File No. CI 20-01-29284

THE QUEEN'S BENCH
Winnipeg Centre

B E T W E E N:

GATEWAY BIBLE BAPTIST CHURCH, PEMBINA VALLEY BAPTIST CHURCH, REDEEMING GRACE BIBLE CHURCH, THOMAS REMPEL, GRACE COVENANT CHURCH, SLAVIC BAPTIST CHURCH, CHRISTIAN CHURCH OF MORDEN, BIBLE BAPTIST CHURCH, TOBIAS TISSEN, ROSS MACKAY

Applicants,

- and -

HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF MANITOBA, and DR. BRENT ROUSSIN in his capacity as CHIEF PUBLIC HEALTH OFFICER OF MANITOBA, and DR. JAZZ ATWAL in his capacity as ACTING DEPUTY CHIEF OFFICER OF HEALTH OF MANITOBA

Respondents.

Reply Affidavit of CARLA LOEPPKY
Affirmed, April 30, 2021

Manitoba Justice, Legal Services Branch
Constitutional Law Section

Per: Michael Conner
Heather Leonoff
Denis Guénette
Sean Boyd

THE QUEEN'S BENCH
Winnipeg Centre

B E T W E E N:

GATEWAY BIBLE BAPTIST CHURCH, PEMBINA VALLEY BAPTIST CHURCH, REDEEMING GRACE BIBLE CHURCH, THOMAS REMPEL, GRACE COVENANT CHURCH, SLAVIC BAPTIST CHURCH, CHRISTIAN CHURCH OF MORDEN, BIBLE BAPTIST CHURCH, TOBIAS TISSEN, ROSS MACKAY

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Respondents.

AFFIDAVIT

1. I have previously presented an affidavit in this proceeding. I have reviewed the affidavits filed subsequent to my initial affidavit, and present this affidavit in reply.

2. I have personal knowledge of the facts and matters stated in this affidavit – except where they are based upon information and belief, in which case I believe them to be true.

A. Applicants' Request for Undertakings, made on March 19, 2021

3. By letter dated March 19, 2021, legal counsel for the applicants wrote to legal counsel for the Government, and made several requests for information in advance of the hearing. Attached as **Exhibit A** is a copy of that letter.

4. By letter dated March 30, 2021, Government legal counsel responded to that letter. Attached as **Exhibit B** is a copy of that letter.

5. Attached **Exhibit C** is the list of modelling parameters, which is referred to identified at Item 7 of that letter.

6. Attached as **Exhibit D** is a print-out of the Public Health Agency of Canada's FluWatch Report, which is referred to at Item 10 of that letter. More information about influenza and the weekly and annual FluWatch report for Canada is publicly available at the following webpage for the Public Health Agency of Canada, and linked webpages:

> https://www.canada.ca/en/public-health/services/diseases/flu-influenza/influenza-surveillance.html

B. Seasonal Influenza

7. In reply to paragraph 13 of the affidavit of Joel Kettner, where he compares COVID-19 to the seasonal influenza, the two diseases are distinct. The state of knowledge of the seasonal influenza is considerably more advanced and mature than it is for COVID-19. As a result, public health

response and epidemiological and surveillance strategies are much more well-developed for seasonal influenza than for COVID-19.

8. One of the standing responsibilities of the Epidemiology and Surveillance Unit of Manitoba Health and Seniors' Care is to actively monitor seasonal influenza. In doing this, it publishes influenza reports and other related information regarding developments of the seasonal influenza within the province. Publications of longstanding practice are publicly available from the following webpage:

https://www.gov.mb.ca/health/publichealth/surveillance/influenza/index.html

9. Typically, seasonal influenza reporting initiates after the first positive influenza laboratory result is communicated. This typically occurs in September, but there can be variation on this point. To this end, the following publications provide summarizing information for the following most recent seasons, and they demonstrate the following:

Influenza year	Positive tests	ICU admissions	Deaths
2019/2020	1856	40	29
2018/2019	977	42	17
2017/2018	1681	35	46
2016/2017	585	23	14
2015/2016	1093	78	25

10. The source of the above information is as follows:

a. Information regarding the 2019/2020 influenza season is from the Week 12 Bulletin (Mar. 15 - 21, 2020), attached as **Exhibit E** (see p. 1).

b. Information regarding the 2018/2019 influenza season is from the Week 19-20 Bulletin (May 5 - 18, 2019), attached as **Exhibit F** (see p. 1).

c. Information regarding the 2017/2018 influenza season is from the Annual Report of Seasonal Influenza, 2017-2018, attached as **Exhibit G** (see pp. 13 and 18).

d. Information regarding the 2016/2017 influenza season is from the Annual Report of Seasonal Influenza, 2016-2017, attached as **Exhibit H** (see pp. 15 and 22).

e. Information regarding the 2015/2016 influenza season is from the Annual Report of Seasonal Influenza, 2015-2016, attached as **Exhibit I** (see pp. 15 and 24).

C. Modelling for COVID-19

11. In reply to the comments made by Joel Kettner in the document attached as Exhibit B to his affidavit, starting at page 22 where he discusses Manitoba's model for predicting the spread of COVID-19, I can advise as follows.

12. Manitoba's model has been developed by Dr. Luiz Guidolin a computational physicist specialized in computer simulations, mathematical

modelling, and epidemiology. He has around ten years of experience in employing and developing state-of-the-art scientific techniques to epidemiology and in modelling of the spread of infectious diseases. His model has been developed to account for Manitoba's realities and is continually refined, reviewed, and validated.

13. Dr. Guidolin participates in weekly meetings with counterparts from Canadian jurisdictions (provincial and federal), including leading modelling experts form Canadian universities who are also working on their own models. During these modelling meetings, results and methods are discussed, presented and critiqued. Manitoba's model has not been yet been published in the form of a peer-reviewed manuscript, given the strain of responding to the pandemic. However it has been presented periodically to a wide range of provincial, federal, and academic specialists who include mathematical modellers, professors, epidemiologists, subject matter specialists, medical officers of health, ICU and other medical doctors, nurses, statisticians, decision makers, and others. This is similar to the academic peer-review process in that it passes the scrutiny of academic reviewers, but at the same has "face-validity" in that its reliability can be compared to the evolving experience of the ongoing pandemic.

14. Within Manitoba, there are weekly meetings about modelling among various public officials. Further, Dr. Guidolin attends regular inter-jurisdictional advisory group meetings within Canada, and has frequent contacts with counterparts and experts beyond Canada. Dr. Guildolin also contributes to the review and critique of the national model and acts a reviewer for peer-reviewed journals.

D. Recent Outbreaks in Faith-Based Gatherings

15. Because the COVID-19 pandemic is ongoing, I have new information about outbreaks in faith-based gatherings that was not yet known when I presented my previous affidavit.

16. The first easing of restrictions for places of worship began on February 12, 2021, at which point places of worship could hold regular services with no more than 50 persons or 10% of usual capacity (whichever is lower), with 2-metre separations between household groupings. Since that time, an addition eight clusters have arisen.

17. I make this affidavit *bona fide*.

AFFIRMED BEFORE ME at)
the City of Winnipeg, in)
the Province of Manitoba,)
this 30th day of April, 2021)

Carla Loeppky

A Barrister at Law in and for
The Province of Manitoba

This is Exhibit "A" referred to in the Affidavit of Carla Loeppky affirmed before me this 30th day of April, 2021.

A Barrister-at-law in and for the
Province of Manitoba.

Justice Centre
for Constitutional Freedoms

March 19, 2021

Via-email

Department of Justice
Constitutional Law Branch
[redacted]

Attention: Heather Leonoff/Michael Conner/Denis Guenette/Sean Boyd

Dear Madam/Sir:

RE: Gateway Bible Baptist Church et al. v. Manitoba and Dr. Roussin – File No. CI 20-01-29284

Upon review of your filed affidavits in this matter, the Applicants request the following information in advance of the hearing which is relevant to both the Respondents' affidavit evidence and the issues in the proceeding:

Specifically, we request that you provide us with the following (subject to further agreement on medium of production and delivery timeline):

1. Affidavit of Carla Loeppky, Exhibit B, page 17
   For all Manitoba Covid deaths listed:
   a. anonymized lab reports with CT threshold used in achieving the Covid-positive test result,
   b. Document(s) identifying whether the deceased was a symptomatic or asymptomatic case,
   c. anonymized death certificates with primary and secondary causes of death

2. Affidavit of Jared Bullard
   Package inserts/manufacturer's instructions from all Covid-19 diagnostic test kits (PCR or otherwise) that Manitoba uses to diagnose Covid-19

[redacted]

3. Affidavit of Jared Bullard, lines 193-199

    a. Document(s) with CT thresholds by percentages of all positive cases between March 2020-March 2021, and specifically, what percentage of cases per month resulted from a positive PCR test with a CT of 36, 37, 38, 39, 40, 40+ (not simply the percentage as a range from 36-40)
    b. for every positive case, the anonymized lab report confirming the CT value used

4. Affidavit of Brent Roussin, para. 70
   Documentation on the contact tracing program:
    a. the proportion of traced contacts that became symptomatic during their quarantine period,
    b. the proportion of traced contacts that tested positive for Covid-19 during their quarantine period,
    c. the proportion of symptomatic contacts that were hospitalized, needed ICU, or died,
    d. estimated number and rate of prevented hospitalizations, ICU admissions, or deaths attributable to contact tracing, quarantine and isolation

5. Affidavit of Carla Loeppky, Exhibit B, pp. 16-33
   Document(s) or policies used to determine whether a death is "related to Covid-19" or is a death "due to Covid-19", and any document(s) outlining any changes in the usual method of death certification (prior to 2020) with respect to Covid-19's designation in Part 1 or Part 2 of the death certificate.

6. Affidavit of Carla Loeppky, Exhibit D, Affidavit of Lanette Siragusa, para. 10
   Document(s) providing the number of total deaths in Manitoba in 2020 due to the following conditions as the primary cause of death:
    a. Malignant neoplasms
    b. Diseases of heart
    c. Cerebrovascular disease
    d. Chronic lower respiratory disease (excluding Covid-19)
    e. Accidents (unintentional injuries)

7. Affidavit of Carla Loeppky, Exhibit F, p. 25
   Document(s) which sets out the 165 parameters in respect of the modelling

8. Affidavit of Carla Loeppky, para. 14
   Document(s) or policies defining a "cluster"

9. Affidavit of Brent Roussin, para. 177
   Document(s) that show:
   a. the total number of ICU beds available in Manitoba for the years 2015-2020
   b. the surge capacity (how many extra beds could be made available for ICU patients) in Manitoba for the years 2015-2020
   c. by month, the highest number of ICU patients in Manitoba for the years 2015-2020 and up to March 2021
   d. how many days per month in the years 2015-2020 and up until March 2021 did ICU patients exceed the number of available ICU beds before and after (if applicable) surge capacity was reached?

10. Documents showing that out of all of the PCR positive cases of Covid-19 in Manitoba, how many of those people were also tested for Influenza within the same time frame as they were tested for Covid-19

11. Please provide Manitoba's Pandemic Response Plan (or similar such emergency plan) for the past 5 years.

We look forward to receiving the foregoing. Please feel free to contact the undersigned should you wish to discuss the method and timeline for delivery. We are content to rely on electronic delivery (i.e. by USB) should that prove more convenient.

Best regards,

A. K Pejovic

Allison Kindle Pejovic
Barrister and Solicitor
Justice Centre for Constitutional Freedoms

cc: Jay Cameron, Litigation Manager, Justice Centre for Constitutional Freedoms,

[redacted]

[redacted]

Jared Brown, Lead Counsel, Brown Litigation [redacted]

Heather Leonoff, Legal Services Branch, Constitutional Law Section, Manitoba Justice, [redacted]

Denis Guenette, Legal Services Branch, Civil Legal Services, Manitoba Justice, [redacted]

Michael Conner, Legal Services Branch, Constitutional Law Section, Manitoba Justice, [redacted]

Sean Boyd, Legal Services Branch, Civil Legal Services, Manitoba Justice, [redacted]

[redacted]

This is Exhibit "B" referred to in the Affidavit of Carla Loeppky affirmed before me this 30th day of April, 2021.

A Barrister-at-law in and for the
Province of Manitoba.

Manitoba

Justice
Constitutional Law Section, Legal Services Branch
Crown Law Division
[redacted]

In reply, please refer to:

Michael Conner
General Counsel

Phone: [redacted]
Fax:
File No:

March 30, 2021

Justice Centre for Constitutional Freedoms
[redacted]

Attention: Allison Kindle Pejovic

Dear Ms Pejovic:

Re: ***Gateway Bible Baptist Church et al. v. Manitoba et al.*** **– File No. CI 20-01-29284**

This is in response to your letter of March 19, 2021, in which you seek undertakings from the Respondents' affiants for the purpose of cross examination.

As you are aware, there is no entitlement to examinations for discovery in an Application. While undertakings can be requested under Rule 39.03.1, the rules contemplate this would occur during the course of cross examination and not as a means of advance discovery. An undertaking can be refused if it does not relate to an important issue, it would be overly onerous or the information would not significantly assist the court in determining the application.

In our view, many of the items requested are of marginal relevance or significance to the ultimate issue to be decided. Nonetheless, in the interest of being cooperative, we will provide the documents requested if they are readily available. Below, we respond to each item.

Item 1: Affidavit of Carla Loeppky

We decline to give this undertaking.

a) The affiant does not have possession of CT values. Further, the lab has no knowledge of whether a particular individual subsequently died of COVID-19 and therefore does not have a record of the CT values used for persons who later died of COVID-19. It would be unduly onerous to try to reconstruct this information.

b) The affiant does not have access to updated medical files of patients indicating whether the deceased was a symptomatic or asymptomatic case of COVID-19 at the time of death.

c) The affiant does not have possession or control over death certificates. Death certificates are prepared by attending physicians and provided to Vital Statistics in accordance with *The Vital Statistics Act*.

Item 2: Affidavit of Jared Bullard

We have attached manufacturers' inserts for PCR tests used by Cadham Provincial Laboratory.

Item 3: Affidavit of Jared Bullard

We decline to provide this undertaking as requested. The lab reports state whether the case is positive for COVID-19 but do not include CT values. The lab would have to undertake further analysis to provide the information requested.

Item 4: Affidavit of Brent Roussin

We decline this undertaking. Available information about the total number of COVID-19 hospitalizations, ICU admissions and deaths has been provided in the affidavit of Carla Loeppky. Specific information about hospitalization, ICU and deaths of individuals who isolated after contact tracing is not readily available.

Item 5: Affidavit of Carla Loeppky

The information requested is not relevant. The Chief Public Health Officers relies on COVID-19 deaths as reported to Epidemiology and Surveillance by hospitals or health officials in the community. Nonetheless, we can provide the following information.

Public Health has published a document for epidemiology and surveillance purposes entitled "COVID-19 Technical Notes", which is part of its Provincial Respiratory Surveillance Report. For reporting COVID-19 deaths, the document follows the "Word Health Organization Guidelines for Certification and Classification (Coding) of COVID-19 as a Cause of Death". These guidelines are consistent with the Public Health Agency of Canada guidelines entitled "National Case Definition".

