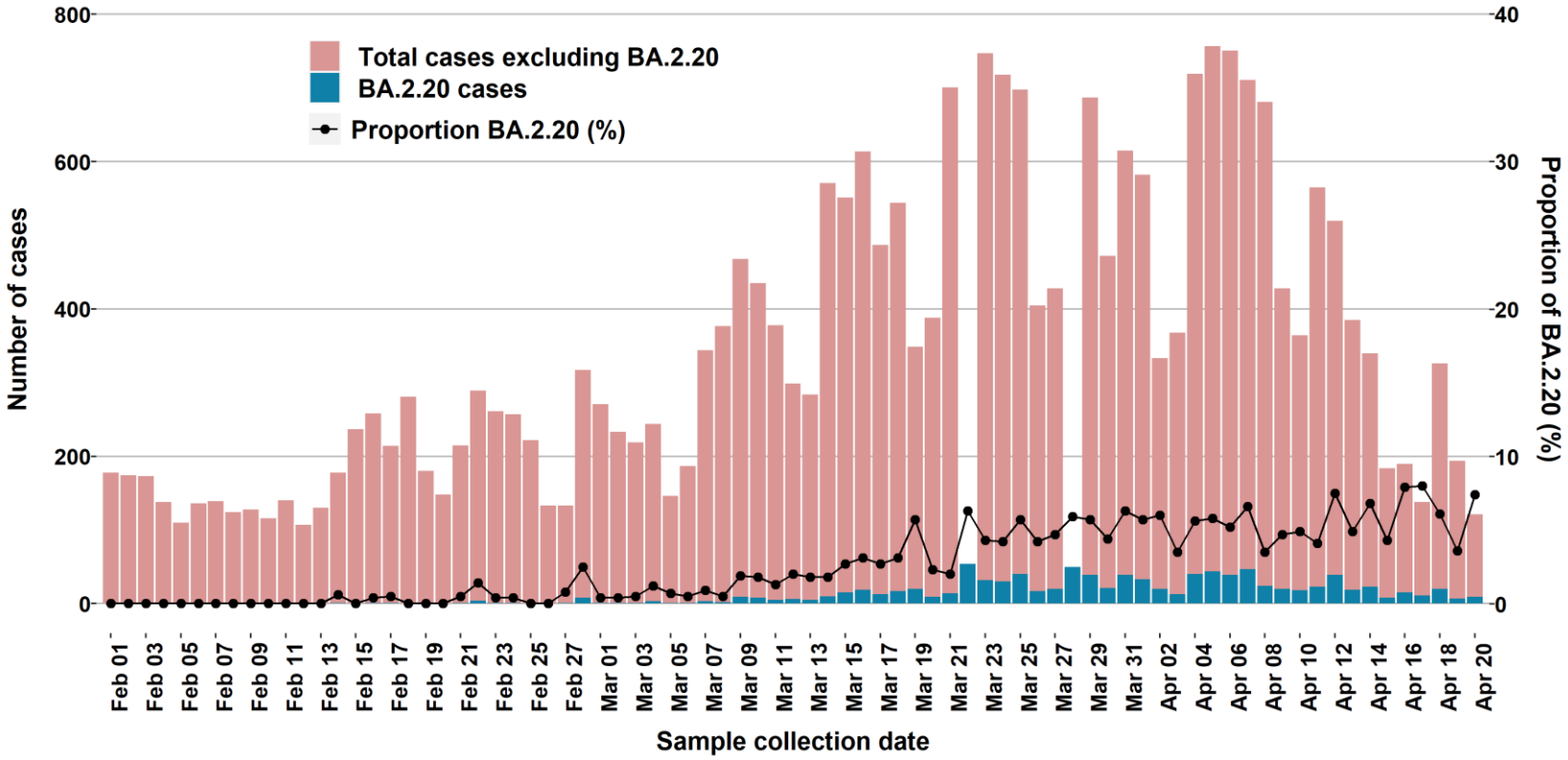
This report includes all cases sequenced by the OCGN for any reason (i.e. representative surveillance, international travel, outbreak investigation, special request, etc.). Testing eligibility is currently restricted to high-risk populations. As such, proportions are not representative of all BA.2 cases in the province.

