Increasing Influenza Activity in BC with Co-circulation of Influenza A and B

In weeks 1-2 (January 3 to 16, 2016), surveillance indicators suggest increasing influenza activity in BC, with a mix of influenza B, A(H3N2) and A(H1N1)pdm09 co-circulating.

At the BCCDC Public Health Laboratory, influenza positivity increased from 18% in week 1 to 30% in week 2. As seen in other recent weeks, influenza B viruses comprised an increasing proportion of influenza detections (60% in weeks 1-2), with B/Victoria lineage viruses predominating over B/Yamagata lineage viruses at a ratio of 3:1 so far this season.

Since our last bulletin two weeks ago, one new lab-confirmed influenza A outbreak was reported in a long-term care facility in FHA, bringing the cumulative seasonal tally (since mid-August) to 14 influenza facility outbreaks.

This week, Canadian researchers published a genomic analysis of influenza A(H3N2) viruses describing how mutations acquired during growth of the viruses in cell culture in laboratories may affect analysis of antigenic relatedness (i.e. vaccine match) by haemagglutination inhibition assay, available from (open access):

www.eurosurveillance.org/ViewArticle.aspx?ArticleId=21355

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Report Disseminated: January 21, 2016
British Columbia

Sentinel Physicians

In weeks 1-2, the proportion of patients with influenza-like illness (ILI) among those presenting to sentinel sites rose to 0.60% in week 1 and dropped to 0.33% in week 2. Rates were within 10-year historical levels in week 1, and then fell below expected historical levels for week 2. So far, 69% and 51% of sentinel sites have reported for weeks 1 and 2, respectively.

**Percent of patient visits to sentinel physicians due to influenza-like illness (ILI) compared to historical average, British Columbia, 2015-16**

BC Children’s Hospital Emergency Room

In weeks 1-2, the proportion of visits to BC Children’s Hospital Emergency Room (ER) attributed to ILI was stable around 17-18% and remained within 5-year historical average levels.

**Percent of patients presenting to BC Children’s Hospital ER attributed to influenza-like illness (ILI), British Columbia, 2015-16**

*Source: BCCH Admitting, Discharge, Transfer database (ADT). Data includes records with a triage chief complaint of "flu" or "influenza" or "fever/cough."

* 5-year historical average for 2015-16 season based on 2010-11 to 2014-15 seasons; CI=confidence interval
Medical Services Plan

In weeks 1-2, BC Medical Services Plan (MSP) general practitioner claims for influenza illness (II), as a proportion of all submitted MSP claims, showed a slight increasing trend, notably in FHA and VCHA, but remained at or below 10-year median levels in all regions across the province.

Service claims submitted to MSP for influenza illness (II)* as a proportion of all submitted general practitioner service claims, British Columbia, 2015-16

* Influenza illness is tracked as the percentage of all submitted MSP general practitioner claims with ICD-9 code 487 (influenza).

Data for the period August 1, 2009 to July 31, 2010 have been excluded from the 10-year median calculation due to atypical seasonality during the 2009/2010 H1N1 pandemic year. MSP week beginning August 1, 2015 corresponds to sentinel ILI week 30; data are current to January 19, 2016.

Data provided by Population Health Surveillance and Epidemiology, BC Ministry of Health Services.

Explanatory note (January 21, 2016): The gap in the historical data on the MSP graphs represents missing data for February 29, due to the leap year in 2016. The BC Ministry of Health is working to resolve this issue.
Laboratory Reports
BCCDC Public Health Laboratory

In weeks 1-2, 608 patients were tested for respiratory viruses at the BCCDC Public Health Laboratory. Of these, 144 (24%) tested positive for influenza, including 57 (40%) influenza A [10 A(H3N2), 5 A(H1N1)pdm09, and 42 subtype pending], 86 (60%) influenza B and one adult patient with an A(H1N1)pdm09 and influenza B co-infection. Influenza positivity increased from 18% in week 1 to 30% in week 2. As seen in other recent weeks, influenza B detections continued to outnumber influenza A detections in weeks 1-2 at a ratio of 1.5:1.