The Technical Notes can be found here:
https://www.gov.mb.ca/health/publichealth/surveillance/covid-19/resources/Notes.html

The WHO Guidelines can be found here:
https://www.who.int/classifications/icd/Guidelines_Cause_of_Death_COVID-19.pdf

The Public Health Agency of Canada guidelines can be found here:
https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/health-professionals/national-case-definition.html

The affiant has no role in determining the cause of death. The Government of Manitoba has not issued any changes to how death certificates are prepared with respect to COVID-19. Death

Certificates are prepared in accordance with *The Vital Statistics Act*, which also follows WHO guidelines.

Item 6: Affidavits of Carla Loeppky and Lanette Siragusa

The number of deaths in Manitoba resulting from other non-communicable diseases is irrelevant to this Application. Nonetheless, the 2020 data is published by Statistics Canada.

Table 1: Number of total deaths in Manitoba from December 29, 2019 to November 14, 2020 by primary cause of death

Primary cause of death	Number
Malignant neoplasms	2020
Diseases of heart	1425
Cerebrovascular diseases	385
Chronic lower respiratory diseases	330
Accidents (unintentional injuries)	325

Data source: Statistics Canada. Table 13-10-0810-01 Selected grouped causes of death, by week

Item 7: Affidavit of Carla Loeppky

The list of modelling parameters is attached.

Item 8: Affidavit of Carla Loeppky

The definition of "cluster" is found at Appendix B of the Interim Guidance Public Health Measures. This document is cited at footnote 158 of Dr. Bhattacharya's report. An updated version of this document can be found at:
https://manitoba.ca/asset_library/en/coronavirus/interim_guidance.pdf

Item 9: Affidavit of Brent Roussin

We decline this undertaking. The information requested is not in the possession or control of the affiant. In any event, the historical ICU and surge capacity is not relevant to the Application.

Item 10: How many COVID-19 PCR positive cases were also tested for influenza

The Public Health Agency of Canada's FluWatch Report is attached. At page 2, the report indicates there were 38,500 influenza tests done in Manitoba from August 23, 2020 to March 20, 2021. Only 1 case tested positive for influenza. Since September 1, 2020, all would also have received a test for SARS-CoV-2.

Item 11: Manitoba's Pandemic Response Plan for the past 5 years

A copy of the Manitoba Emergency Plan can be found at:
https://www.gov.mb.ca/emo/pdfs/MEP.pdf

Sincerely,

"Original signed by"

Michael Conner,
General Counsel

c. Jay Cameron and Jared Brown, counsel for the Applicants
Heather Leonoff, Q.C., Denis Guénette and Sean Boyd, counsel for the Respondents

This is Exhibit "C" referred to in the Affidavit of Carla Loeppky affirmed before me this 30th day of April, 2021.

A Barrister-at-law in and for the
Province of Manitoba.

parameter_descirption
Max number of days to be simulated
Number of days to allocate in sim_summary vectors
Real population size
pop_scale
Population Parameters / Social Compartments Parameters
Population size
Household size: 1 agent (cumulative "probability")
Household size: 2 agents
Household size: 3 agents
Household size: 4 agents
Household size: 5 agents
Household size: 'num_of_agents_in_care_home' agents (care homes)
Total num of agents in PCH
max_num_agents_in_PCH (scaled for pop_size)
Num. agents per care home
Num. agents in other social compartment
Num. agents in other social compartment if healthcare worker (must be smaller than 'other' group size)
Total num. of healthcare workers (**make it divisible by 'num_of_agents_per_healthcare_team'**)
Num. of agents per healthcare team
Healthcare Capacity
Total number of clinical beds available
Max. num. of clinical beds available (scaled for pop_size)
Total number of ICU beds available
Max. num. of ICU beds available (scaled for pop_size)
Transmission Dynamics Paramters / Beahaviour Parameters
basic reproduction number
Transmission rate number of contacts correction factor (determined by simulating SC1 pure scenario)
Transmission probability reduction factor for asymptomatic infections - lower limit
Transmission probability reduction factor for asymptomatic infections - mode
Transmission probability reduction factor for asymptomatic infections - upper limit
Number of interactions on a day - min (PERT distribution)
Number of interactions on a day - mode (PERT distribution)
Number of interactions on a day - min (PERT distribution)
Number of random interactions on a day - min (PERT distribution)
Number of random interactions on a day - mode (PERT distribution)
Number of random interactions on a day - max (PERT distribution)
Probability of a random contact happening outside social compartments (3/7 = 3 times per week)
Daily probability of participating in a large event
Number of random interactions on a large event - min (PERT distribution)
Number of random interactions on a large event - mode (PERT distribution)
Number of random interactions on a large event - max (PERT distribution)
Probability of HCW to have one contact with co-workers during work days (5/7 = 5 workdays, week of 7 days)
Probability of HCW to have one contact with a PCH resident during work days (3/7 = assuming part-time 3 days/wk)
Probability of interaction of a HCW with a hospitalized agents (infectious)
Daily num. of agents to import due to unecessary travel - min (PERT distribution)
Daily num. of agents to import due to unecessary travel - mode (PERT distribution)
Daily num. of agents to import due to unecessary travel - max (PERT distribution)
State Duration / Length of Stay
Exposed duration meanLog (\mu lognormal distribution)
Exposed duration sdLog (\sigma lognormal distribution)
Exposed duration maximum (truncate lognormal at this value)
Infectious pre-symptomatic minumum duration (uniform distribution)
Infectious pre-symptomatic maximum duration (uniform distribution)
Infectious asymptomatic duration minimun (min PERT distribution)
Infectious asymptomatic duration mode (mode PERT distribution)
Infectious asymptomatic duration maximum (max PERT distribution)
Infectious symptomatic duration minimun (min PERT distribution)
Infectious symptomatic duration mode (mode PERT distribution)

Infectious symptomatic duration maximum (max PERT distribution)
Number of days **presenting symptoms** prior to being **hospitalized** - lower limit
Number of days **presenting symptoms** prior to being **hospitalized** - mode
Number of days **presenting symptoms** prior to being **hospitalized** - upper limit
Number of days in **hospital** if recovering (not from ICU) meanLog (\mu lognormal distribution)
Number of days in **hospital** if recovering (not from ICU) sdLog (\sigma lognormal distribution)
Number of days in **hospital** if recovering (not from ICU) max (truncate lognormal distribution)
Number of days in **hospital** before going to ICU - meanLog (\mu lognormal distribution)
Number of days in **hospital** before going to ICU - sdLog (\sigma lognormal distribution)
Number of days in **hospital** before going to ICU - max (truncate lognormal distribution)
Average number of days in **hospital** after stepping down from **ICU** mean - (normal distribution)
Average number of days in **hospital** after stepping down from **ICU** sd - (normal distribution)
Average number of days in **hospital** after stepping down from **ICU** max - (truncate normal distribution)
Average number of days in **ICU** if **recovering** mean - (normal distribution)
Average number of days in **ICU** if **recovering** sd - (normal distribution)
Average number of days in **ICU** if **recovering** max - (truncate normal distribution)
Average number of days in **ICU** if **dying** mean - (normaldistribution)
Average number of days in **ICU** if **dying** sd - (normal distribution)
Average number of days in **ICU** if **dying** max - (truncate normal distribution)

State Transition

Prob. of **staying asymptomatic** throughout the infection - lower limit
Prob. of **staying asymptomatic** throughout the infection - mode
Prob. of **staying asymptomatic** throughout the infection - upper limit
Probability of being **hospitalized** once **symptomatic** - lower limit
Probability of being **hospitalized** once **symptomatic** - mode
Probability of being **hospitalized** once **symptomatic** - upper limit
Probability of requiring **ICU** after being **hospitalized** - lower limit
Probability of requiring **ICU** after being **hospitalized** - mode
Probability of requiring **ICU** after being **hospitalized** - upper limit
Probability of **dying** when in **ICU** - lower limite
Probability of **dying** when in **ICU** - mode
Probability of **dying** when in **ICU** - upper limite
Probability of **dying** if there are no more **clinical beds** available - lower limit
Probability of **dying** if there are no more **clinical beds** available - mode
Probability of **dying** if there are no more **clinical beds** available - upper limit
Probability of **dying** if there are no more **ICU beds** available (hard-coded at 100%)

Public Health Measures and Interventions

Sim. day to close borders to unecessary travel
Close care-home visitation
Daily prob. of an infectious household member visiting a family member in a care home (1/7 days)
Max. daily probability of an Infectious symptomatic agent being diagnosed
Number of lab tests per day for the real population - (\mu lognormal distribution)
Number of lab tests per day for the real population - (\sigma lognormal distribution)
Number of lab tests per day for the real population - (truncate lognormal distribution at this value)
Number of lab tests per day for the real population - (truncate lognormal distribution at this value)
Number of lab tests per day for the real population - (truncate lognormal distribution at this value)
Percentage of lab tests reserved for contact tracng testing (automatic)
Test positivity rate (percent)
Test positivity rate (percent)
Test positivity rate (percent)
Prob. of being tested if Infectious Asymptomatic/Pre-symptomatic
Testing delay (num of days between becoming I and performing contact tracing when diagnosed)
Contact tracing efficiency
Start **quarantining** agents on a specific simulation day
Stop **quarantining** agents on a specific simulation day
Quarantine agents upond being diagnosed (**decrease num. of contacts to Hospital levels**)
Healthcare worker, self-isolation compliance when symptomatic and diagnosed
Healthcare worker, self-isolation prob of an interaction to happen when symptomatic and diagnosed

Healthcare worker, physical distancing compliance when symptomatic and diagnosed
Healthcare worker, self-isolation prob of an interaction to happen when symptomatic and diagnosed
Healthcare worker, self-isolation compliance when symptomatic and non-diagnosed
Healthcare worker, self-isolation prob of an interaction to happen when symptomatic and non-diagnosed
Healthcare worker, physical distancing compliance when symptomatic and non-diagnosed
Healthcare worker, self-isolation prob of an interaction to happen when symptomatic and non-diagnosed
Healthcare worker, self-isolation compliance when asymptomatic and diagnosed
Healthcare worker, self-isolation prob of an interaction to happen when asymptomatic and diagnosed
Healthcare worker, physical distancing compliance when asymptomatic and diagnosed
Healthcare worker, self-isolation prob of an interaction to happen when asymptomatic and diagnosed
Healthcare worker, self-isolation compliance when asymptomatic and non-diagnosed
Healthcare worker, self-isolation prob of an interaction to happen when asymptomatic and non-diagnosed
Healthcare worker, physical distancing compliance when asymptomatic and non-diagnosed
Healthcare worker, self-isolation prob of an interaction to happen when asymptomatic and non-diagnosed
Personal Care Home resident, self-isolation compliance when symptomatic and diagnosed
Personal Care Home resident, self-isolation prob of an interaction to happen when symptomatic and diagnosed
Personal Care Home resident, physical distancing compliance when symptomatic and diagnosed
Personal Care Home resident, self-isolation prob of an interaction to happen when symptomatic and diagnosed
Personal Care Home resident, self-isolation compliance when symptomatic and non-diagnosed
Personal Care Home resident, self-isolation prob of an interaction to happen when symptomatic and non-diagnosed
Personal Care Home resident, physical distancing compliance when symptomatic and non-diagnosed
Personal Care Home resident, self-isolation prob of an interaction to happen when symptomatic and non-diagnosed
Personal Care Home resident, self-isolation compliance when asymptomatic and diagnosed
Personal Care Home resident, self-isolation prob of an interaction to happen asymptomatic and diagnosed
Personal Care Home resident, physical distancing compliance when asymptomatic and diagnosed
Personal Care Home resident, self-isolation prob of an interaction to happen when asymptomatic and diagnosed
Personal Care Home resident, self-isolation compliance when asymptomatic and non-diagnosed
Personal Care Home resident, self-isolation prob of an interaction to happen when asymptomatic and non-diagnosed
Personal Care Home resident, physical distancing compliance when asymptomatic and non-diagnosed
Personal Care Home resident, self-isolation prob of an interaction to happen when asymptomatic and non-diagnosed
Regular agent, self-isolation compliance when symptomatic and diagnosed
Regular agent, self-isolation prob of an interaction to happen when symptomatic and diagnosed
Regular agent, physical distancing compliance when symptomatic and diagnosed
Regular agent, self-isolation prob of an interaction to happen when symptomatic and diagnosed
Regular agent, self-isolation compliance when symptomatic and non-diagnosed
Regular agent, self-isolation prob of an interaction to happen when symptomatic and non-diagnosed
Regular agent, physical distancing compliance when symptomatic and non-diagnosed
Regular agent, self-isolation prob of an interaction to happen when symptomatic and non-diagnosed
Regular agent, self-isolation compliance when asymptomatic and diagnosed
Regular agent, self-isolation prob of an interaction to happen when asymptomatic and diagnosed
Regular agent, physical distancing compliance when asymptomatic and diagnosed
Regular agent, self-isolation prob of an interaction to happen when asymptomatic and diagnosed
Regular agent, self-isolation compliance when asymptomatic and non-diagnosed
Regular agent, self-isolation prob of an interaction to happen when asymptomatic and non-diagnosed
Regular agent, physical distancing compliance when asymptomatic and non-diagnosed
Regular agent, self-isolation prob of an interaction to happen when asymptomatic and non-diagnosed

This is Exhibit "D" referred to in the Affidavit of Carla Loeppky affirmed before me this 30th day of April, 2021.

A Barrister-at-law in and for the
Province of Manitoba.

Respiratory Virus Report, Week 11 - ending March 20, 2021

The Respiratory Virus Detection Surveillance System collects data from select laboratories across Canada on the number of tests performed and the number of tests positive for influenza and other respiratory viruses. Data are reported on a weekly basis year-round to the Centre for Immunization and Respiratory Infectious Diseases (CIRID), Public Health Agency of Canada. These data are also summarized in the weekly FluWatch report.