For weekly case proportions based on representative surveillance, see the weekly SARS-CoV-2 Whole Genome Sequencing report. Please note that BA.2.20 may not be included in the weekly report as lineage assignment tools are currently being updated.

Since only a proportion of samples are sequenced, not all BA.2.20 cases in Ontario have been identified and included in this report.

Epidemic Curve

Figure 1: Number and proportion of BA.2.20 cases among all sequenced cases by sample collection date, Ontario, February 1 to April 20, 2022



Note: Results may not be representative of Ontario overall. Total cases in this figure includes all lineages except for BA.2.20. Not all BA.2.20 cases in Ontario would have been detected in this time period as only a proportion of samples are sequenced. Details on the proportion of eligible samples sequenced by the OCGN can be found in the technical notes. Not all sequencing and bioinformatics analyses for recent weeks were complete at the time of data extraction. As such, the total cases sequenced for recent weeks will increase over time.
Data source: PHO, The Hospital for Sick Children, Kingston Health Sciences Centre, Shared Hospital Laboratory, Hamilton Regional Laboratory Medicine Program

Table 1: Number of BA.2.20 and all sequenced cases, and proportion of BA.2.20 cases by week, Ontario, February 1 to April 20, 2022

Week	BA.2.20 cases	Total cases	Proportion BA.2.20
February 1 - March 26, 2022	355	16,629	2.1%
Week 13 (March 27 to April 2)	222	3,965	5.6%
Week 14 (April 3 to April 9)	227	4,415	5.1%
Week 15 (April 10 to April 16)	145	2,548	5.7%
Week 16 (April 17 to April 20*)	47	804	5.8%
Total	996	28,091	3.5%

Note: *Partial week, week 16 is from April 17 to 23.
Results may not be representative of Ontario overall. Not all BA.2.20 cases in Ontario would have been detected in this time period as only a proportion of samples are sequenced. Not all sequencing and bioinformatics analyses for recent weeks were complete at the time of data extraction. As such, the total cases sequenced for recent weeks will increase over time.
Data source: PHO, The Hospital for Sick Children, Kingston Health Sciences Centre, Shared Hospital Laboratory, Hamilton Regional Laboratory Medicine Program

Sex and Age Group

Table 2: Number and percentage (column %) of BA.2.20 cases by sex and age group, Ontario, February 1 to April 20, 2022

Sex/Age group	February 1 - March 26, 2022	Week 13 (March 27 to April 2)	Week 14 (April 3 to April 9)	Week 15 (April 10 to April 16)	Week 16 (April 17 to April 20*)	Total
Sex: Female	215 (60.6%)	120 (54.1%)	131 (57.7%)	88 (60.7%)	27 (57.4%)	581 (58.3%)
Sex: Male	137 (38.6%)	101 (45.5%)	93 (41.0%)	57 (39.3%)	19 (40.4%)	407 (40.9%)
Sex: Unknown	3 (0.8%)	1 (0.5%)	3 (1.3%)	0 (0.0%)	1 (2.1%)	8 (0.8%)
Ages: 0-4	8 (2.3%)	6 (2.7%)	6 (2.6%)	3 (2.1%)	1 (2.1%)	24 (2.4%)
Ages: 5-11	10 (2.8%)	4 (1.8%)	12 (5.3%)	1 (0.7%)	0 (0.0%)	27 (2.7%)
Ages: 12-19	28 (7.9%)	14 (6.3%)	8 (3.5%)	6 (4.1%)	1 (2.1%)	57 (5.7%)
Ages: 20-39	136 (38.3%)	95 (42.8%)	91 (40.1%)	52 (35.9%)	13 (27.7%)	387 (38.9%)
Ages: 40-59	121 (34.1%)	59 (26.6%)	69 (30.4%)	43 (29.7%)	16 (34.0%)	308 (30.9%)
Ages: 60-79	38 (10.7%)	32 (14.4%)	27 (11.9%)	23 (15.9%)	7 (14.9%)	127 (12.8%)
Ages: 80 and over	14 (3.9%)	12 (5.4%)	14 (6.2%)	17 (11.7%)	9 (19.1%)	66 (6.6%)
Total cases	355 (100%)	222 (100%)	227 (100%)	145 (100%)	47 (100%)	996 (100%)

