

Ontario Agency for Health Protection and Promotion (OAHPP): Laboratory Pandemic Influenza Surveillance Report

Information current as of: Monday March 29, 2010

This report summarizes patient specimens (1 specimen/patient) collected and received at the Ontario Agency for Health Protection and Promotion (OAHPP) public health laboratories (PHL) in Ontario for influenza virus testing since September 1, 2009. This information is current as of Monday March 29, 2010 and is updated weekly. Note that influenza A positivity rates are only reported for influenza A tests performed at the OAHPP Public Health Laboratories.

This report uses the specimen collection date to classify the specimens submitted. The PHL performs the majority of subtype testing; however, several hospital laboratories also perform subtyping. Therefore, the numbers reported here may not reconcile precisely with those reported through the integrated Public Health Information System (iPHIS) since results from hospital laboratories may be entered into iPHIS without being entered into the PHL database.

SUREVILLANCE SUMMARY

Pandemic influenza (pH1N1) is virtually absent in Ontario with the most recent pH1N1 positive sample collected on March 25, 2010. The most recent influenza B sample was also identified on March 25, 2010. The predominant circulating respiratory virus continues to be respiratory syncytial virus (RSV).

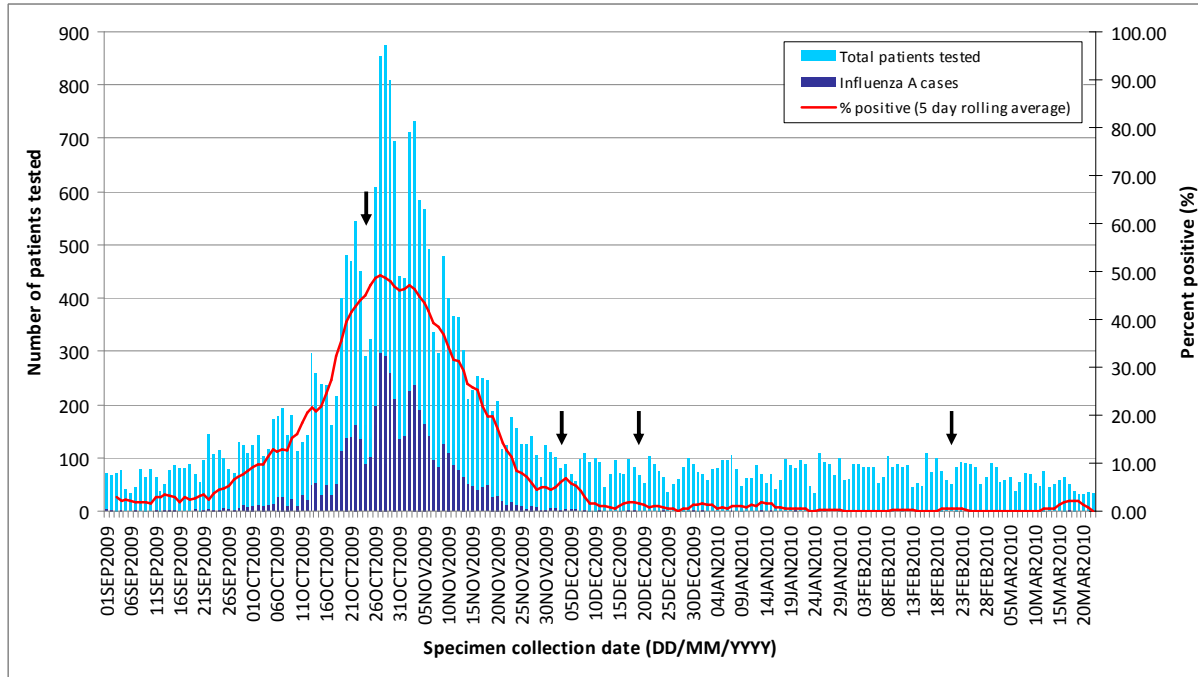
PLEASE NOTE DUE TO A TECHNICAL CHANGE ON MARCH 12, 2010 THE RESULTS PRESENTED IN THIS WEEK'S REPORT MAY DIFFER FROM PREVIOUS REPORTS.