In this Respiratory Virus Report, the number of detections of coronavirus reflects only seasonal human coronaviruses, not the novel pandemic coronavirus (SARS-CoV2) that causes COVID-19. For information on COVID-19, see the Coronavirus disease (COVID-19): Outbreak

Table 1: Respiratory Virus Detections/Isolations for the week ending March 20, 2021 (Reporting Week 202111)

Reporting Laboratory	Flu Tested	A(H1N1)pdm09 Positive	A(H3) Positive	A(UnS) Positive	Total Flu A Positive	Total Flu B Positive	RSV Tested	RSV Positive	PIV Tested	PIV 1 Positive	PIV 2 Positive	PIV 3 Positive	PIV 4 Positive	Other PIV Positive	Adeno Tested	Adeno Positive	hMPV Tested	hMPV Positive	Entero/Rhino Tested	Entero/Rhino Positive	Coron Tested	Coron Positive
Newfoundland	380	0	0	0	0	0	380	0	380	0	0	0	0	0	384	1	380	0	380	8	N.A.	N.A.
Prince Edward Island	138	0	0	0	0	0	138	0	138	0	0	0	0	0	138	0	138	0	138	6	138	0
Nova Scotia	400	0	0	0	0	0	400	0	39	0	0	0	0	0	39	0	39	0	39	2	39	0
New Brunswick	581	0	0	0	0	0	334	0	128	0	0	0	0	0	128	0	128	0	128	0	128	0
Atlantic	**1499**	**0**	**0**	**0**	**0**	**0**	**1252**	**0**	**685**	**0**	**0**	**0**	**0**	**0**	**689**	**1**	**685**	**0**	**685**	**16**	**305**	**0**
Région Nord-Est	272	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	N.A.	N.A.	0	0
Québec-Chaudière-Appalaches	12	0	0	0	0	0	14	0	10	0	0	0	0	0	10	0	10	0	N.A.	N.A.	10	0
Centre-du-Québec	30	0	0	0	0	0	30	0	11	0	0	0	0	0	11	0	11	0	N.A.	N.A.	11	1
Montréal-Laval	250	0	0	0	0	0	249	5	109	0	0	0	0	0	109	5	108	0	N.A.	N.A.	108	4
Ouest du Québec	112	0	0	0	0	0	112	0	0	0	0	0	0	0	0	0	0	0	N.A.	N.A.	0	0
Montérégie	83	0	0	0	0	0	83	0	0	0	0	0	0	0	0	0	0	0	N.A.	N.A.	0	0
Province of Québec	**759**	**0**	**0**	**0**	**0**	**0**	**508**	**5**	**130**	**0**	**0**	**0**	**0**	**0**	**130**	**5**	**129**	**0**	**N.A.**	**N.A.**	**129**	**5**
P.H.O.L. - Ottawa	19	0	0	0	0	0	19	0	15	0	0	0	0	0	15	0	15	0	15	0	15	0
CHEO - Ottawa	104	0	0	0	0	0	104	1	14	0	0	0	0	0	14	0	14	0	14	2	14	0
P.H.O.L. - Kingston	13	0	0	0	0	0	13	0	10	0	0	0	0	0	10	0	10	0	10	0	10	0
UHN / Mount Sinai Hospital	487	0	0	0	0	0	487	0	444	0	0	0	0	0	444	0	444	0	444	4	444	1
P.H.O.L. - Toronto	131	0	0	0	0	0	131	0	85	0	0	0	0	0	85	1	85	0	85	0	85	0
Sick Kids Hospital - Toronto	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Sunnybrook & Women's College HSC	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
P.H.O.L. - Sault Ste. Marie	3	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P.H.O.L. - Timmins	3	0	0	0	0	0	3	0	2	0	0	0	0	0	2	0	2	0	2	0	2	0
St. Joseph's - London	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
P.H.O.L. - London	26	0	0	0	0	0	26	0	14	0	0	0	0	0	14	0	14	0	14	1	14	0
P.H.O.L. - Orillia	5	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P.H.O.L. - Thunder Bay	9	0	0	0	0	0	9	0	9	0	0	0	0	0	9	0	9	0	9	0	9	0
P.H.O.L. - Sudbury	7	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P.H.O.L. - Hamilton	17	0	0	0	0	0	17	0	13	0	0	0	0	0	13	0	13	0	13	0	13	0
P.H.O.L. - Peterborough	5	0	0	0	0	0	5	0	5	0	0	0	0	0	5	0	5	0	5	0	5	0
St. Joseph's - Hamilton	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Province of Ontario	**829**	**0**	**0**	**0**	**0**	**0**	**829**	**1**	**611**	**0**	**0**	**0**	**0**	**0**	**611**	**1**	**611**	**0**	**611**	**7**	**611**	**1**
Province of Manitoba	1418	0	0	0	0	0	1418	0	61	0	0	0	0	0	61	0	112	0	61	4	112	0
Province of Saskatchewan	11976	0	0	0	0	0	2161	0	32	0	0	0	0	0	32	0	32	4	32	3	32	5
Province of Alberta	2249	0	0	0	0	0	533	0	533	0	0	0	0	0	533	1	533	0	533	58	533	0
Prairies	**15643**	**0**	**0**	**0**	**0**	**0**	**4112**	**0**	**626**	**0**	**0**	**0**	**0**	**0**	**626**	**1**	**677**	**4**	**626**	**65**	**677**	**5**
British Columbia	**2879**	**0**	**0**	**0**	**0**	**0**	**2800**	**0**	**442**	**0**	**0**	**0**	**0**	**0**	**442**	**2**	**442**	**0**	**436**	**19**	**422**	**1**
Yukon	41	0	0	0	0	0	41	0	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Northwest Territories	12	0	0	0	0	0	8	0	8	0	0	0	0	0	8	0	8	0	8	1	8	0
Nunavut	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Territories	**54**	**0**	**0**	**0**	**0**	**0**	**49**	**0**	**8**	**0**	**0**	**0**	**0**	**0**	**8**	**0**	**8**	**0**	**8**	**1**	**8**	**0**
CANADA	**21663**	**0**	**0**	**0**	**0**	**0**	**9550**	**7**	**2502**	**0**	**0**	**0**	**0**	**0**	**2506**	**10**	**2552**	**4**	**2366**	**108**	**2152**	**12**

The data in the RVDSS report represent surveillance data available at the time of writing. Missing data are denoted by N.A.

Specimens from Yukon (YT), Northwest Territories (NT) and Nunavit (NU) are sent to reference laboratories in other provinces and reported results reflect specimens identified as originating from YT, NT or NU.
Results from British Columbia comprise of specimens from the following sites: BC Children's and Women's Hospital, Children's and Women's Hospital Laboratory, Fraser Health Medical Microbiology Laboratory, Island Health, Providence Health Care, Powell River Hospital , St. Paul's Hospital , Vancouver General Hospital, Victoria General Hospital, BCCDC Public Health Laboratory, Interior Health Authority sites and Northern Health Authority sites.
Delays in the reporting of data may cause data to change retrospectively.

Influenza co-detections may cause the sum of A(H1N1)pdm09, A(H3), and A(UnS) positive results to exceed the sum of Total Flu A Positive results.

Table 2: Respiratory Virus Detections/Isolations for the period August 23, 2020 - March 20, 2021 (Reporting Weeks 202035-202111)

Reporting Laboratory	Flu Tested	A(H1N1)pdm09 Positive	A(H3) Positive	A(UnS) Positive	Total Flu A Positive	Total Flu B Positive	RSV Tested	RSV Positive	PIV Tested	PIV 1 Positive	PIV 2 Positive	PIV 3 Positive	PIV 4 Positive	Other PIV Positive	Adeno Tested	Adeno Positive	hMPV Tested	hMPV Positive	Entero/Rhino Tested	Entero/Rhino Positive	Coron Tested	Coron Positive
Newfoundland	9242	0	0	0	0	0	9242	10	9242	1	0	1	0	0	9259	43	8655	2	9242	1948	N.A.	N.A.
Prince Edward Island	2574	0	0	0	0	0	2574	3	2570	2	0	0	0	0	2570	29	2570	0	2570	275	2570	0
Nova Scotia	3226	0	0	0	0	0	3229	0	461	0	0	0	0	0	461	7	461	0	461	62	461	0
New Brunswick	49907	0	0	0	0	1	17348	0	695	0	0	0	0	0	686	8	686	0	686	48	641	0
Atlantic	**64949**	**0**	**0**	**0**	**0**	**1**	**32393**	**13**	**12968**	**3**	**0**	**1**	**0**	**0**	**12976**	**87**	**12372**	**2**	**12959**	**2333**	**3672**	**0**
Région Nord-Est	3089	0	0	0	0	0	860	1	0	0	0	0	0	0	0	0	0	0	N.A.	N.A.	0	0
Québec-Chaudière-Appalaches	662	0	0	1	1	0	733	0	445	0	0	0	0	0	447	24	442	0	N.A.	N.A.	425	7
Centre-du-Québec	728	0	0	0	0	0	737	1	240	0	0	0	0	0	238	17	240	0	N.A.	N.A.	237	1
Montréal-Laval	5745	0	0	0	0	0	4788	13	3156	0	0	1	0	0	3220	115	3150	1	N.A.	N.A.	3150	25
Ouest du Québec	1275	0	0	0	0	0	1219	0	0	0	0	0	0	0	0	0	0	0	N.A.	N.A.	0	0
Montérégie	331	0	0	0	0	0	331	0	0	0	0	0	0	0	0	0	0	0	N.A.	N.A.	0	0
Province of Québec	**11830**	**0**	**0**	**1**	**1**	**0**	**8668**	**15**	**3851**	**0**	**0**	**1**	**0**	**0**	**3905**	**156**	**3832**	**1**	**N.A.**	**N.A.**	**3812**	**33**
P.H.O.L. - Ottawa	464	0	0	0	0	0	464	1	384	0	0	0	0	0	384	0	383	0	384	22	383	1
CHEO - Ottawa	4126	0	0	1	1	1	3723	5	625	0	0	0	0	0	625	12	625	1	625	71	625	0
P.H.O.L. - Kingston	737	0	0	1	1	0	737	0	493	0	0	0	0	0	493	3	487	0	493	102	487	0
UHN / Mount Sinai Hospital	9545	2	0	2	4	1	9476	6	9024	3	2	3	8	0	7398	9	8984	6	8781	91	6820	6
P.H.O.L. - Toronto	4997	0	0	0	0	0	4994	2	4379	0	0	0	0	2	4380	12	4378	0	4379	144	4378	4
Sick Kids Hospital - Toronto	854	0	0	0	0	0	0	0	854	0	0	0	0	0	854	12	854	0	854	88	854	0
Sunnybrook & Women's College HSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P.H.O.L. - Sault Ste. Marie	127	0	0	2	2	0	125	0	87	0	0	0	0	0	87	0	87	0	87	6	87	0
P.H.O.L. - Timmins	596	0	0	0	0	0	595	0	152	0	0	0	0	0	152	0	151	0	152	30	151	0
St Joseph's - London	218	0	0	0	0	0	218	0	55	0	0	0	0	0	55	0	55	0	91	6	36	0
P.H.O.L. - London	1714	1	0	5	6	2	1704	0	1222	0	0	0	0	2	1222	2	1217	0	1222	125	1217	3
P.H.O.L. - Orillia	349	0	0	1	1	0	347	0	189	0	0	0	0	0	189	1	189	0	189	12	189	0
P.H.O.L. - Thunder Bay	378	0	0	0	0	0	378	0	366	0	0	0	0	0	367	2	366	0	366	135	366	0
P.H.O.L. - Sudbury	424	0	0	0	0	0	422	0	320	0	0	0	0	0	320	2	320	0	320	28	320	0
P.H.O.L. - Hamilton	1375	0	0	0	0	0	1324	1	1120	0	0	0	0	0	1120	2	1120	0	1120	95	1120	0
P.H.O.L. - Peterborough	413	0	0	1	1	0	367	0	280	0	0	0	0	0	280	0	280	0	280	20	280	0
St Joseph's - Hamilton	7629	0	0	0	0	0	7629	1	7629	0	0	0	0	0	7629	18	7629	0	7629	403	0	0
Province of Ontario	**33936**	**3**	**0**	**13**	**16**	**4**	**32494**	**16**	**27179**	**3**	**2**	**3**	**8**	**4**	**25555**	**75**	**27125**	**9**	**26972**	**1380**	**17313**	**14**
Manitoba	38500	0	0	0	0	1	38490	68	2652	0	1	1	0	0	2652	17	2748	1	2652	135	2748	3
Province of Saskatchewan	71810	0	0	0	0	0	11653	3	1537	0	0	1	1	0	1537	10	1537	4	1537	158	1537	7
Province of Alberta	104631	4	0	6	10	0	71887	0	71887	2	18	3	5	0	71887	128	71887	11	71887	6010	71887	21
Prairies	**214941**	**4**	**0**	**6**	**10**	**1**	**122030**	**71**	**76076**	**2**	**19**	**5**	**6**	**0**	**76076**	**155**	**76172**	**16**	**76076**	**6303**	**76172**	**31**
British Columbia	**66553**	**3**	**8**	**1**	**10**	**8**	**66204**	**5**	**14018**	**1**	**4**	**0**	**7**	**5**	**14562**	**77**	**14412**	**56**	**14233**	**1222**	**10256**	**19**
Yukon	4434	0	0	8	8	7	4372	4	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Northwest Territories	1103	0	0	0	0	0	1070	0	1070	0	0	0	1	0	1070	9	1070	1	1070	315	1070	1
Nunavut	1099	0	0	0	0	0	1086	0	1086	3	1	0	0	0	1086	25	1086	5	1086	280	183	0
Territories	**6636**	**0**	**0**	**8**	**8**	**7**	**6528**	**4**	**2156**	**3**	**1**	**0**	**1**	**0**	**2156**	**34**	**2156**	**6**	**2156**	**595**	**1253**	**1**
CANADA	**398845**	**10**	**8**	**29**	**45**	**21**	**268317**	**124**	**136248**	**12**	**26**	**10**	**22**	**9**	**135230**	**584**	**136069**	**90**	**132396**	**11833**	**112478**	**98**

The data in the RVDSS report represent surveillance data available at the time of writing. Missing data are denoted by N.A.

Specimens from YT, NT and NU are sent to reference laboratories in other provinces and reported results reflect specimens identified as originating from YT, NT or NU.

Results from British Columbia comprise of specimens from the following sites: BC Children's and Women's Hospital, Children's and Women's Hospital Laboratory, Fraser Health Medical Microbiology Laboratory, Island Health, Providence Health Care, Powell River Hospital, St. Paul's Hospital, Vancouver General Hospital, Victoria General Hospital, BCCDC Public Health Laboratory, Interior Health Authority sites and Northern Health Authority sites.

Delays in the reporting of data may cause data to change retrospectively.

Due to reporting delays, the sum of weekly report totals do not add up to cumulative totals.

Influenza co-detections may cause the sum of A(H1N1)pdm09, A(H3), and A(UnS) positive results to exceed the sum of Total Flu A Positive results.