Note: *Partial week, week 16 is from April 17 to 23.
Sex was assigned based on the sex field in CCM. If a case did not link to CCM (1.2%), or if sex was missing in CCM, sex was treated as unknown. Age was calculated based on sample collection date and birth date provided by the OCGN submitter. Birth date from CCM was used if birth date was not provided by the OCGN submitter. If birth date was missing in CCM, age was treated as unknown. If sample collection date was missing, login date was used. Results may not be representative of Ontario overall. Not all BA.2.20 cases in Ontario would have been detected in this time period as only a proportion of samples are sequenced. Not all sequencing and bioinformatics analyses for recent weeks were complete at the time of data extraction. As such, the total cases sequenced for recent weeks will increase over time.
Data source: PHO, The Hospital for Sick Children, Kingston Health Sciences Centre, Shared Hospital Laboratory, Hamilton Regional Laboratory Medicine Program, CCM

Geography

Table 3: Number and percentage (column %) of BA.2.20 cases by public health unit and week, Ontario, February 1 to April 20, 2022

Region/Public Health Unit	February 1 - March 26, 2022	Week 13 (March 27 to April 2)	Week 14 (April 3 to April 9)	Week 15 (April 10 to April 16)	Week 16 (April 17 to April 20*)	Total
Northwestern Health Unit	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Thunder Bay District Health Unit	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
TOTAL NORTH WEST	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Algoma Public Health	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
North Bay Parry Sound District Health Unit	0 (0.0%)	1 (0.5%)	0 (0.0%)	4 (2.8%)	0 (0.0%)	5 (0.5%)
Porcupine Health Unit	1 (0.3%)	0 (0.0%)	1 (0.4%)	0 (0.0%)	0 (0.0%)	2 (0.2%)
Public Health Sudbury & Districts	2 (0.6%)	0 (0.0%)	0 (0.0%)	1 (0.7%)	0 (0.0%)	3 (0.3%)
Timiskaming Health Unit	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
TOTAL NORTH EAST	3 (0.8%)	1 (0.5%)	1 (0.4%)	5 (3.4%)	0 (0.0%)	10 (1.0%)
Ottawa Public Health	3 (0.8%)	2 (0.9%)	2 (0.9%)	9 (6.2%)	14 (29.8%)	30 (3.0%)
Eastern Ontario Health Unit	0 (0.0%)	5 (2.3%)	3 (1.3%)	1 (0.7%)	1 (2.1%)	10 (1.0%)
Hastings Prince Edward Public Health	2 (0.6%)	4 (1.8%)	0 (0.0%)	3 (2.1%)	0 (0.0%)	9 (0.9%)