Case statistics:

Between September 1, 2009 and March 29, 2010, a total of 25,557 patient specimens and isolates (1/patient) have been submitted for influenza testing and subtyping at the PHL and entered into the PHL electronic system. Of those, 24,802 specimens and isolates have been tested for influenza A at the PHL, of which 5,037 (20.3%) were positive for Influenza A; an additional 487 patient specimens that tested positive for influenza A at hospital laboratories were forwarded to the PHL for subtyping. Four cases of seasonal influenza (H3) have been detected in Weeks 36, 37, 52 and Week 1, 2010. No seasonal influenza A H1 has been detected. Eight cases of influenza B have been detected: one each in Weeks 40, 44, 45 of 2009 and Weeks 10 and 11 of 2010, and two in Week 9, 2010.

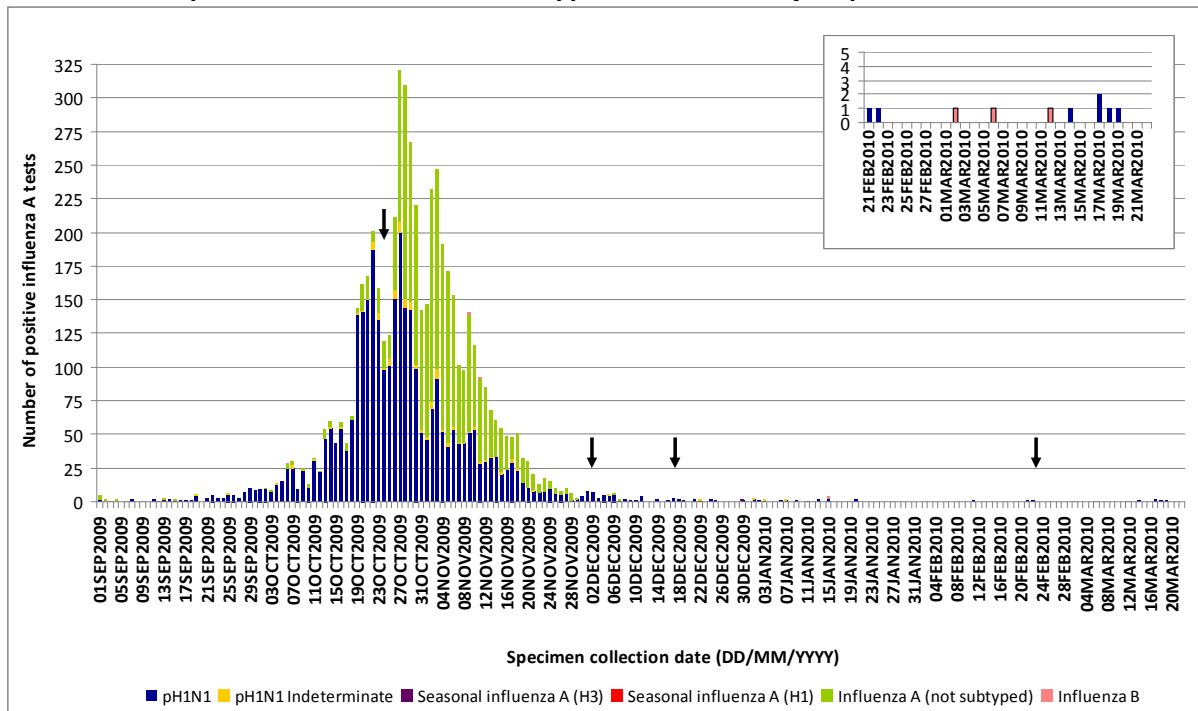
Please refer to **Appendix 1** for further information on lab testing algorithms and interpreting subtyping results.

Figure 1. Total number of influenza A tests conducted, the number of influenza A positive cases and the percent positive (5 day rolling average), September 1, 2009 – March 22, 2010**.



Source: The Ontario Agency for Health Protection and Promotion (OAHPP) public health laboratories.

Figure 2. The number of positive influenza A test results by subtype (pH1N1, seasonal H1/H3, indeterminate pH1N1 Influenza A - not subtyped & influenza B), September 1, 2009 – March 22, 2010**.



Source: The Ontario Agency for Health Protection and Promotion (OAHPP) public health laboratories.

For 1,389 specimens, no specimen collection date was available; the date the specimen was received at the lab has been used as a proxy. **Data collected since March 22, 2010 has been excluded from Figures 1 and 2. Since not all specimens collected on those dates have test results available, the data from those days may not reflect the current situation. ↓ **Modification to testing algorithm**

Resistance testing

A proportion of isolates undergo oseltamivir susceptibility testing, specifically looking for a nucleotide mutation at position 275 for tyrosine (H275Y) in the neuraminidase gene, which confers resistance.