Figure 1: Number positive laboratory tests for other respiratory viruses by report week, Canada, 2020-21

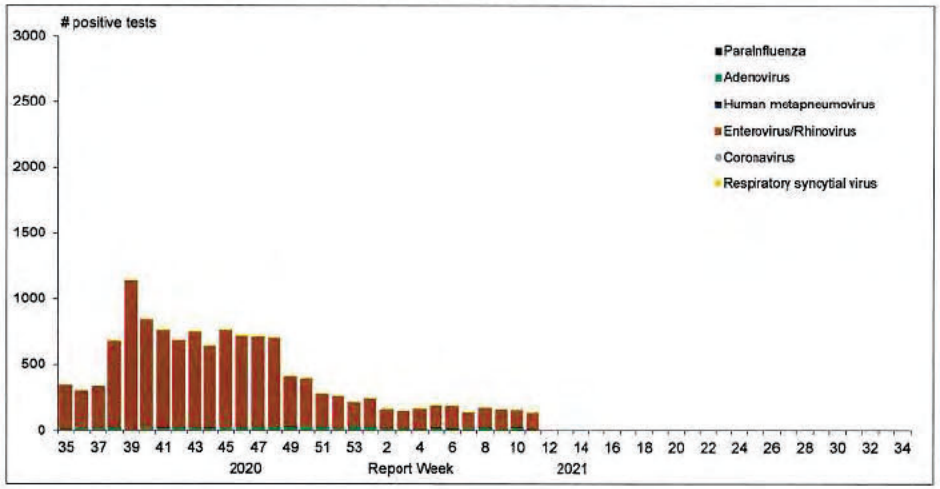


Figure 2 : Positive Influenza Tests (%) in Canada by Region by Week of Report

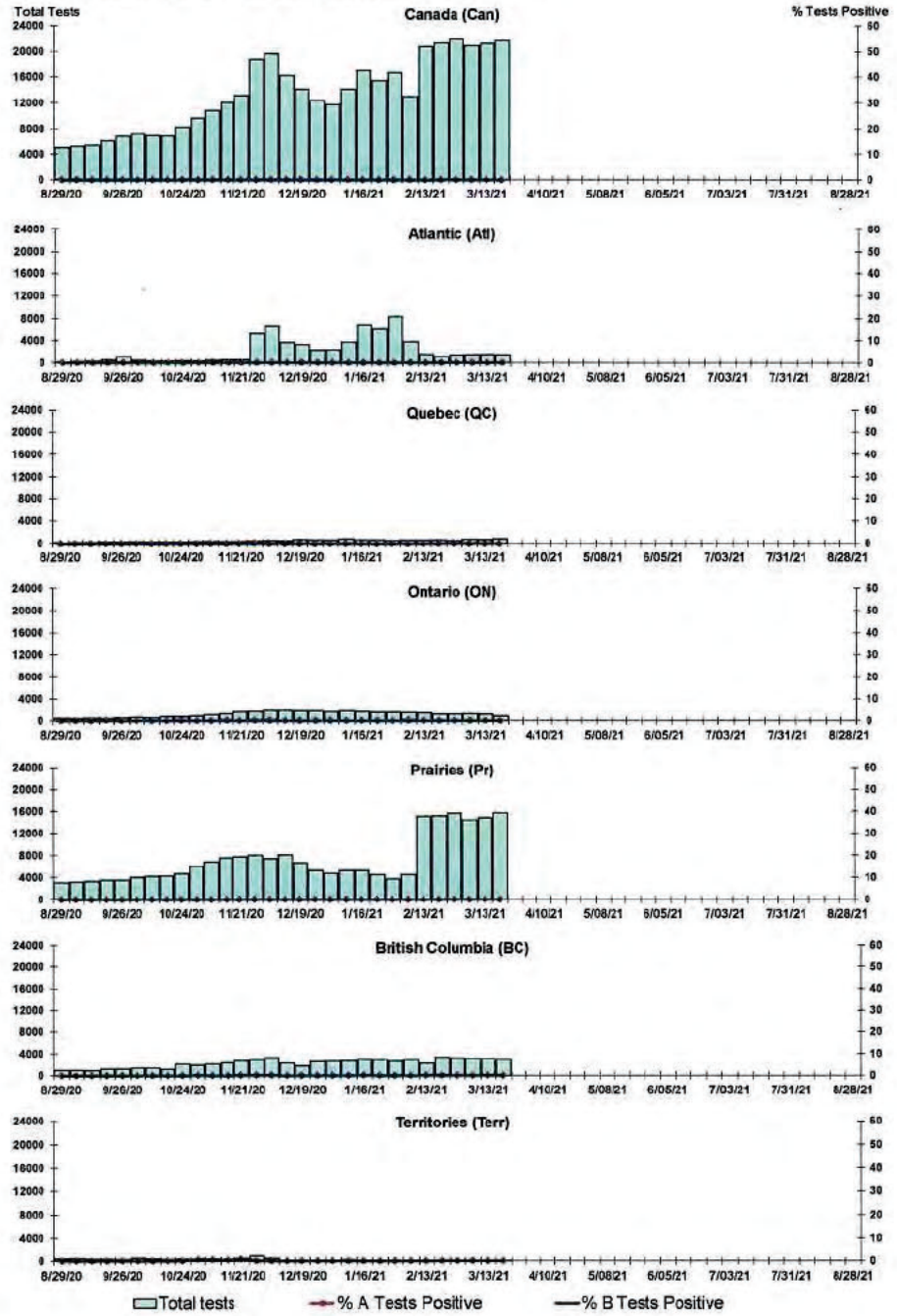


Figure 3: Positive Respiratory syncytial virus (RSV) Tests (%) in Canada by Region by Week of Report

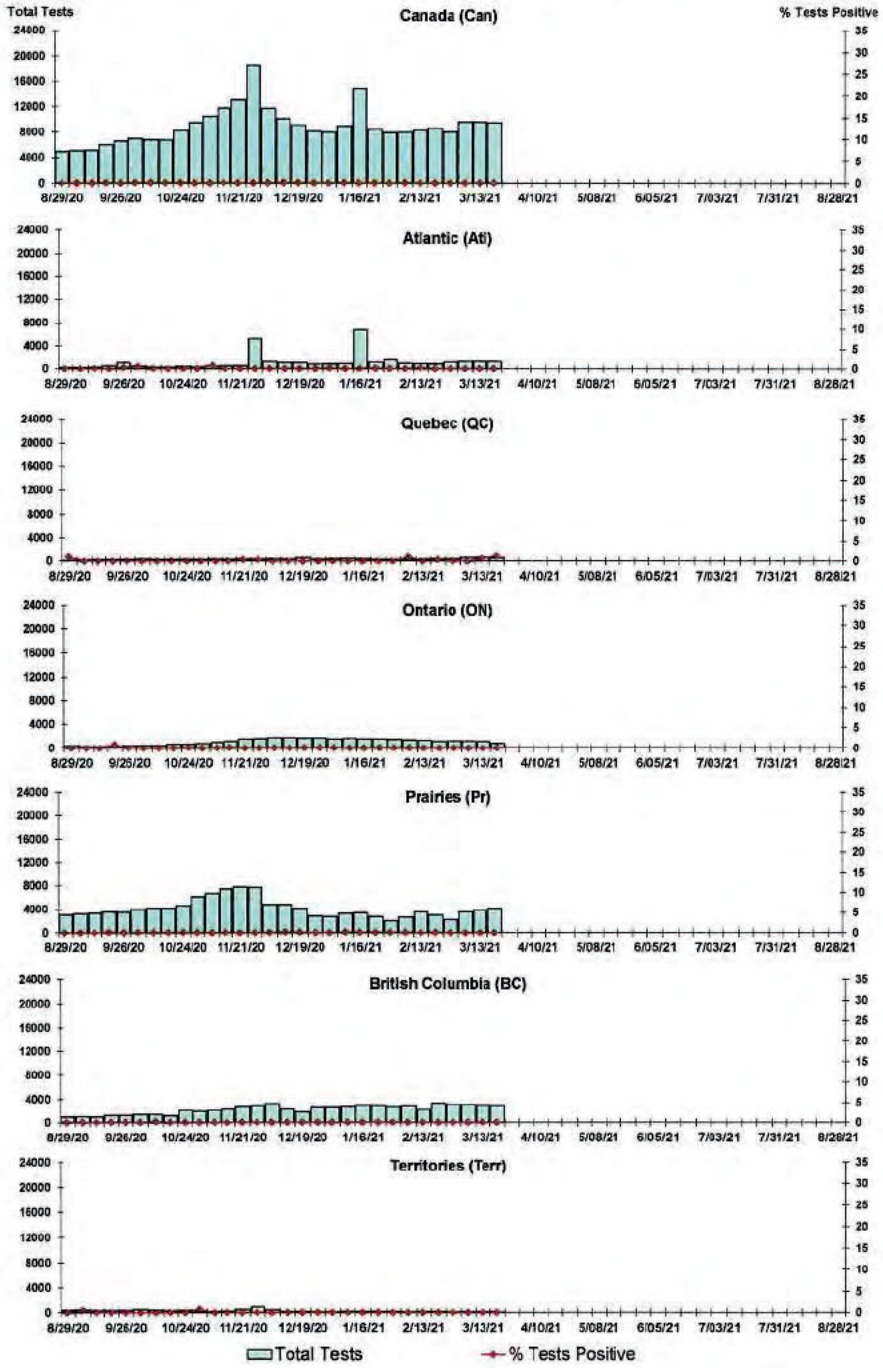


Figure 4: Positive Parainfluenza (PIV) Tests (%) in Canada by Region by Week of Report

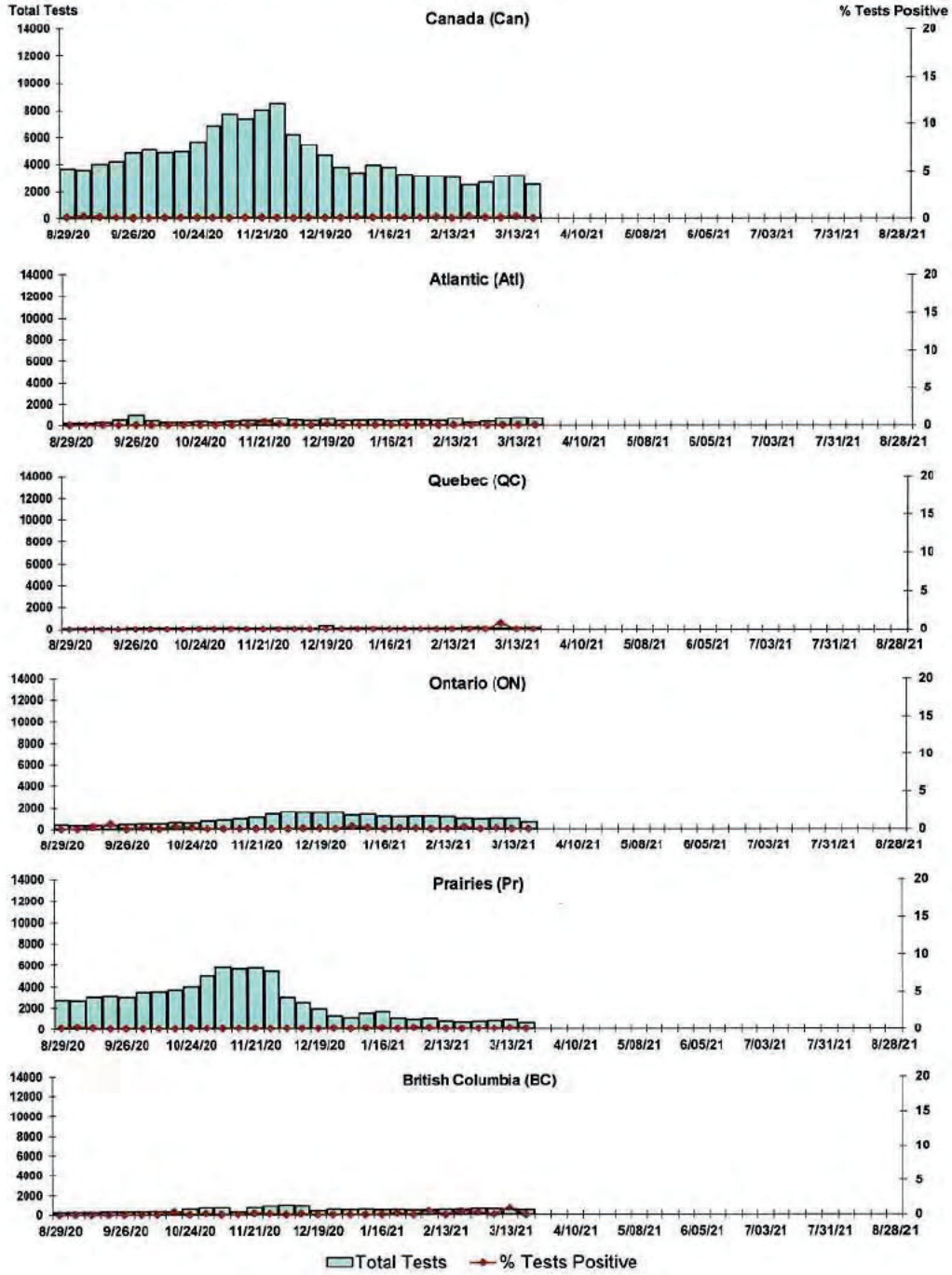


Figure 5: Positive Adenovirus (adeno) Tests (%) in Canada by Region by Week of Report

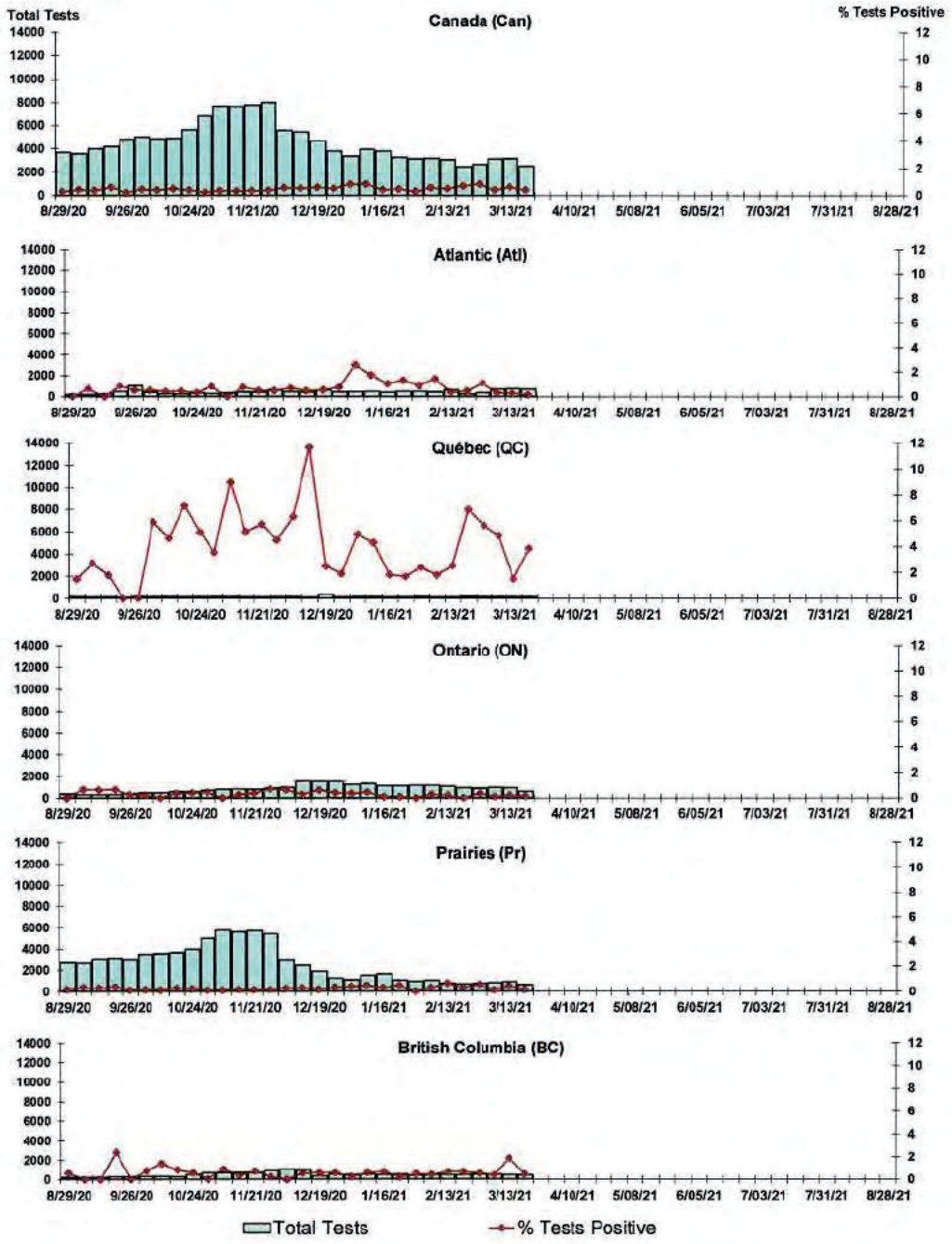


Figure 6: Positive human metapneumovirus (hMPV) Tests (%) in Canada by Region by Week of Report