Region/Public Health Unit	February 1 - March 26, 2022	Week 13 (March 27 to April 2)	Week 14 (April 3 to April 9)	Week 15 (April 10 to April 16)	Week 16 (April 17 to April 20*)	Total
Kingston, Frontenac and Lennox & Addington Public Health	3 (0.8%)	5 (2.3%)	2 (0.9%)	3 (2.1%)	1 (2.1%)	14 (1.4%)
Leeds, Grenville & Lanark District Health Unit	1 (0.3%)	1 (0.5%)	1 (0.4%)	1 (0.7%)	2 (4.3%)	6 (0.6%)
Renfrew County and District Health Unit	2 (0.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (0.2%)
TOTAL EASTERN	11 (3.1%)	17 (7.7%)	8 (3.5%)	17 (11.7%)	18 (38.3%)	71 (7.1%)
Durham Region Health Department	7 (2.0%)	8 (3.6%)	8 (3.5%)	8 (5.5%)	2 (4.3%)	33 (3.3%)
Haliburton, Kawartha, Pine Ridge District Health Unit	2 (0.6%)	0 (0.0%)	2 (0.9%)	1 (0.7%)	0 (0.0%)	5 (0.5%)
Peel Public Health	20 (5.6%)	12 (5.4%)	13 (5.7%)	8 (5.5%)	2 (4.3%)	55 (5.5%)
Peterborough Public Health	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.7%)	3 (6.4%)	4 (0.4%)
Simcoe Muskoka District Health Unit	16 (4.5%)	16 (7.2%)	17 (7.5%)	7 (4.8%)	1 (2.1%)	57 (5.7%)
York Region Public Health	21 (5.9%)	16 (7.2%)	16 (7.0%)	6 (4.1%)	0 (0.0%)	59 (5.9%)
TOTAL CENTRAL EAST	66 (18.6%)	52 (23.4%)	56 (24.7%)	31 (21.4%)	8 (17.0%)	213 (21.4%)
Toronto Public Health	68 (19.2%)	47 (21.2%)	32 (14.1%)	33 (22.8%)	7 (14.9%)	187 (18.8%)
TOTAL TORONTO	68 (19.2%)	47 (21.2%)	32 (14.1%)	33 (22.8%)	7 (14.9%)	187 (18.8%)
Chatham-Kent Public Health	6 (1.7%)	3 (1.4%)	7 (3.1%)	5 (3.4%)	0 (0.0%)	21 (2.1%)

Region/Public Health Unit	February 1 - March 26, 2022	Week 13 (March 27 to April 2)	Week 14 (April 3 to April 9)	Week 15 (April 10 to April 16)	Week 16 (April 17 to April 20*)	Total
Grey Bruce Health Unit	4 (1.1%)	2 (0.9%)	5 (2.2%)	1 (0.7%)	1 (2.1%)	13 (1.3%)
Huron Perth Public Health	16 (4.5%)	4 (1.8%)	0 (0.0%)	1 (0.7%)	1 (2.1%)	22 (2.2%)
Lambton Public Health	11 (3.1%)	5 (2.3%)	5 (2.2%)	4 (2.8%)	1 (2.1%)	26 (2.6%)
Middlesex-London Health Unit	71 (20.0%)	19 (8.6%)	22 (9.7%)	14 (9.7%)	0 (0.0%)	126 (12.7%)
Southwestern Public Health	19 (5.4%)	11 (5.0%)	8 (3.5%)	2 (1.4%)	1 (2.1%)	41 (4.1%)
Windsor-Essex County Health Unit	14 (3.9%)	3 (1.4%)	4 (1.8%)	0 (0.0%)	1 (2.1%)	22 (2.2%)
TOTAL SOUTH WEST	141 (39.7%)	47 (21.2%)	51 (22.5%)	27 (18.6%)	5 (10.6%)	271 (27.2%)
Brant County Health Unit	6 (1.7%)	4 (1.8%)	11 (4.8%)	5 (3.4%)	0 (0.0%)	26 (2.6%)
City of Hamilton Public Health Services	3 (0.8%)	9 (4.1%)	33 (14.5%)	9 (6.2%)	1 (2.1%)	55 (5.5%)
Haldimand-Norfolk Health Unit	6 (1.7%)	5 (2.3%)	1 (0.4%)	0 (0.0%)	4 (8.5%)	16 (1.6%)
Halton Region Public Health	13 (3.7%)	12 (5.4%)	1 (0.4%)	5 (3.4%)	4 (8.5%)	35 (3.5%)
Niagara Region Public Health	12 (3.4%)	7 (3.2%)	14 (6.2%)	3 (2.1%)	0 (0.0%)	36 (3.6%)
Region of Waterloo Public Health and Emergency Services	12 (3.4%)	17 (7.7%)	13 (5.7%)	9 (6.2%)	0 (0.0%)	51 (5.1%)
Wellington-Dufferin-Guelph Public Health	14 (3.9%)	4 (1.8%)	6 (2.6%)	1 (0.7%)	0 (0.0%)	25 (2.5%)
TOTAL CENTRAL WEST	66 (18.6%)	58 (26.1%)	79 (34.8%)	32 (22.1%)	9 (19.1%)	244 (24.5%)