Cumulatively since week 40 (starting October 4, 2015), 338 patients have tested positive for influenza at the BCCDC Public Health Laboratory, including 179 (53%) with influenza A [111 A(H3N2), 26 A(H1N1)pdm09 and 42 subtype pending], 158 (47%) with influenza B, and one patient with an A(H1N1)pdm09 and influenza B co-infection. So far during the 2015-16 season, influenza A(H3N2) viruses have predominated, comprising more than two-thirds of influenza detections with known type/subtype until week 48. However, in recent weeks, an increasing proportion of influenza B viruses has been detected (comprising 60% of influenza detections in weeks 1-2), with influenza B/Victoria lineage viruses predominating over B/Yamagata lineage viruses at a ratio of 3:1 so far this season. An increasing number of A(H1N1)pdm09 viruses have also been detected since week 51.

Just over one-third of influenza detections so far during the 2015-16 season have been in elderly adults aged ≥65 years, driven by the predominance of A(H3N2) activity earlier this season. However, in recent weeks, a greater proportion of detections has been in younger, working-aged adults 20-64 years (representing 45% of influenza detections so far this season) and to a lesser extent children <20 years (20% of detections), due to increased circulation of A(H1N1)pdm09 and influenza B viruses.

Influenza and other virus detections among respiratory specimens submitted to BCCDC Public Health Laboratory, 2015-16

Data are current to January 19, 2016.
Cumulative number (since week 40) of influenza detections by type/subtype and age group, BCCDC Public Health Laboratory, 2015-16

Data are current to January 19, 2016; figure includes cumulative influenza detections for specimens collected from weeks 40-2.

Age distribution of influenza detections (cumulative since week 40) by type/subtype, BCCDC Public Health Laboratory, 2015-16

Data are current to January 19, 2016; figure includes cumulative influenza detections for specimens collected from weeks 40-2.
BC Children’s and Women's Health Centre Laboratory

In weeks 1-2, the BC Children’s and Women's Health Centre Laboratory conducted 160 tests for influenza; 6 (4%) were positive for influenza A, and 12 (8%) were positive for influenza B. The proportion of tests positive for respiratory syncytial virus (RSV) remained elevated at 19-21% in weeks 1-2. Human Metapneumovirus was also commonly detected over this period.

* Positive rates were calculated using aggregate data. The denominators for each rate represent the total number of tests; multiple tests may be performed for a single specimen and/or patient.
Influenza-like Illness (ILI) Outbreaks

Since our last bulletin two weeks ago, one new lab-confirmed influenza A (subtype pending) outbreak was reported in a long-term care facility (LTCF) in FHA with onset in week 3. Four new ILI outbreaks were reported from schools in IHA: one in week 1, two in week 2, and one in week 3.

In total since mid-August (since week 32, starting August 9, 2015), 14 influenza outbreaks [11 A(H3N2), 1 A subtype pending and 2 influenza B] have been reported from facilities, including 13 from LTCFs and one from an acute care facility. Six school ILI outbreaks have been reported so far this season.

Updated AMMI Guidelines: LTCF Outbreak Control

In December 2015, the Association of Medical Microbiology and Infectious Disease (AMMI) Canada posted updated recommendations for influenza antiviral drug treatment and prophylaxis for the 2015-16 season, notably in relation to control of influenza outbreaks in long-term care facilities, available from www.ammi.ca/guidelines.
FluWatch (week 1, January 3 to 9, 2016):

Overall, in week 1, seasonal influenza activity increased in Canada. Laboratory detections of influenza increased but remain below expected levels for this time of the year. The percent of tests positive for influenza increased from 4% in week 52 to 6% in week 1 (compared to the expected range of 14-33% based on the previous five seasons). There was an increase in the number of laboratory detections and hospitalizations associated with influenza A(H1N1)pdm09. To date, the majority of influenza laboratory detections and hospitalizations have been in seniors greater than 65 years of age; however, an increasing proportion of detections are in adults aged 20-44 years, representing 27% of A(H1N1)pdm09 cases and 24% of influenza B cases. Details are available at: healthycanadians.gc.ca/diseases-conditions-maladies-affections/disease-maladie/flu-grippe/surveillance/fluwatch-reports-rapports-surveillance-influenza-eng.php.

National Microbiology Laboratory (NML): Strain Characterization

From September 1, 2015 to January 21, 2016, the National Microbiology Laboratory (NML) received 184 influenza viruses [95 A(H3N2), 55 A(H1N1)pdm09 and 34 B] from Canadian laboratories for antigenic characterization.