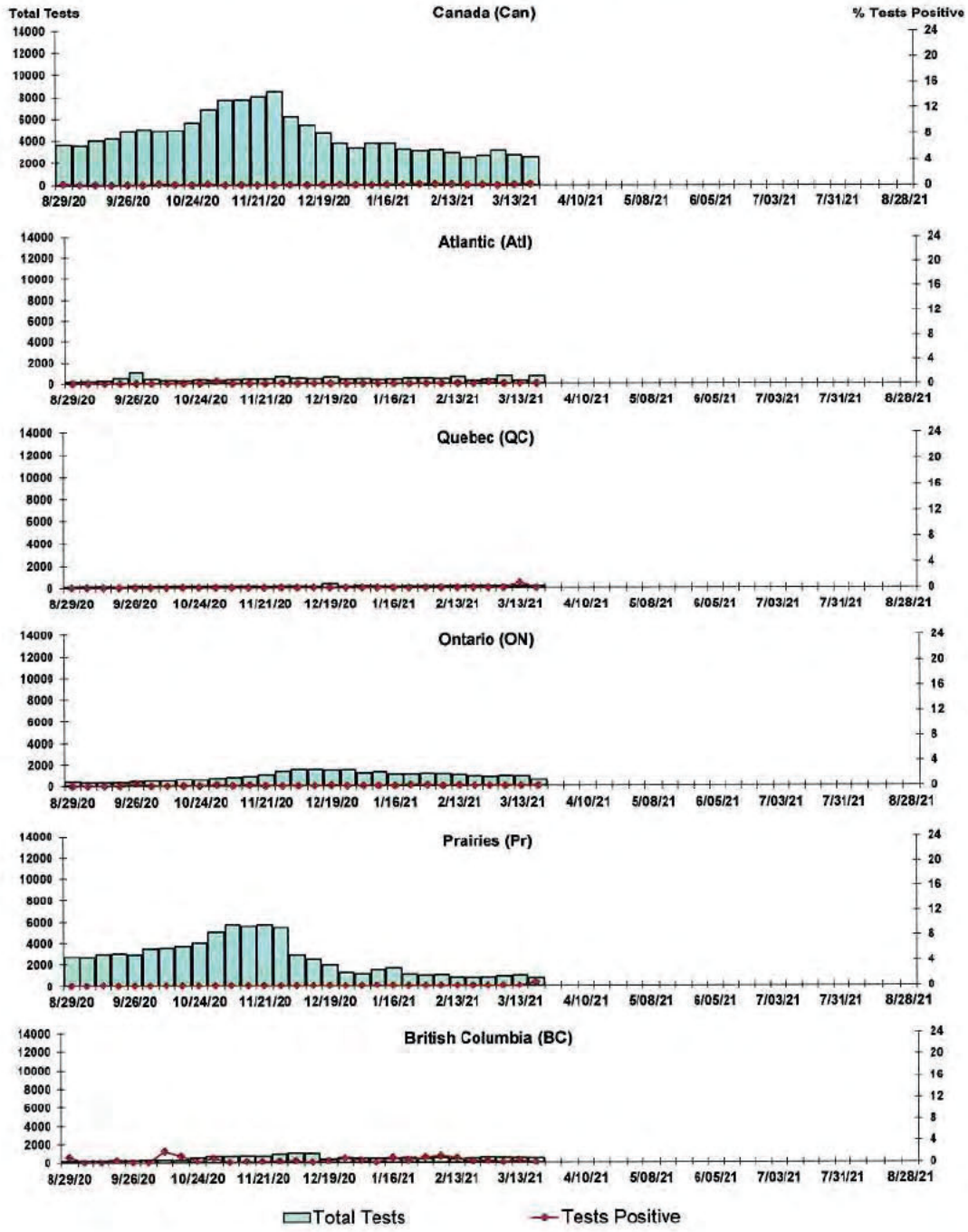


Figure 7: Positive Enterovirus/Rhinovirus (entero/rhino) Tests (%) in Canada by Region by Week of Report

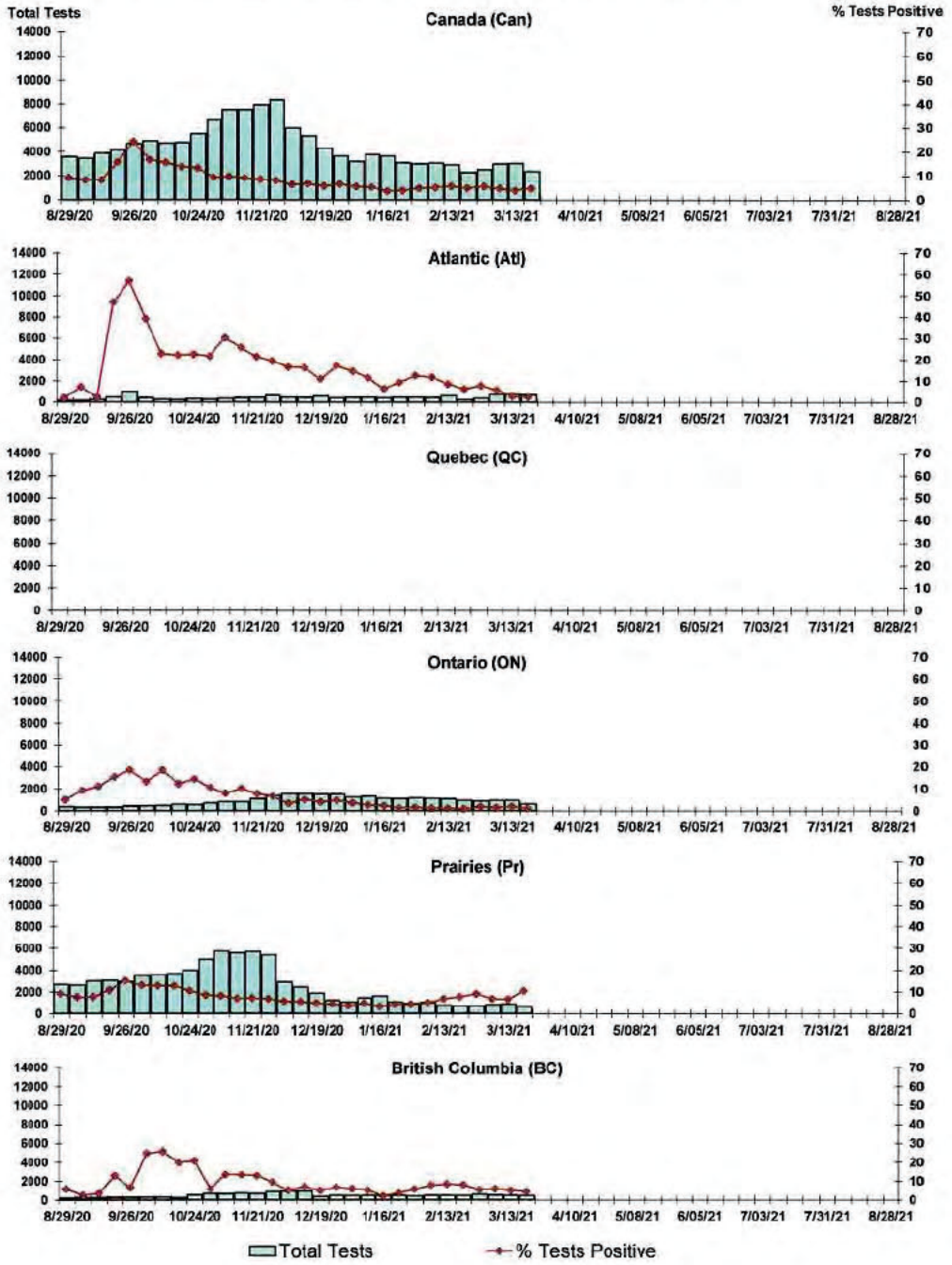
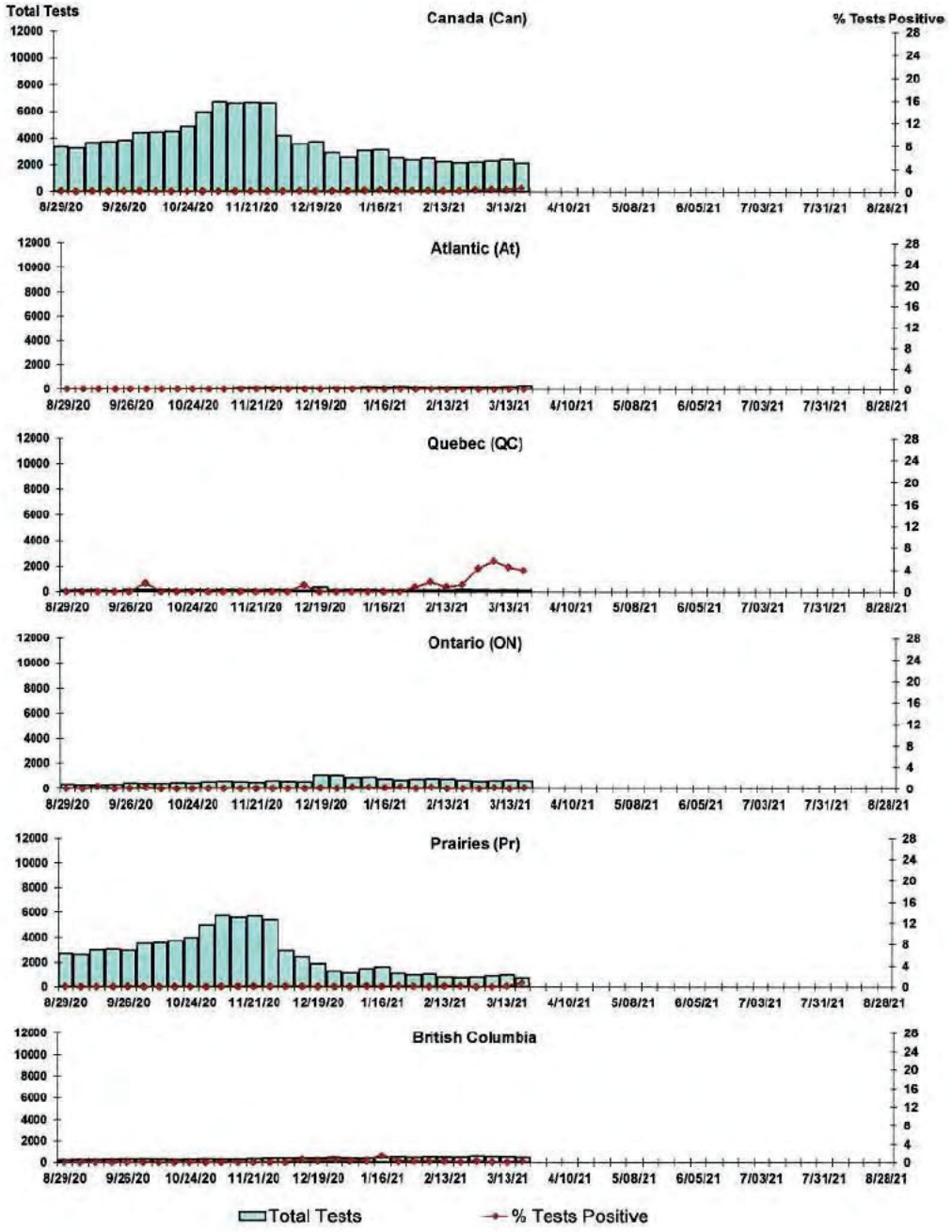


Figure 8: Positive Coronavirus (coron) Tests (%) in Canada by Region by Week of Report



Abbreviations:

A(H1N1)pdm09: Influenza A(H1N1)pdm09
A(H3): Influenza A(H3N2)
A (UnS): Influenza A (Unsublyped)
Adeno: Adenovirus
CHEO: Children's Hospital of Eastern Ontario
Coron: Coronavirus
Entero: Enterovirus
hMPV: human metapneumovirus
HSC: Health Sciences Centre
N.A.: Not Applicable
P.H.L.: Public Health Laboratory
P.H.O.L.: Public Health Ontario Laboratory
PIV: Parainfluenza
Rhino: Rhinovirus
RSV: Respiratory syncytial virus
UHN: University Health Network

Notes:

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Specimens from Yukon (YT), Northwest Territories (NT) and Nunavut (NU) are sent to reference laboratories in other provinces. Results reported for the Territories reflect the number of specimens that are identified as originating from YT, NT or NU.

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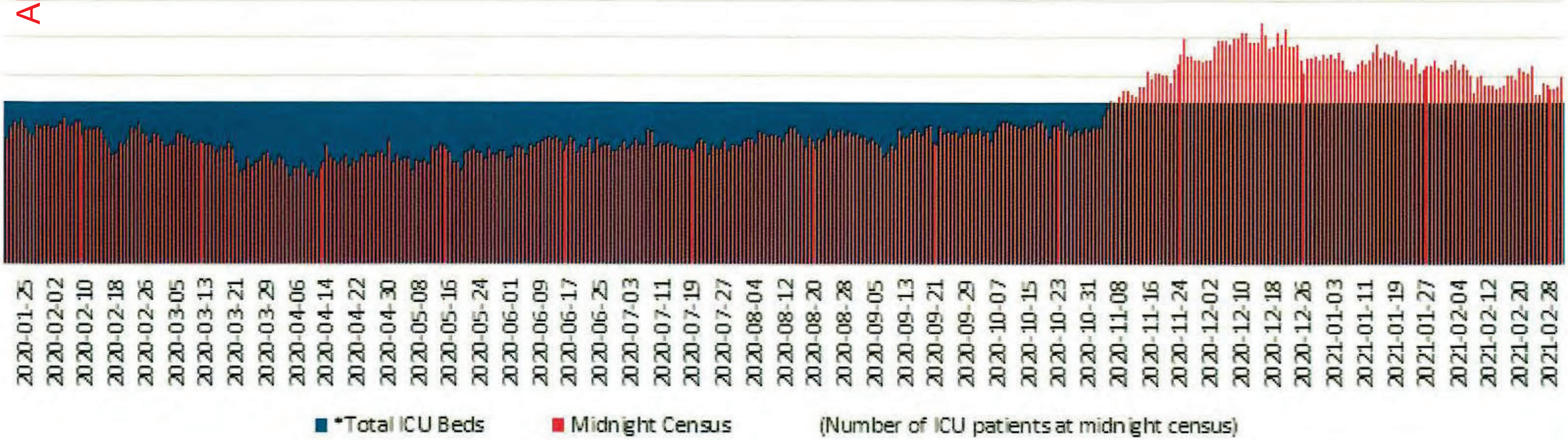
Due to reporting delays, the sum of weekly report totals do not add up to cumulative totals.