Region/Public Health Unit	February 1 - March 26, 2022	Week 13 (March 27 to April 2)	Week 14 (April 3 to April 9)	Week 15 (April 10 to April 16)	Week 16 (April 17 to April 20*)	Total
UNKNOWN	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
TOTAL ONTARIO	355 (100%)	222 (100%)	227 (100%)	145 (100%)	47 (100%)	996 (100%)

Note: *Partial week, week 16 is from April 17 to 23.
Results may not be representative of Ontario overall. Public health unit was assigned based on diagnosing health unit in CCM. If a case did not link to CCM (1.2%), OCGN patient postal code was used. Ordering provider postal code was used if patient postal code was missing. Not all BA.2.20 cases in Ontario would have been detected in this time period as only a proportion of samples are sequenced. Not all sequencing and bioinformatics analyses for recent weeks were complete at the time of data extraction. As such, the total cases sequenced for recent weeks will increase over time.
Data source: PHO, The Hospital for Sick Children, Kingston Health Sciences Centre, Shared Hospital Laboratory, Hamilton Regional Laboratory Medicine Program, CCM

Border Testing

Table 4: Number and percentage (column %) of BA.2.20 cases detected through Public Health Agency of Canada's border testing program and sequenced at Public Health Ontario, Ontario, February 1 to April 20, 2022

Cases	February 1 - March 26, 2022	Week 13 (March 27 to April 2)	Week 14 (April 3 to April 9)	Week 15 (April 10 to April 16)	Week 16 (April 17 to April 20*)	Total
Border testing	11 (3.1%)	3 (1.4%)	2 (0.9%)	3 (2.1%)	0 (0.0%)	19 (1.9%)
Non-border testing/Unknown	344 (96.9%)	219 (98.6%)	225 (99.1%)	142 (97.9%)	47 (100%)	977 (98.1%)
Total cases	355 (100%)	222 (100%)	227 (100%)	145 (100%)	47 (100%)	996 (100%)

Note: *Partial week, week 16 is from April 17 to 23.
Please refer to COVID-19 testing for travellers for more details on the border testing program led by the Public Health Agency of Canada. This does not include BA.2.20 border cases sequenced by Public Health Agency of Canada at laboratories other than PHO. Not all sequencing and bioinformatics analyses for recent weeks were complete at the time of data extraction. As such, the total cases sequenced for recent weeks will increase over time.
Data source: PHO, The Hospital for Sick Children, Kingston Health Sciences Centre, Shared Hospital Laboratory, Hamilton Regional Laboratory Medicine Program

Severity

Table 5: Number and percentage (column %) of BA.2.20 and BA.2 cases by severity, Ontario, February 1 to April 20, 2022

Severity	BA.2.20 cases	BA.2 cases excluding BA.2.20
Ever hospitalized	30 (3.0%)	474 (3.1%)
Deceased	0 (0.0%)	39 (0.3%)
Total cases	984 (100%)	15,261 (100%)

Note: Results may not be representative of Ontario overall. BA.2 cases include all BA.2 sub-lineages except for BA.2.20. Cases include only those that linked to CCM (98.8% and 97.0% respectively for BA.2.20 and BA.2 cases). Hospitalized cases include cases that reported hospitalization at time of data extraction. Deceased cases include cases that reported a "Fatal" outcome and the type of death value in CCM was not 'DOPHS was unrelated to cause of death' or 'Under PHU Review' at the time of data extraction. Not all BA.2.20 and BA.2 cases in Ontario would have been detected in this time period as only a proportion of samples are sequenced. Not all sequencing and bioinformatics analyses for recent weeks were complete at the time of data extraction. As such, the total cases sequenced for recent weeks will increase over time.
Data source: PHO, The Hospital for Sick Children, Kingston Health Sciences Centre, Shared Hospital Laboratory, Hamilton Regional Laboratory Medicine Program, CCM

Vaccination status

Table 6: Number and percentage (column %) of BA.2.20 and BA.2 cases by vaccination status, Ontario, February 1 to April 20, 2022