Influenza A(H3N2): Of the 95 influenza A(H3N2) viruses, only 12 (13%) had sufficient hemagglutination titre for antigenic characterization by hemagglutination inhibition (HI) assay. Of the 12 viruses characterized by HI assay, all were considered antigenically similar to a cell-passaged A/Switzerland/9715293/2013-like virus, the WHO-recommended A(H3N2) component for the 2015-16 northern hemisphere influenza vaccine. Genetic characterization was performed to infer antigenic properties on the remaining 83 viruses that did not grow to sufficient titre for HI assay. Of the 83 A(H3N2) viruses genetically characterized, all were reported to belong to a genetic group in which most viruses were antigenically related to A/Switzerland/9715293/2013.

Influenza A(H1N1)pdm09: The 55 A(H1N1)pdm09 viruses characterized were antigenically similar to an A/California/7/2009-like virus, the WHO-recommended A(H1N1) component for the 2015-16 northern hemisphere influenza vaccine.

Influenza B: Of the 34 influenza B viruses characterized, 22 (65%) were antigenically similar to a B/Phuket/3073/2013-like (Yamagata lineage) virus, the recommended influenza B component for the 2015-16 northern hemisphere influenza vaccine. Twelve (35%) were characterized as a B/Brisbane/60/2008-like (Victoria lineage) virus, the recommended influenza B component for the 2015-16 northern hemisphere quadrivalent influenza vaccine containing two influenza B components.

National Microbiology Laboratory (NML): Antiviral Resistance

From September 1, 2015 to January 21, 2016, the NML received influenza viruses from Canadian laboratories for drug susceptibility testing. Of the 151 influenza A viruses [101 A(H3N2) and 50 A(H1N1)pdm09] tested against amantadine, all were resistant with the exception of one A(H3N2) virus which was sensitive to amantadine. Of the 179 influenza viruses [92 A(H3N2), 52 A(H1N1)pdm09 and 35 B] tested against oseltamivir, all were sensitive. Of the 179 influenza viruses [92 A(H3N2), 52 A(H1N1)pdm09 and 35 B] tested against zanamivir, all were sensitive.
Antigenic Characterization of Influenza A(H3N2) Clade 3C.2a Viruses

In today’s issue of Eurosurveillance, Canadian researchers published a genomic analysis of influenza A(H3N2) clade 3C.2a viruses collected through the Sentinel Practitioner Surveillance Network (SPSN) during the 2014/15 season. They describe how mutations acquired during virus growth in cell culture in laboratories may affect analysis of antigenic relatedness (i.e. vaccine match) by haemagglutination inhibition (HI) assay. The full text article (open access) is available from: www.eurosurveillance.org/ViewArticle.aspx?ArticleId=21355.

Abstract:
As elsewhere, few (<15%) sentinel influenza A(H3N2) clade 3C.2a viruses that dominated in Canada during the 2014/15 season could be antigenically characterised by haemagglutination inhibition (HI) assay. Clade 3C.2a viruses that could be HI-characterised had acquired genetic mutations during in vitro cell culture isolation that modified the potential glycosylation motif found in original patient specimens and the consensus sequence of circulating viruses at amino acid positions 158–160 of the haemagglutinin protein. Caution is warranted in extrapolating antigenic relatedness based on limited HI findings for clade 3C.2a viruses that continue to circulate globally.
International

USA (week 1, January 3 to 9, 2016): During week 1 (January 3-9, 2016), laboratory data indicated that influenza activity increased slightly in the United States. The most frequently identified influenza virus type reported by public health laboratories during week 1 was influenza A, with influenza A(H1N1)pdm09 viruses predominating. The percentage of respiratory specimens testing positive for influenza in clinical laboratories was low. The proportion of deaths attributed to pneumonia and influenza (P&I) was below the epidemic threshold. One influenza-associated paediatric death was reported. A cumulative rate for the season of 1.5 laboratory-confirmed influenza-associated hospitalizations per 100,000 population was reported. The proportion of outpatient visits for influenza-like illness (ILI) was 2.0%, which is below the national baseline of 2.1%. The geographic spread of influenza in Guam, Puerto Rico, and nine states were reported as regional; 11 states reported local activity; the U.S. Virgin Islands and 28 states reported sporadic activity; and the District of Columbia and two states reported no influenza activity.

Details are available at: www.cdc.gov/flu/weekly/.