AB2464

Provincial Daily ICU & Midnight Census



This is Exhibit "E" referred to in the Affidavit of Carla Loeppky affirmed before me this 30th day of April, 2021.

A Barrister-at-law in and for the
Province of Manitoba.

Manitoba Health, Seniors and Active Living (MHSAL)

Influenza Surveillance Report 2019–2020

Week 12 (Mar. 15 – 21, 2020)

Data extracted : Mar. 27, 2020 at 11:00 am

Last Seasonal Report

Provincial Update: Influenza A viruses continue to circulate at a high level provincially. Laboratory-confirmed influenza outbreaks continue to occur. In Week 12, of all tested respiratory patients, 21.9% were tested positive for influenza. Influenza B detections continued to decrease. Activity levels in a few syndromic indicators increased in the last two weeks likely due to increased COVID-19 activity and increased concerns over COVID-19. The number of respiratory visits to the Emergency Department increased significantly in Week 11 and decreased in Week 12 to expected levels for this time of a year. This is the final seasonal influenza surveillance report for 2019–2020.

High Influenza A Activity

National Update: As of Week 11, influenza activity continued to be reported in all regions in Canada. Influenza-like illness activity reported by sentinel practitioners and FluWatchers increased this week. Two thirds of influenza detections were influenza A, and among those subtyped, A(H1N1) continued to be the dominant subtype circulating in Canada. The highest cumulative hospitalization rates are among children under 5 years of age and adults 65 years of age and older. Hospitalizations among adults are predominantly due to influenza A, while those among children are due to a mix of influenza A and B.

International Update: In Week 11, laboratory confirmed flu activity as reported by clinical laboratories continued to decrease; however, influenza-like illness activity increased. Influenza severity indicators remain moderate to low overall, but hospitalization rates differ by age group, with high rates among children and young adults.

Laboratory** — This Week

Laboratory-confirmed influenza cases:

- Influenza A: **38**
- Influenza B: **3**

From Sept.

- Influenza A: **1158**
- Influenza B: **698**

Severity — Week 11

Severe outcomes associated with influenza:

- Hospitalizations: **1**
- ICU* admissions: **0**
- Deaths: **0**

From Sept.

- Hospitalizations: **403**
- ICU* admissions: **40**
- Deaths: **29**

Outbreaks — This Week

Laboratory-confirmed influenza outbreaks:

- Influenza A: **1**
- Influenza B: **0**
- Influenza A & B: **0**

From Sept.

- Influenza A: **32**
- Influenza B: **6**
- Influenza A & B: **1**

Calls — This Week

Calls to Influenza Service at Health Links–Info Santé: **70**

Physician Visits — This Week

Visits to sentinel physicians due to ILI: **2.6%**

Vaccine — As of Mar. 26

- Percentage of Manitoba residents immunized with the seasonal influenza vaccine: **26.3%**

Antiviral — This Week

Units of antiviral dispensed from pharmacies: **49**

ER Visits — This Week

Respiratory visits to Emergency Department (ED): **158/day**

Note: * ICU admissions were also included in hospitalizations.
**Laboratory-confirmed influenza cases were reported from the provincial Laboratory Information Management System (LIMS).
Numbers are subject to change. Missed events in the current report due to a delay of submission to MHSAL will be included in later reports when data become available.

Influenza Surveillance Report 2019–2020

Figure 1. Weekly Cases of Laboratory-Confirmed Influenza, Manitoba

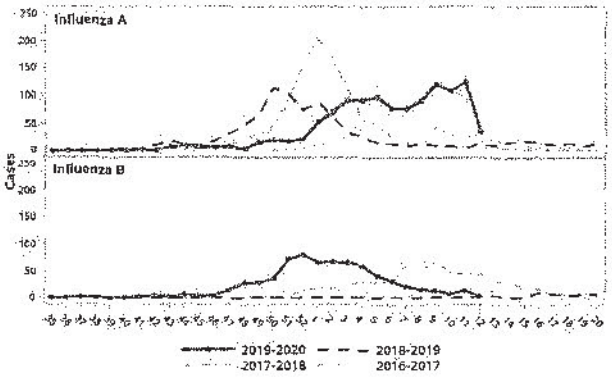


Figure 2. Weekly Influenza and ILI Outbreaks, Manitoba

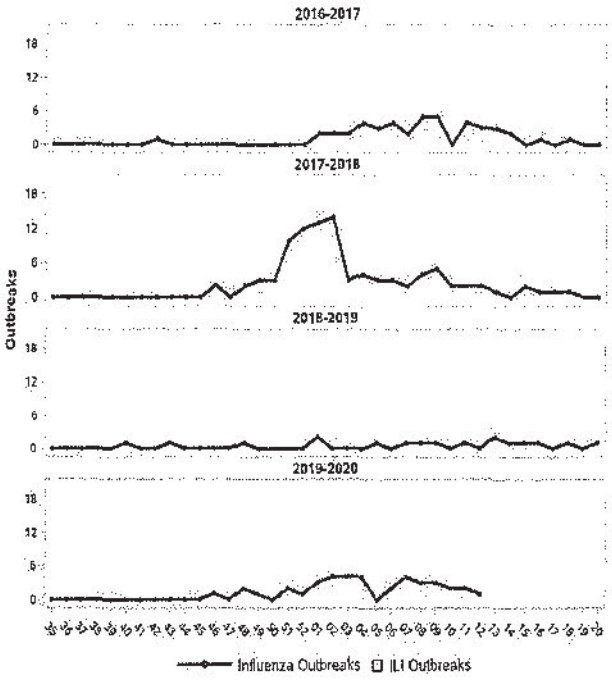


Figure 3. Average Daily Respiratory Visits to Emergency Department and % of Total Visits, Winnipeg Regional Health Authority, Manitoba

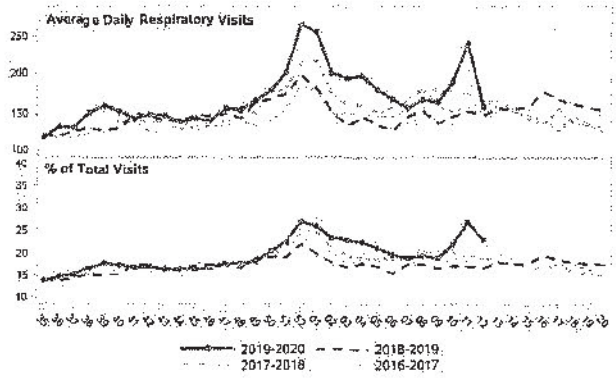


Table 1. Antiviral Resistance of Isolates by Influenza Type and Subtype since September 1, 2019

		Oseltamivir		Zanamivir	
		R*	S**	R*	S**
Canada	A(H3N2)	0	155	0	155
	A(H1N1)	1	250	0	251
	B	0	263	0	263
Manitoba	A(H3N2)	0	8	0	8
	A(H1N1)	0	21	0	21
	B	0	47	0	47

** Resistant **Sensitive*

Table 2. Influenza Strain Characterization reported by National Microbiology Laboratory since September 1, 2019

Strain	Number of viruses	
	Canada	Manitoba
Influenza A (H3N2)		
A/Kansas/14/2017-like	55	1
Influenza A (H1N1)		
A/Brisbane/02/2018-like	474	26
Influenza B		
B/Colorado/06/2017-like	180	17
Influenza B		
B/Phuket/3073/13-like	2	0

As per the World Health Organization (WHO), all seasonal quadrivalent influenza vaccines for 2019–2020 in the northern hemisphere contain those strains.

This is Exhibit "F" referred to in the Affidavit of Carla Loeppky affirmed before me this 30th day of April, 2021.

A Barrister-at-law in and for the
Province of Manitoba.

Manitoba Health, Seniors and Active Living (MHSAL)

Influenza Surveillance Report 2018–2019

Week 19–20 (May. 5–18, 2019)
Data extracted May. 24, 2019 at 11:00 am
Last report for this season

Low and Sustained Activity

Provincial Update: There has been a sustained and low-level influenza activity in Manitoba. This week, 19.4% of respiratory specimens were tested positive for influenza. There have been 977 laboratory-confirmed influenza cases since September, mostly with influenza A(H1N1). Between mid-February and April, influenza A(H3N2) was the most detected influenza virus. From April, influenza A(H1N1), A(H3N2) and B have been co-circulating. This is the final seasonal influenza surveillance report for 2018-2019.

National Update: As of Week 19, influenza activity continued to decline overall. Detections of influenza A (H3N2) and influenza A (H1N1) pdm09 accounted for 83% and 71% of subtyped influenza A detections, respectively. Overall, influenza A viruses predominated for this season, and there are very few influenza B viruses circulating when compared to previous seasons.

International Update: As of Week 20, Influenza activity continued to decrease in the United States. Influenza A(H1N1) viruses predominated from October to mid-February, and influenza A(H3N2) has been more commonly identified since late February. A small number of influenza B viruses have also been reported.

Laboratory

Laboratory-confirmed influenza cases in Week 19–20:

- Influenza A cases: **23**
- Influenza B cases: **12**

Since Sept. 1, 2018:

- *Influenza A cases: **926***
- *Influenza B cases: **51***

Severity

Severe outcomes associated with laboratory-confirmed diagnosis of influenza in Week 19–20:

- Hospitalizations: **7**
- ICU* admissions: **<5**
- Deaths: **<5**

Since Sept. 1, 2018:

- *Hospitalizations: **228***
- *ICU* admissions: **42***
- *Deaths: **17***

Outbreak

Laboratory-confirmed influenza outbreaks in Week 19–20:

- Influenza A outbreaks: **<5**
- Influenza B outbreaks: **0**
- Influenza A & B outbreaks: **0**

Since Sept. 1, 2018:

- *Influenza A outbreaks: **17***
- *Influenza B outbreaks: **0***
- *Influenza A & B outbreaks: **0***

Syndromic in Community

Calls to Influenza Service at Health Links–Info Santé:

- Week 19: **17**
- Week 20: **24**

Syndromic in Care

Visits to sentinel physicians due to ILI :

- Week 19: **0.8%**
- Week 20:**1.6%**

Units of antiviral dispensed from pharmacies:

- Week 19: **14**
- Week 20: **8**

Syndromic in ED

Respiratory visits to Emergency Department (ED):

- Week 19: **156/day**
- Week 20: **152/day**

Immunization

As of May 24, 2019:

- *Percentage of Manitoba residents immunized with the seasonal influenza vaccine: **23.6%***

Antiviral Susceptibility

Isolates resistant to antiviral since Sept. 1, 2018 in Canada:

- *Oseltamivir: **4** (out of 1287 tests)*
- *Zanamivir: **0** (out of 1286 tests)*

Regional Health Authority

Influenza cases (cases/100,000 population) since Sept. 1, 2018:

- *Winnipeg: **340 (43.7)***
- *Southern: **139 (68)***
- *Interlake-Eastern: **114 (87.5)***
- *Prairie Mountain: **199 (116.4)***
- *Northern: **185 (240.7)***

Note. * ICU admissions were also included in hospitalizations.

Time trends in this report were analyzed by epidemiology week.

Numbers are subject to change. Missed events in the current report due to a delay of submission to MHSAL will be included in later reports when data become available.

Figure 1. Weekly Cases of Laboratory-Confirmed Influenza, Manitoba

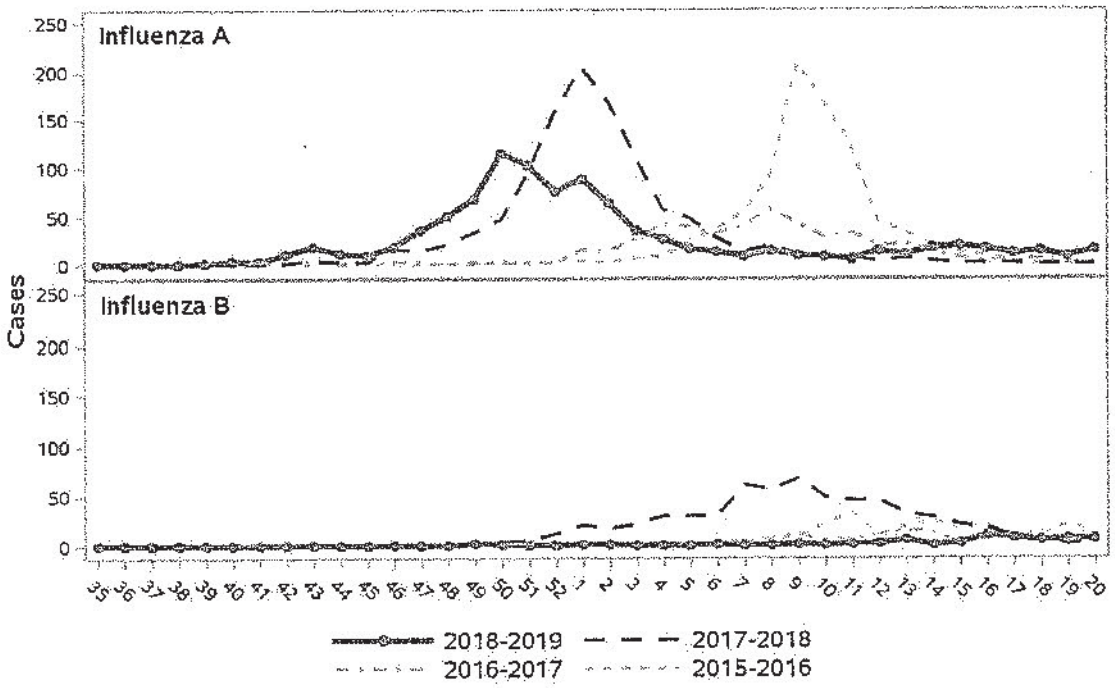


Figure 2. Distribution of Influenza Cases since September 1, 2018 by Age Group, Manitoba, 2018–2019