Vaccination status	BA.2.20 cases	BA.2 cases excluding BA.2.20
Unvaccinated	118 (12.0%)	2,213 (14.5%)
Post-series initiation	5 (0.5%)	267 (1.8%)
Post-series completion	226 (23.0%)	3,685 (24.2%)
Post-booster dose	610 (62.0%)	8,705 (57.1%)
Post-two booster doses	25 (2.5%)	386 (2.5%)
Total cases	984 (100%)	15,256 (100%)

Note: BA.2 cases include all BA.2 sub-lineages except for BA.2.20. Cases include only those that linked to CCM (98.8% and 97.0% respectively for BA.2.20 and BA.2). Individuals with a vaccine not approved by Health Canada were excluded. Vaccine category definitions can be found in the Confirmed Cases of COVID-19 Following Vaccination in Ontario report. A higher proportion of cases reported in post-series completion cases is a reflection of both trends in vaccine administration (increasing number of doses administered over time) and trends in COVID-19 incidence. Not all BA.2.20 and BA.2 cases in Ontario would have been detected in this time period as only a proportion of samples are sequenced. Not all sequencing and bioinformatics analyses for recent weeks were complete at the time of data extraction. As such, the total cases sequenced for recent weeks will increase over time.
Data source: PHO, The Hospital for Sick Children, Kingston Health Sciences Centre, Shared Hospital Laboratory, Hamilton Regional Laboratory Medicine Program, CCM, COVaxON

Technical Notes

Data Sources

Public Health Ontario (PHO)

- Data were extracted from the PHO Laboratory Information Management System on April 28, 2022 at approximately 2:00 a.m.
- Data were extracted from the PHO SARS-CoV-2 Whole Genome Sequencing Database on April 28, 2022 at approximately 9:00 a.m.
- List of BA.2 samples with the N148T mutation were received on April 29 at approximately 5:00pm

The Hospital for Sick Children (HSC)

- Data were received by PHO on April 27, 2022 at approximately 4:30 p.m.
- List of BA.2 samples with the N148T mutation were received on April 28 at approximately 4:45pm

Kingston Health Sciences Centre (KHSC)

- Data were received by PHO on May 2, 2022 at approximately 12:15 p.m.
- List of BA.2 samples with the N148T mutation were received on April 28 at approximately 11:00am

Shared Hospital Laboratory (SHL)

- Data were received by PHO on April 27, 2022 at approximately 4:00 p.m.
- List of BA.2 samples with the N148T mutation were received on April 29 at approximately 1:30pm

Hamilton Regional Laboratory Medicine Program (HRLMP)

- Data were received by PHO on April 27, 2022 at approximately 10:40 p.m.
- List of BA.2 samples with the N148T mutation were received on May 2 at approximately 2:00pm

Public Health Case and Contact Management Solution (CCM)

- Data were extracted from the Public Health Case and Contact Management Solution on April 25, 2022 at approximately 1:00 p.m.

Ontario Ministry of Health's COVaxON application (COVaxON)

- COVID-19 vaccination data were based on information successfully extracted from the Ontario Ministry of Health's COVaxON application as of April 25, 2022 at approximately 7:00 a.m.
- COVaxON data was linked to COVID-19 case data from CCM.

Ontario SARS-CoV-2 Whole Genome Sequencing Strategy

- As of May 2, 2021, Ontario has implemented a strategy of representative surveillance for whole genome sequencing (WGS) of SARS-CoV-2 samples. A proportion of eligible provincial samples are sequenced at one of five Ontario COVID Genomics Network (OCGN) sequencing laboratories. To optimize use of WGS capacity relative to case counts, OCGN switched from sequencing 5% to 20% on February 16; 50% on March 9; 25% on March 30; and 10% on April 13, 2022.

- Targeted sequencing is performed on SARS-CoV-2 samples with a recent history of international travel (including border testing), deceased individuals, and when requested (e.g. outbreak investigations).

Data Caveats and Methods: Ontario COVID-19 Genomics Network (OCGN)

- Lineage nomenclature is dynamic. Pango lineage naming and assignment may change as more samples are sequenced and analyzed globally.

- Data submitted to PHO from OCGN laboratories have not been independently verified.