WHO (as of January 4, 2016): Globally influenza activity was picking up in some temperate countries of the Northern Hemisphere, but in general remained low. In North America, influenza increased slightly but remained at low levels. In Europe, influenza activity continued at low levels, except in some countries in Northern and Eastern Europe where an increase in influenza activity was observed. High levels of influenza activity were reported from some countries in Western Asia. In Eastern Asia, influenza activity continued at low levels, except Mongolia where increased influenza activity was reported. In Central Asia, influenza activity increased in a few countries, but in general remained low. In Western Asia, influenza activity remained at high levels. Israel, Jordan and Oman reported increased influenza activity associated with influenza A(H1N1)pdm09 and influenza B viruses, and the Islamic Republic of Iran and Pakistan reported elevated influenza activity, predominantly due to influenza A(H1N1)pdm09. Bahrain and Qatar reported a decline in influenza activity. In Northern Africa, influenza activity increased in a few countries, but in general remained low. In tropical Africa, few influenza virus detections were reported. In tropics of the Americas, respiratory virus activity was at low levels. In tropical Asia, countries in Southern and South East Asia reported low influenza activity overall with the exception of Lao People’s Democratic Republic and Thailand where influenza B viruses continue to be detected. In the temperate countries of the Southern Hemisphere, respiratory virus activity was generally low in recent weeks. From December 14 to 27, 2015, the WHO Global Influenza Surveillance and Response System (GISRS) laboratories tested more than 35,732 specimens. Of these, 4,383 were positive for influenza viruses, including 3,900 (89%) that were typed as influenza A and 483 (11%) as influenza B. Of the sub-typed influenza A viruses, 2,919 (93%) were influenza A(H1N1)pdm09 and 210 (7%) were influenza A(H3N2). Of the characterized B viruses, 46 (53%) belonged to the B/Yamagata lineage and 41 (47%) to the B/Victoria lineage.

Details are available at: www.who.int/influenza/surveillance_monitoring/updates/en/.
WHO Recommendations for Influenza Vaccines

WHO Recommendations for 2015-16 Northern Hemisphere Influenza Vaccine
On February 26, 2015, the WHO announced the recommended strain components for the 2015-16 Northern Hemisphere trivalent influenza vaccine (TIV):*
- an A/California/7/2009(H1N1)pdm09-like virus;†
- an A/Switzerland/9715293/2013(H3N2)-like virus;‡
- a B/Phuket/3073/2013-like (Yamagata-lineage) virus.§

It is recommended that quadrivalent influenza vaccines (QIV) containing two influenza B viruses contain the above three viruses and a B/Brisbane/60/2008-like (Victoria-lineage) virus.

* These recommended strains are the same as those used for the 2015 Southern Hemisphere vaccine.
† Recommended strain has been retained as the A(H1N1) component since the 2009 pandemic and has been included in the Northern Hemisphere vaccine since 2010-11.
‡ A/South Australia/55/2014, A/Norway/466/2014, and A/Stockholm/6/2014 are A/Switzerland/9715293/2013-like viruses. Recommended strain is considered antigenically distinct from the A/Texas/50/2012-like virus recommended for the 2014-15 Northern Hemisphere vaccine and clusters within the emerging phylogenetic clade 3C.3a.
§ Recommended strain is the same influenza B-Yamagata lineage as the B/Massachusetts/2/2012-like virus recommended for the 2014-15 Northern Hemisphere vaccine but represents a phylogenetic clade-level change from clade 2 to clade 3.

For further details: www.who.int/influenza/vaccines/virus/recommendations/2015_16_north/en/

WHO Recommendations for 2016 Southern Hemisphere Influenza Vaccine
On September 24, 2015, the WHO announced recommended strain components for the 2016 Southern Hemisphere trivalent influenza vaccine (TIV):*
- an A/California/7/2009(H1N1)pdm09-like virus;†
- an A/Hong Kong/4801/2014(H3N2)-like virus;‡
- a B/Brisbane/60/2008-like (Victoria-lineage) virus.§

It is recommended that quadrivalent influenza vaccines (QIV) containing two influenza B viruses contain the above three viruses and a B/Phuket/3073/2013-like (Yamagata-lineage) virus.

* Recommended strains represent a change for two of the three components used for the 2015 Southern Hemisphere and 2015-16 Northern Hemisphere vaccines.
† Recommended strain has been retained as the A(H1N1) component since the 2009 pandemic and has been included in the Southern Hemisphere vaccine since 2010 and in the Northern Hemisphere vaccine since 2010-11.
‡ Recommended strain for the A(H3N2) component represents a phylogenetic clade-level change from a clade 3C.3a virus to a clade 3C.2a virus. Most viruses belonging to A/Hong Kong/4801/2014(H3N2)-like (clade 3C.2a) viruses are considered antigenically related to cell-passaged A/Switzerland/9715293/2013-like (clade 3C.3a) viruses recommended for the 2015 Southern Hemisphere and 2015-16 Northern Hemisphere vaccines but are antigenically distinct from egg-passaged A/Switzerland/9715293/2013-like viruses used in vaccine manufacturing.
§ Recommended strain for the influenza B component represents a lineage-level change from a B/Yamagata-lineage virus to a B/Victoria-lineage virus.