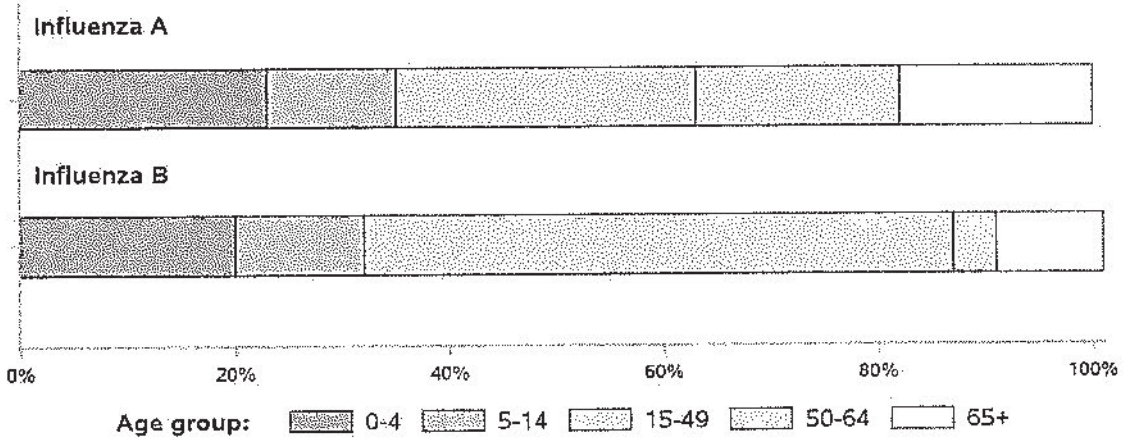


Figure 3 Weekly Influenza and ILI Outbreaks, Manitoba

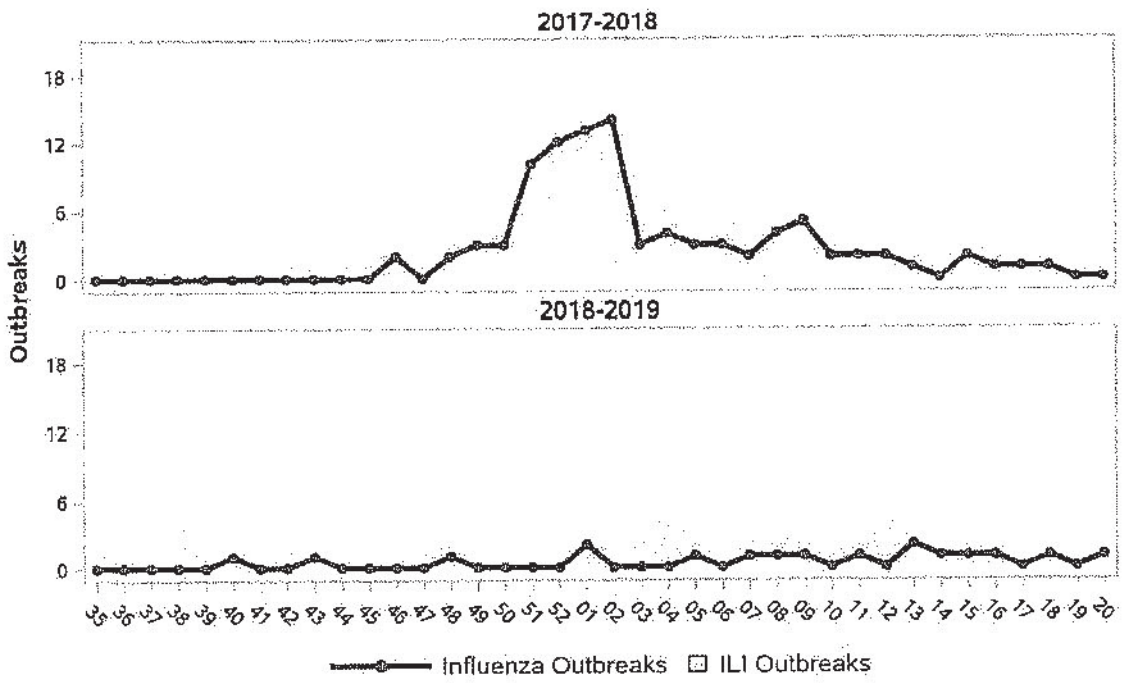


Figure 4 Weekly Influenza Related Calls to Health Links - Info Santé, Manitoba

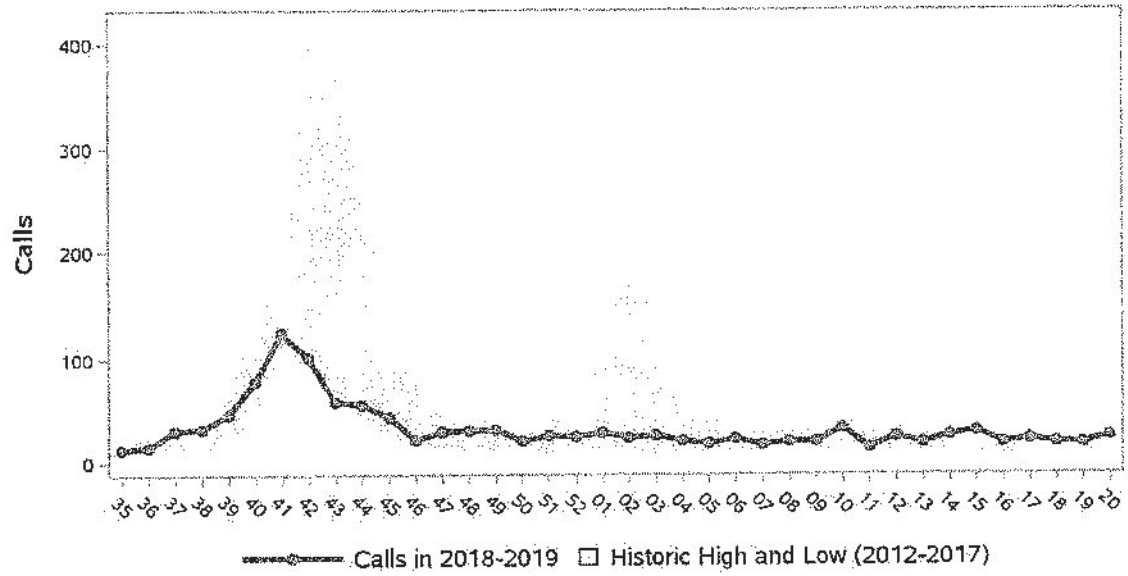


Figure 5 Weekly % of ILI Related Visits to Sentinel Physicians, Manitoba

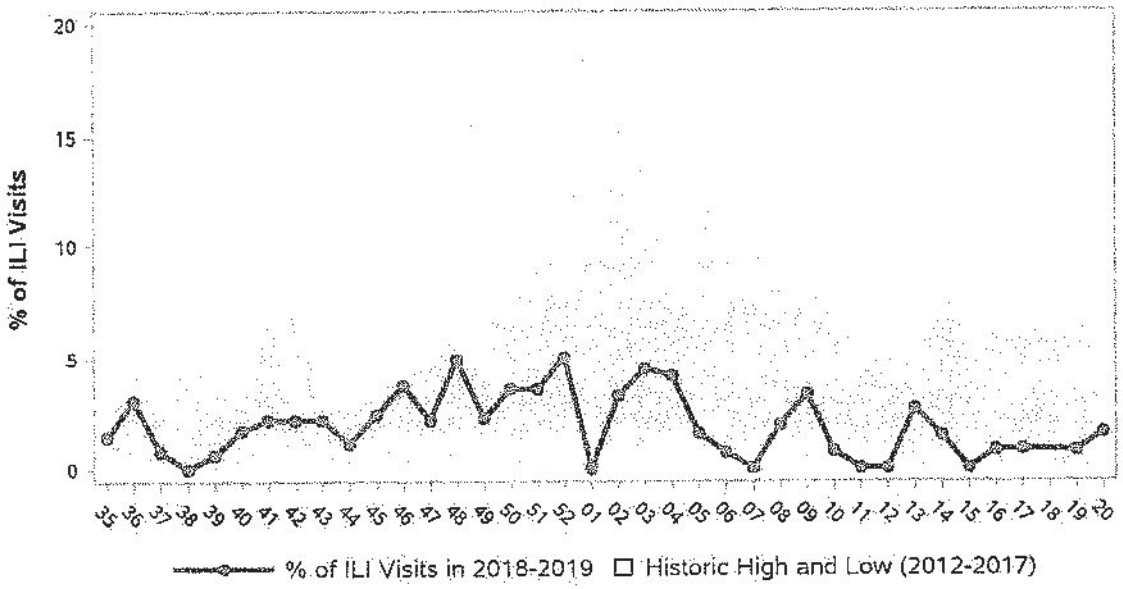


Figure 6 Weekly Units of Antiviral Dispensed from Pharmacies, Manitoba

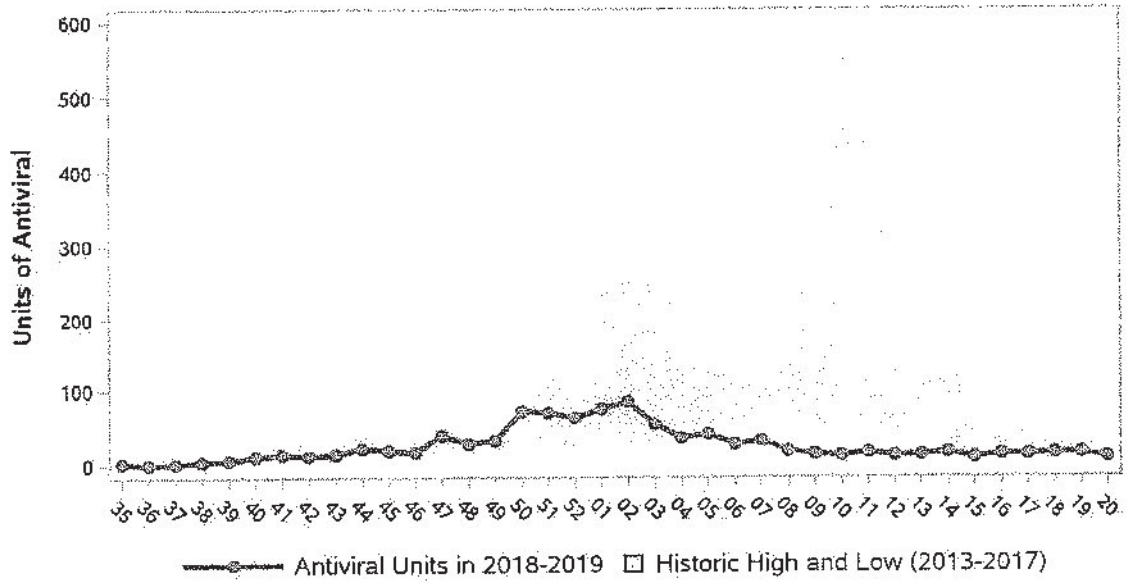


Figure 7 Weekly Respiratory Visits to Emergency Department and % of Total, Winnipeg Regional Health Authority, Manitoba

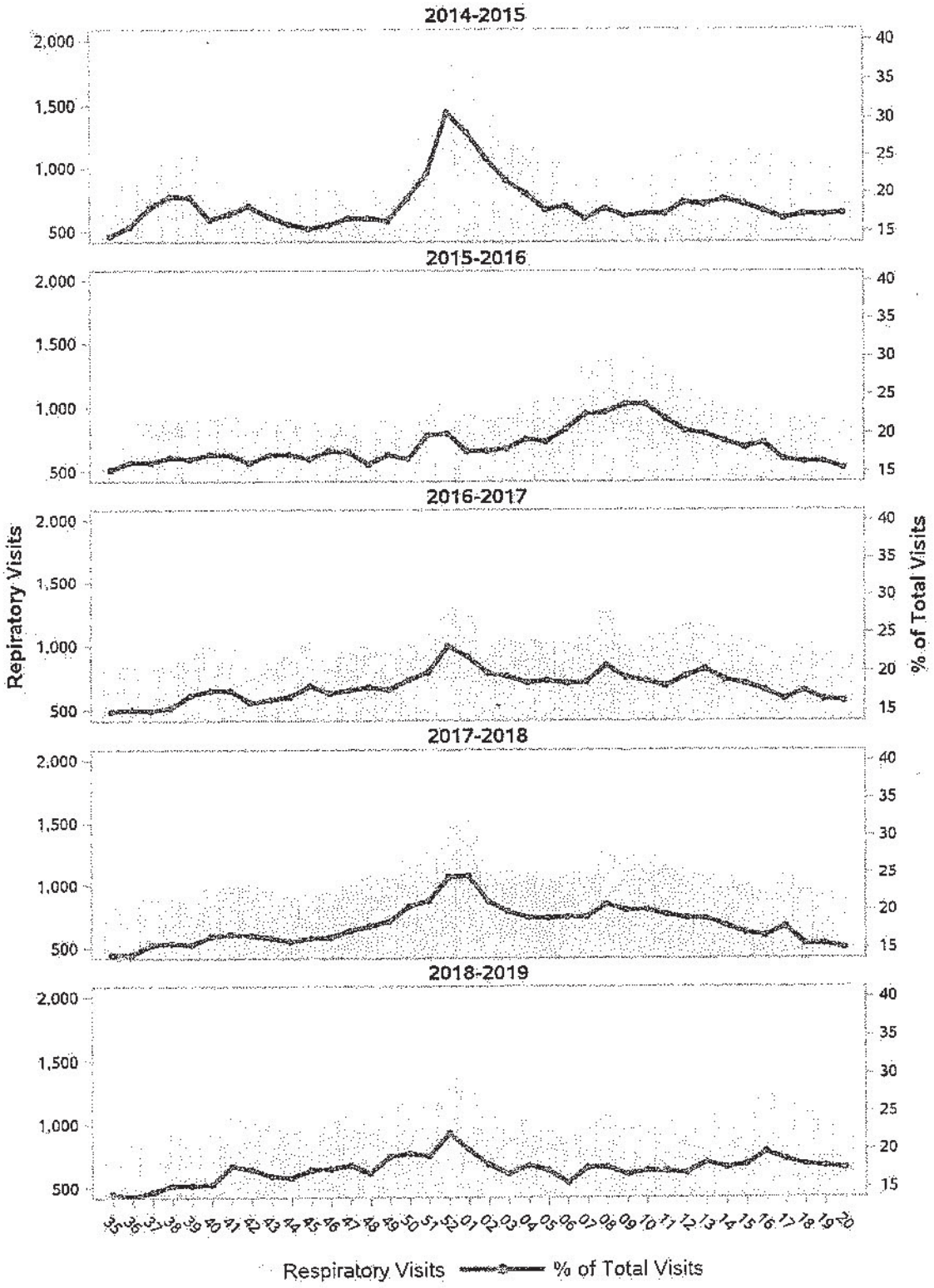


Table 1. Antiviral Resistance of Isolates by Influenza Type and Subtype since September 1, 2018, 2018–2019

		Oseltamivir		Zanamivir		Amantadine	
		Resistant	Sensitive	Resistant	Sensitive	Resistant	Sensitive
Canada	A(H3N2)	0	167	0	167	89	0
	A(H1N1)	4	1035	0	1038	360	0
	B	0	81	0	81	N/A	N/A
Manitoba	A(H3N2)	0	5	0	5	8	0
	A(H1N1)	0	77	0	77	29	0
	B	0	9	0	9	N/A	N/A

- N/A = Not applicable

Table 2. Influenza Strain Characterization reported by National Microbiology Laboratory since September 1, 2018, 2018–2019

Strain	Number of viruses	
	Canada	Manitoba
A/Singapore/INFIMH-16-0019/2016 (H3N2)-like	295	8
A/Michigan/45/2015 (H1N1)-like	1612	96
B/Colorado/06/2017-like	129	9
B/Phuket/3073/2013-like	23	1

- As per World Health Organization (WHO), all seasonal quadrivalent influenza vaccines for 2018–2019 in the northern hemisphere contain those strains.