- The dates associated with samples submitted by network laboratories vary due to sample logistics and different laboratory information systems. Dates associated with WGS samples were assigned based on a hierarchy: sample collection date > SARS-CoV-2 diagnostic received date > SARS-CoV-2 diagnostic reported date > VOC PCR received date > VOC PCR reported date > WGS received date > WGS reported date.

- Samples from the same case were linked if they had the same health card number or if they had the same first name, last name, and date of birth. If more than one sample was sequenced for a case, the most recent sample was used. This may shift a case to a more recent week if a subsequent sample was sequenced from the same case. A small proportion of cases may have samples that were not linked due to inconsistencies or data entry errors.

- Results for recent weeks are incomplete as not all sequencing and bioinformatics analyses were complete at the time of data extraction.

- Public health unit was assigned using diagnosing health unit in CCM. If the case did not link to CCM (1.2% and 3.0% respectively of BA.2.20 and BA.2 cases), then public health unit was assigned using OCGN patient postal code or ordering provider postal code if patient postal code was missing.

Data Caveats and Methods: Public Health Case and Contact Management Solution (CCM)

- CCM is a dynamic disease reporting system, which allows for 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 other PHO products.

- Methods for processing the CCM case data are described in the Technical Notes of the COVID-19 Daily Epidemiological Summary.
- Data corrections or updates can result in case records being removed and/or updated from past reports.
- Cases were linked to CCM if they had the same health card number or if they had the same first name, last name, and date of birth. Cases may not have linked to CCM due to discrepancies in patient identifiers or if they were not residents of Ontario (diagnosing health unit was reported as MOH).
- Tables for severity and vaccination status only include cases that linked to CCM (98.8% and 97.0% respectively of BA.2.20 and BA.2 cases).
- Data on hospital admissions and deaths are likely under-reported as these events may occur after the completion of public health follow up of cases. Cases that were admitted to hospital or died after follow-up was completed may not be captured in CCM.
- Hospitalization includes all cases hospitalized (or that had their hospital stay extended) because of COVID-19. It includes cases that have been discharged from hospital as well as cases that are currently hospitalized. Includes Intensive Care Unit (ICU) cases but not emergency room visits. Hospitalizations were identified by a reported hospital admission date or reported 'Yes' for hospitalization/ICU.
- For surveillance purposes, a COVID-19 death is defined as a death resulting from a clinically compatible illness unless there is a clear alternative cause of death that cannot be related to COVID-19 (e.g., trauma, medically assisted death). There should be no period of complete recovery from COVID-19 between illness and reported death.
- Deaths are determined by using the outcome and Type of Death fields in CCM. COVID-19 deaths are counted where the Outcome value is 'Fatal' and the Type of Death value is not 'DOPHS was unrelated to cause of death' or 'Under PHU Review'.

Data Caveats and Methods: COVaxON

- In order to identify cases post-vaccination, vaccine uptake data extracted from the Ontario Ministry of Health's (MOH) COVaxON application was linked to case data extracted from the MOH's Public Health Case and Contact Management Solution (CCM).
    - Clients in COVaxON and CCM were linked using health card number as well as other personal identifiers, including name, date of birth, gender, and postal code.
- Linkage was done using processed COVaxON and CCM data. Methods for processing COVaxON vaccine uptake data are described in the Technical Notes of the COVID-19 Vaccine Uptake Report and methods for processing post-vaccination cases are described in the Technical Notes of the Confirmed Cases of COVID-19 Post Vaccination Report.

- Only cases that have received Health Canada authorized vaccines including, Pfizer-BioNTech Comirnaty™, Moderna Spikevax™, AstraZeneca Vaxzevria™/COVISHIELD, and Janssen are included. Cases that received one or more doses of a non-Health Canada authorized vaccine are excluded.
- A higher proportion of cases reported in post-series completion is a reflection of both trends in vaccine administration (increasing number of doses administered over time) and trends in COVID-19 incidence. Further details on vaccine administration trends in Ontario are described in the COVID-19 Vaccine Uptake Report.
- For vaccine category definitions, please refer to Confirmed Cases of COVID-19 Following Vaccination in Ontario.

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