Table 1: PHL oseltamivir susceptibility testing results since September 1, 2009.

| Isolate tested | Total tested | Total Positive (%) | Total number of patients | Collection date of first resistant isolate |
|-----------------------------|--------------|--------------------|--------------------------|--|
| Pandemic Influenza A (H1N1) | 766 | 15 (2.0) | 5 | 1 Week 30 1 Week 36 2 Week 45 1 Week 49 |

Source: The Ontario Agency for Health Protection and Promotion (OAHP) public health laboratories.

Nationally oseltamivir, amantadine and zanamivir susceptibility testing is conducted at the National Microbiology Laboratory (NML).

Table 2: NML susceptibility assay results for influenza isolates in Canada from September 1, 2009 – March 30, 2010

| Isolates tested | Isolates tested for Oseltamivir susceptibility | Isolates resistant to Oseltamivir (%) | Isolates tested for Amantadine susceptibility | Isolates resistant to Amantadine (%) | Isolates tested for Zanamivir susceptibility | Isolates resistant to Zanamivir (%) |
|-----------------------------|--|---------------------------------------|---|--------------------------------------|--|-------------------------------------|
| Seasonal Influenza A (H1N1) | 6 | 6(100) | 5 | 1 (20) | 2 | 0 (0) |
| Influenza A (H3N2) | 13 | 0 (0) | 24 | 24(100) | 13 | 0 (0) |
| Influenza B | 4 | 0 (0) | n/a | n/a | 4 | 0 (0) |
| Pandemic Influenza A (H1N1) | 1068 | 12 (1.12) | 1123 | 1123 (100) | 1046 | 0 (0) |

Source: Influenza and Respiratory Viruses Section, National Microbial Laboratory, Public Health Agency of Canada.

Table 3: NML strain characterization of isolates from Ontario and Canada from September 1, 2009 to March 31, 2010.

| Strain | Positive isolates, Ontario | Positive isolates, Canada |
|------------------------------------|----------------------------|---------------------------|
| Seasonal Influenza A (H1N1) | | |
| A/Brisbane/59/2007-like | 0 | 3 |
| Seasonal Influenza A (H3N2) | | |
| A/Brisbane/10/2007 – like | 0 | 2 |
| A/Perth/16/2009 – like | 0 | 8 |
| Seasonal Influenza B | | |
| B/Brisbane/60/2008 – like | 2 | 2 |
| B/Florida/04/2006 –like | 0 | 1 |
| B/Malaysia/2506/2004 – like | 1 | 1 |
| Pandemic Influenza A (H1N1) | | |
| A/California/07/2009 – like | 295 | 843 |

Source: Influenza and Respiratory Viruses Section, National Microbial Laboratory, Public Health Agency of Canada.

Note:

Pandemic (2009) H1N1 vaccine component: A/California/07/2009

Seasonal influenza vaccine for 2009/2010: A/Brisbane/59/07-like (H1N1 component),

A/Brisbane/10/2007-like (H3N2 component), B/Brisbane/60/2008-like (influenza B component)

For the season to date, the vast majority of circulating influenza was the pH1N1 strain. However, of the seasonal influenza strains that circulated in Canada, most of the H3N2 subtype has drifted from the 2009/10 H3N2 vaccine component.

Spotlight on Current Research at the OAHPP Public Health Laboratories:

Mutations in position 222 in the haemagglutinin (HA) protein of pandemic H1N1 2009 have been observed in many countries around the world including the United States and many parts of Europe. The D222G substitution is a single nucleotide change, which results in an amino acid change in the HA protein. This mutation may confer a higher affinity for receptors located deeper in the respiratory tract, leading to an increase in the severity of illness. In addition to the D222G substitution, other substitutions at the 222 position have been observed, including D222E and D222N.

Currently the Toronto Public Health Laboratory at the OAHPP is conducting D222G/E/N mutation testing on viral isolates to determine the frequency of mutation at the D222 position in Ontario. Testing has been conducted on 228 and 217 H1N1 positive samples from both the first and second wave respectively. To date 15.2% of samples from the second wave contained the D222E mutation, and none of the samples from the first wave contained a mutation. No D222G or N mutations have been identified. Currently there is no evidence that D222E is associated with an increase in severe disease.