For further details: www.who.int/influenza/vaccines/virus/recommendations/2016_south/en/
Additional Information

Explanatory Note:
The surveillance period for the 2015-16 influenza season is defined starting in week 40. Weeks 36-39 of the 2014-15 season are shown on graphs for comparison purposes.

List of Acronyms:
- ACF: Acute Care Facility
- AI: Avian influenza
- FHA: Fraser Health Authority
- HBoV: Human bocavirus
- HMPV: Human metapneumovirus
- HSDA: Health Service Delivery Area
- IHA: Interior Health Authority
- ILI: Influenza-Like Illness
- LTCF: Long-Term Care Facility
- MSP: BC Medical Services Plan
- NHA: Northern Health Authority
- NML: National Microbiological Laboratory
- A(H1N1)pdm09: Pandemic H1N1 influenza (2009)
- RSV: Respiratory syncytial virus
- VCHA: Vancouver Coastal Health Authority
- VIHA: Vancouver Island Health Authority
- WHO: World Health Organization

Current AMMI Canada Guidelines on the Use of Antiviral Drugs for Influenza: www.ammi.ca/guidelines

Web Sites:
- BCCDC Emerging Respiratory Pathogen Updates: www.bccdc.ca/health-professionals/data-reports/emerging-respiratory-virus-updates
- Influenza Web Sites
  - Canada – Flu Watch: www.phac-aspc.gc.ca/fluwatch/
  - USA Weekly Surveillance Reports: www.cdc.gov/flu/weekly/
  - European Influenza Surveillance Scheme: ecdc.europa.eu/EN/HEALTHTOPICS/SEASONAL_INFLUENZA/EPIDEMIOLOGICAL_DATA/Pages/Weekly_Influenza_Surveillance_Overview.aspx
  - WHO – Weekly Epidemiological Record: www.who.int/wer/en/
  - WHO Collaborating Centre for Reference and Research on Influenza (Australia): www.influenzacentre.org/

Avian Influenza Web Sites
- World Organization for Animal Health: www.oie.int/eng/en_index.htm

Contact Us:
Tel: (604) 707-2510
Fax: (604) 707-2516
Email: InfluenzaFieldEpi@bccdc.ca

Communicable Disease Prevention and Control Services (CDPACS)
BC Centre for Disease Control
655 West 12th Ave, Vancouver BC V5Z 4R4

Online: www.bccdc.ca/health-professionals/data-reports/influenza-surveillance-reports
### Influenza-Like Illness (ILI) Outbreak Summary Report Form

**Please complete and email to ilioutbreak@bccdc.ca**

**Note:** This form is for provincial surveillance purposes. Please notify your local health unit per local guidelines/requirements.

**ILI:** Acute onset of respiratory illness with fever and cough and with one or more of the following: sore throat, arthralgia, myalgia, or prostration which could be due to influenza virus. In children under 5, gastrointestinal symptoms may also be present. In patients under 5 or 65 and older, fever may not be prominent.

**Schools and work site outbreak:** greater than 10% absenteeism on any day, most likely due to ILI.

**Residential institutions (facilities) outbreak:** two or more cases of ILI within a seven-day period.

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### First Notification

**Type of facility:**
- ☐ LTCF
- ☐ Acute Care Hospital
- ☐ Senior’s Residence
- (if ward or wing, please specify name/number: ____________________)
- ☐ Workplace
- ☐ School (grades: )
- ☐ Other (___________)

**Date of onset of first case of ILI (dd/mm/yyyy):** DD / MMM / YYYY

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### Update AND Outbreak Declared Over

**Date of onset for most recent case of ILI (dd/mm/yyyy):** DD / MMM / YYYY

If over, date outbreak declared over (dd/mm/yyyy): DD / MMM / YYYY

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### Laboratory Information

**Specimen(s) submitted?**
- ☐ Yes (location: ______________)  ☐ No  ☐ Don’t know

**If yes, organism identified?**
- ☐ Yes (specify: ______________)  ☐ No  ☐ Don’t know