More information on D222G/E/N mutations can be found at:

<http://www.recombinomics.com>

http://www.who.int/csr/resources/publications/swineflu/cp165_2009_2812_review_d222g_amino_acid_substitution_in_ha_h1n1_viruses.pdf

*****Due to low submissions, results from the Vaccine Effective (VE) Study will be included in a future laboratory report.*****

Additional information on the VE study can be found at <http://www.oahpp.ca/vestudy/index.php>

Ontario Public Health Units

At the PHL, a patient is sorted into a public health unit (PHU) based on their place of residence. If this information is not available, the address of the physician who submitted the sample is used to classify patients into PHUs. As a result, influenza A cases may not necessarily be residents of the PHU in which they have been classified.

Table 4. Number of influenza specimens submitted for testing, pH1N1 and influenza A cases, percent positive and submission rate and cumulative influenza A cases (/100,000) by PHU. Cumulative numbers from Sept. 1, 2009- Mar.29, 2010 (Specimens collected: March 21-27, 2010 (**Week 12*****) are in displayed in brackets, **if no bracket value is 0**)

| Public Health Unit | Total number of specimens submitted | Submission rate (/100,000) | Number of lab confirmed cases of pH1N1 | Number of lab confirmed Influenza A cases | Number of laboratory Influenza A tests completed | Percent positive (%) influenza A** | Cumulative influenza A cases rate (/100,000) |
|---|-------------------------------------|----------------------------|--|---|--|------------------------------------|--|
| Algoma District | 431(8) | 370.7(6.9) | 51 | 103 | 427(5) | 24.1 | 88.6 |
| Brant County | 302(9) | 241.3(7.2) | 28 | 50 | 298(8) | 16.8 | 40.0 |
| Chatham-Kent | 249(1) | 229.3(0.9) | 33 | 62 | 248 | 25.0 | 57.1 |
| City of Hamilton | 666(6) | 132.0(1.2) | 265 | 136 | 492(2) | 27.6 | 27.0 |
| City of Ottawa | 118 | 14.5 | 18 | 27 | 118 | 22.9 | 3.3 |
| City of Toronto | 4,995(57) | 199.5(2.3) | 371 | 673 | 4,894(25) | 13.8 | 26.9 |
| Durham Regional | 867(11) | 154.5(2.0) | 122 | 208 | 854(5) | 24.4 | 37.1 |
| Eastern Ontario | 396(1) | 207.8(0.5) | 99 | 118 | 391(1) | 30.2 | 61.9 |
| Elgin-St. Thomas | 160(2) | 187.5(2.3) | 19 | 40 | 156 | 25.6 | 46.9 |
| Grey Bruce | 517(5) | 327.7(3.2) | 36 | 113 | 509(1) | 22.2 | 71.6 |
| Haldimand-Norfolk | 179(2) | 166.1(1.9) | 36 | 50 | 169(1) | 29.6 | 46.4 |
| Haliburton-Kawartha-Pine Ridge District | 377(5) | 219.6(2.9) | 43 | 70 | 368(2) | 19.0 | 40.8 |
| Halton Regional | 1,154(15) | 262.7(3.4) | 138 | 197 | 1,091(5) | 18.1 | 44.8 |
| Hastings & Prince Edward Counties | 429(4) | 275.1(2.6) | 91 | 81 | 397(3) | 20.4 | 51.9 |
| Huron County | 165(2) | 278.1(3.4) | 24 | 48 | 163(2) | 29.4 | 80.9 |
| Kingston-Frontenac and Lennox & Addington | 558(2) | 302.6(1.1) | 133 | 133 | 541(2) | 24.6 | 72.1 |
| Lambton | 265(1) | 206.7(0.8) | 35 | 53 | 265(1) | 20.0 | 41.3 |
| Leeds-Grenville and Lanark District | 222 | 136.2 | 49 | 63 | 216 | 29.2 | 38.7 |
| Middlesex-London | 335(3) | 79.3(0.7) | 142 | 104 | 274 | 38.0 | 24.6 |
| Niagara Regional Area | 956(12) | 223.7(2.8) | 128 | 213 | 932(4) | 22.9 | 49.8 |
| North Bay Parry Sound District | 370(2) | 301.2(1.6) | 44 | 75 | 363 | 20.7 | 61.1 |
| Northwestern | 414(4) | 514.1(5.0) | 70 | 127 | 410(1) | 31.0 | 157.7 |
| Oxford County | 165(1) | 160.6(1.0) | 29 | 48 | 164 | 29.3 | 46.7 |
| Peel Regional | 3,334(45) | 287.6(3.9) | 252 | 436 | 3,277(37) | 13.3 | 37.6 |
| Perth District | 272(8) | 365.9(10.8) | 30 | 43 | 269(7) | 16.0 | 57.8 |
| Peterborough County-City | 318(3) | 239.0(2.3) | 45 | 84 | 318(3) | 26.4 | 63.1 |
| Porcupine | 620(6) | 736.7(7.1) | 178 | 236 | 617(6) | 38.2 | 280.4 |
| Renfrew County & District | 88(1) | 88.6(1.0) | 15 | 27 | 87(1) | 31.0 | 27.2 |
| Simcoe Muskoka District | 1,753(19) | 365.4(4.0) | 150 | 253 | 1,679(12) | 15.1 | 52.7 |

| Public Health Unit | Total number of specimens submitted | Submission rate (/100,000) | Number of lab confirmed cases of pH1N1 | Number of lab confirmed Influenza A cases | Number of laboratory Influenza A tests completed | Percent positive (%) influenza A** | Cumulative influenza A cases rate (/100,000) |
|-------------------------------|-------------------------------------|----------------------------|--|---|--|------------------------------------|--|
| Sudbury & District | 452(10) | 234.9(5.2) | 55 | 124(1) | 448(7) | 27.7(14.3) | 64.5 |
| Thunder Bay District | 555(7) | 360.2(4.5) | 87 | 157 | 551(4) | 28.5 | 101.9 |
| Timiskaming | 114 | 333.2 | 34 | 44 | 114 | 38.6 | 128.6 |
| Waterloo | 625(14) | 130.7(2.9) | 78 | 127 | 608(7) | 20.9 | 26.6 |
| Wellington-Dufferin-Guelph | 541(14) | 212.3(5.5) | 43 | 85 | 531(10) | 16.0 | 33.4 |
| Windsor-Essex County | 890(1) | 226.2(0.3) | 117 | 324 | 888 | 36.5 | 82.4 |
| York Regional | 1,607(24) | 180.0(2.7) | 133 | 280 | 1,578(15) | 17.7 | 31.4 |
| Out of Province/Not Available | 98(2) | N/A | 17 | 25 | 97(2) | 25.8 | N/A |
| Grand Total | 25,557(307) | 210.2(2.5) | 3,238(0) | 5,037(1) | 24,802(179) | 20.3(0.56) | 41.4 |

Source: The Ontario Agency for Health Protection and Promotion (OAHPP) public health laboratories.

*** Because of the lag in time from the date the specimen was collected to the date the final test result is confirmed, not all cases with specimens collected during the most recent week are included in this summary.

**Percent positive influenza A is calculated based on the number of specimens where testing has been completed. This may not equal the number of specimens submitted for testing.

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Appendix 1

Changes to Testing Algorithm:

| Date | Change |
|---------------------|--|
| February 22, 2010 | All limitations on ambulatory (community) viral culture requests and influenza A subtyping have been removed. |
| December 17, 2009 | Viral culture testing was increased to all ambulatory samples and a minimum of 20% of influenza A negative RT-PCR tests. Viral culture testing increases as resources allowed. |
| December 2, 2009 | Subtyping was increased as resources allow. |
| November 9-12, 2009 | Only 20% of ambulatory (community) viral culture requests were being processed. |
| October 25-31, 2009 | Subtyping was performed on all intensive care samples, outbreak samples and on 20% of all additional influenza A positive tests. |

For additional details on modifications to the testing algorithm, please view the November Lababstract at www.oahpp.ca/resources/lababstracts.html

Interpretation of subtyping results:

- **Indeterminate:** a RT-PCR test reflects a very low level of the target (e.g. influenza, or influenza subtype). Due to the level of target being near the threshold of detection it is not known if this is a true positive result, or nonspecific activity giving a false positive response.
- **Untypeable:** occurs when an influenza A is detected, but the sample does not match any of the subtypes that can be tested for (e.g. pH1N1, seasonal H3N2, H1N1).
- **Unable to subtype:** occurs when an influenza A positive sample has a very low amount of virus and the subtype cannot be detected.

A reference calendar of epidemiological weeks can be found at <http://www.phac-aspc.gc.ca/fluwatch/09-10/09-10cal-eng.php>

This report and past versions are available on our website and can be viewed at anytime at <http://oahpp.ca/h1n1>