Since September 1, 2018, National Microbiology Laboratory (NML) has characterized:

1. 488 influenza A(H3N2) viruses
   - 162 influenza A (H3N2) viruses were antigenically characterized as A/Singapore/INFIMH-16-0019/2016-like by HI testing using antiserum raised against egg-propagated A/Singapore/INFIMH-16-0019/2016. A/Singapore/INFIMH-16-0019/2016 is the influenza A/H3N2 component of the 2018-19 Northern Hemisphere influenza vaccine. 101 influenza A (H3N2) viruses characterized belonged to genetic group 3C.2a1. 20 viruses belonged to genetic group 3C.2a and 116 to 3C.3a. Sequencing is pending for the remaining isolates.
   - 133 viruses showed reduced titer with ferret antisera raised against egg-propagated A/Singapore/INFIMH-16-0019/2016.
   - 193 influenza A(H3N2) viruses did not grow to sufficient hemagglutination titer for antigenic characterization by hemagglutination inhibition (HI) assay. Therefore, NML has performed genetic characterization to determine the genetic group identity of these viruses. Sequence analysis of the HA gene of the viruses showed that 20 viruses belonged to genetic group 3C.2a, 168 viruses belonged to subclade 3C.2a1, and four viruses belonged to 3C.3a. One isolate could not be sequenced. A/Singapore/INFIMH-16-0019/2016-like virus belongs to genetic group 3C.2a1 and is the influenza A/H3N2 component of the 2018-19 Northern Hemisphere influenza vaccine.
2. 1612 influenza A(H1N1) viruses
   - 1569 H1N1 viruses characterized were antigenically similar to A/Michigan/45/2015, which is the influenza A/H1N1 component of the 2018-19 Northern Hemisphere influenza vaccine.
   - 43 viruses showed reduced titer with ferret antisera raised against cell culture-propagated A/Michigan/45/2015.

3. 152 influenza B viruses:

   - 23 influenza B viruses were characterized as B/Phuket/3073/2013-like, which belongs to the Yamagata lineage and is included as an influenza B component of the 2018-19 Northern Hemisphere quadrivalent influenza vaccine.
   - 29 influenza B viruses were characterized as B/Colorado/06/2017, which belongs to the Victoria lineage and is included as an influenza B component of the 2018-19 Northern Hemisphere influenza vaccine.
   - 100 viruses showed reduced titer with ferret antisera raised against cell culture-propagated B/Colorado/06/2017. Sequence analysis showed that 83 viruses that showed reduced titer had a three amino acid deletion (162-164) in the HA gene.

Appendix

Data Sources

Laboratory Surveillance

Detections of influenza nucleic acid detection, culture isolation, and enzyme immunoassay (EIA) are reported from Cadham Provincial Laboratory (CPL) and occasionally other laboratories. These reports are forwarded to Epidemiology and Surveillance (E&S) within 24 hours of confirmation. CPL also performs testing for other respiratory viruses including parainfluenza, RSV, adenovirus, rhinovirus, coronavirus, enterovirus, and bocavirus, which are reported to E&S on a weekly basis.

Influenza Associated Hospitalizations, ICU Admissions and Deaths

Each influenza season on a weekly basis, the Public Health Office in each Regional Health Authority (RHA) is requested to submit a line list of hospitalizations, Intensive Care Unit (ICU) admissions and deaths for laboratory-confirmed influenza patients that were admitted in hospitals in the reporting RHA or deceased as the registered residents of the reporting RHA.

The reason for the hospitalizations, ICU admissions or the cause of deaths does not have to be attributable to influenza. Instead, a temporal association with a positive influenza laboratory result is sufficient due to the requirement for timely reporting. Submissions are cleaned by E&S to remove duplicate submissions for the same patient within the same illness episode. In this report, only Manitoba residents are included.

Outbreak

Outbreaks are reported to E&S by a phone call or email from public health staff within RHAs or from CPL advising the assignment of an outbreak code. CPL submits both positive and negative laboratory results related to outbreaks to E&S. Outbreak investigations are reported from RHAs to E&S by completing an outbreak summary report form electronically through the Canadian Network for Public Health Intelligence (CNPHI) or on paper.

Health Links – Info Santé

Health Links–Info Santé is a 24-hour, 7-days a week telephone information service. It is staffed by registered nurses with the knowledge to provide answers to health care questions and guidance to appropriate care over the phone. When a caller phones Health Links–Info Santé and selects Influenza Service, they are given an option to select information on (1) the groups of individuals who are at an increased risk of serious illness, (2) how to arrange an influenza vaccine, (3) the annual influenza immunization campaign, or (4) the management of influenza and its potential complications.

ILI Visits to Sentinel Physicians

Manitoba participates in *FluWatch*, the Canada's national surveillance system co-ordinated by Public Health Agency of Canada (PHAC), which monitors the spread of influenza and ILI on a year-round basis. *FluWatch* consists of a network of laboratories, hospitals, doctor's offices and provincial and territorial ministries of health. In 2018–2019, there are 19 sentinel physicians recruited throughout Manitoba reporting to *FluWatch* weekly. E&S receives weekly reports from *FluWatch* which present the ILI rate for Manitoba and for each participating sentinel physician. The reporting sentinel physicians are different by week and their reports may not be representative of ILI activity across the province.

Antiviral Dispensing

The units of antiviral drugs, Oseltamivir and Zanamivor, dispensed from community retail pharmacies to Manitoba residents are reported to E&S from Drug Programs Information Network (DPIN) on a weekly basis. Antiviral drugs dispensed to in-patients or through nursing stations could not be included in this report due to lack of data.

Respiratory Visits to Emergency Department

Daily statistics of visits to Emergency Department (ED) that are related to respiratory illness in Winnipeg Regional Health Authority (WRHA) are submitted to E&S weekly. ILI cases are defined as patients whose triage chief complaints contain either of these symptoms: weakness, shortness of breath, cough, headache, fever, cardiac/respiratory arrest, sore throat, and upper respiratory tract infection complaints.

Immunization

Immunization data were extracted from Panorama, the provincial immunization registry. The report includes clients who have received one or more valid doses of the influenza vaccine and who have active registration with Manitoba Health, Seniors and Active Living (MHSAL) at the time that the report is generated (i.e. it is not based on the number of doses in the registry divided by the population of Manitoba). This report coverage does not include the following:

- clients who have moved or passed away and are now inactive in the client registry;
- clients who receive services from public health in Manitoba, but have been entered in the Immunization Registry as inactive clients;
- clients who are not in the registry, such as immigrants and refugees, visiting students, and visitors who are not registered for health services in Manitoba;
- doses that have not been reported to MHSAL.

Antiviral Resistance

Influenza and Respiratory Viruses Section of National Microbiology Laboratory (NML) undertakes enhanced surveillance, investigations, and research on influenza and other respiratory pathogens. A sample of positive influenza specimens isolated by culture is referred from each provincial laboratory to NML for strain characterization and antiviral resistance testing. The aggregate level information is then shared with provinces and territories on a weekly basis.

Circulating Strain

NML antigenically characterizes influenza viruses received from Canadian laboratories year-round. In Manitoba, representative samples of influenza viruses isolated by culture, from different regions, time periods and outbreaks, is referred from CPL to NML for strain characterization.

Immunization Program

As per World Health Organization (WHO), all seasonal quadrivalent influenza vaccines for 2018-2019 in the northern hemisphere contain:

- A/Michigan/45/2015 (H1N1)pdm09-like virus
- A/Singapore/INFIMH-16-0019/2016 (H3N2)-like virus
- B/Colorado/06/2017-like virus (B/Victoria/2/87 lineage)
- B/Phuket/3073/2013-like virus (not included in the trivalent high dose influenza vaccine)

For the 2018–2019 influenza season, MHSAL has been allotted the quadrivalent inactivated vaccines (QIV), Fluzone® Quadrivalent (Sanofi Pasteur) and FluLaval Tetra® (GlaxoSmithKline), and the quadrivalent live attenuated influenza vaccine (QLAIV), FluMist® Quadrivalent (AstraZeneca), as part of the province's Publicly-Funded Seasonal Influenza Immunization Program.

Fluzone® High-Dose (Sanofi Pasteur), is being offered again to people 65 years of age or older that are living in long-term care facilities (LTCF) in Manitoba, including chronic care residents. Clients in interim/transitional care beds, respite care clients, and new or unimmunized residents admitted to a LTCF during the flu season are also eligible. This vaccine is a trivalent inactivated vaccine (TIV) and contains four times the amount of influenza virus antigen per strain compared to the standard-dose influenza vaccine. Therefore, this vaccine is expected to provide better protection against seasonal influenza than the standard-dose vaccine.

Abbreviations

CPL	Cadham Provincial Laboratory
CNPHI	Canadian Network for Public Health Intelligence
E&S	Epidemiology and Surveillance
ED	Emergency Department
ICU	Intensive Care Unit
ILI	Influenza-Like-Illness
LTCF	Long Term Care Facility
MHSAL	Manitoba Health, Seniors and Active Living
NML	National Microbiology Laboratory
PHAC	Public Health Agency of Canada
RHA	Regional Health Authority
RSV	Respiratory Syncytial Virus
WRHA	Winnipeg Regional Health Authority

Explanatory Notes and Definitions

Cumulative Data

Cumulative data include updates to previous weeks; due to reporting delays or amendments, the sum of weekly report totals may not add up to cumulative totals.

Data Extraction Date

Manitoba-specific information contained within this report is based on data confirmed at 11:00 am on the date of data extraction.

Epidemiology Week

Time trends in this report are presented by epidemiology week, a schedule used by the national FluWatch program coordinated by PHAC.

Incidence Rate

Incidence rate measures the frequency that influenza occurs in a population. It is calculated as the total number of new cases this influenza season multiplied by 100,000 and divided by the total population in each region. Regional populations are based on the Manitoba Health Population Report 2016.

ILI in General Population

Acute onset of respiratory illness with fever and cough and with one or more of the following – sore throat, arthralgia, myalgia, or prostration, which is likely due to influenza. In children under 5,

gastrointestinal symptoms may also be present. In patients under 5 or 65 and older, fever may not be prominent.

ILI Outbreak

Schools: Greater than 10% absenteeism (or absenteeism that is higher (e.g. >5-10%) than expected level as determined by school or public health authority) which is likely due to ILI.

Hospitals and residential institutions: Two or more cases of ILI within a seven-day period.

Other settings: Two or more cases of ILI within a seven-day period, including at least one laboratory confirmed case; i.e. workplace, closed communities.

Specimen Collection Date

The date the laboratory specimen was taken is used to assign cases to the epidemiology week in this report. Occasionally, if the specimen collection date is not available, the laboratory report date will be used.

Epidemiology and Surveillance
Manitoba Health, Seniors and Active Living
flusurveillance@gov.mb.ca
(204)786-7335

Other Epidemiology and Surveillance reports
http://www.gov.mb.ca/health/publichealth/surveillance/index.html

National Influenza Surveillance
http://www.phac-aspc.gc.ca/fluwatch/index-eng.php

This is Exhibit "G" referred to in the Affidavit of Carla Loeppky affirmed before me this 30th day of April, 2021.

A Barrister-at-law in and for the
Province of Manitoba.

epiREPORT

Manitoba Health, Seniors and Active Living

Annual Report of

SEASONAL INFLUENZA

2017–2018

Epidemiology and Surveillance
Cadham Provincial Laboratory

Manitoba

Acknowledgements

A dedicated team of individuals throughout Manitoba contribute to influenza surveillance including healthcare providers, laboratory personnel, regional public health employees and many more.

Epidemiology & Surveillance
Information Management & Analytics
Manitoba Health, Seniors, and Active Living
2019

Please email your feedback or comments to flusurveillance@gov.mb.ca

Executive Summary

Seasonal influenza can cause severe morbidity and mortality, especially in vulnerable populations, and the burden is highly variable. In Manitoba, influenza is reportable under *The Public Health Act*. Routine monitoring and reporting of influenza is performed year-round by Epidemiology and Surveillance (E&S) at Manitoba Health, Seniors and Active Living (MHSAL) in collaboration with Cadham Provincial Laboratory (CPL). During an influenza season, typically between November and May, E&S produces weekly seasonal influenza reports to provide timely updates. The annual influenza report summarizes all influenza related information between July 1 and June 30 with more in-depth analysis, aiming to summarize the season in its broad trends.

In 2017–2018, the influenza activity increased from mid November 2017, peaked at the beginning of January 2018, and remained elevated through April. Overall, the 2017–2018 influenza season was the most severe and prolonged since the 2010–2011 influenza season. The number of laboratory confirmed influenza cases and hospitalization rates were both the highest from 2010–2011.

The influenza A(H3N2) virus was the predominant circulating strain in Manitoba in 2017–2018. The influenza A activity level was high and similar to 2014–2015, the last severe influenza A(H3N2)-predominant season. In addition, there was also prolonged and high influenza B activity between December 2017 and April 2018.

In 2017–2018, the highest rates of illness associated with both influenza A and B were observed in the population aged 65 years and older. There were also high rates of illness in children under the age of five years.

Fluzone® High-Dose, a trivalent inactivated vaccine (TIV) product expected to provide better protection, was offered to elderly people aged 65 years and older living in long-term care facilities (LTCFs) in 2017–2018. Fewer influenza A outbreaks were reported in LTCFs in 2017–2018 compared with 2014–2015, the last severe influenza A(H3N2)-predominant season. However, a higher number of influenza B outbreaks than 2014–2015 were reported from LTCFs likely due to the mismatch between the influenza B component in this vaccine and the circulating influenza B viruses.

As of March 31, 2018, 22.5% of all Manitoba residents had received at least one dose of influenza vaccine. The population coverage of influenza vaccines has been relatively stable, 20%– 23%, over the past few seasons including 2017–2018. Regional variance continued to be present in 2017–2018 and varied by age group. In young children aged 0–4 years, the coverage rate in Winnipeg Regional Health Authority (WRHA) was approximately two to three times higher than the coverage rate in Northern Health Region (NH), Prairie Mountain Health (PMH) and Southern Health-Santé Sud (SH-SS).

Physicians were the most common providers of influenza immunizations and pharmacists were the second most common providers in 2017–2018.

Table of Contents

Acronyms

AEFI	Adverse Event Following Immunization
CI	Confidence Interval
CPL	Cadham Provincial Laboratory
DPIN	Drug Programs Information Network
E&S	Epidemiology and Surveillance
EIA	Enzyme Immunoassay
ICU	Intensive Care Unit
ILI	Influenza–like Illness
IRVS	Influenza and Respiratory Viruses Section
LTC	Long Term Care
LTCF	Long Term Care Facility
MHSAL	Manitoba Health, Seniors and Active Living
MIMS	Manitoba Immunization Monitoring System
MOH	Medical Officer of Health
NML	National Microbiology Laboratory
PCR	Polymerase Chain Reaction
PHCC	Provincial Health Contact Centre
PHAC	Public Health Agency of Canada
PHIMS	Public Health Information Management System
QLAIV	Quadrivalent Live Attenuated Influenza Vaccine
QIV	Quadrivalent Inactivated Vaccine
RHA	Regional Health Authority
TIV	Trivalent Inactivated Vaccine

Regional Health Authorities

WRHA	Winnipeg Regional Health Authority (includes Churchill)
SH-SS	Southern Health – Santé Sud
IERHA	Interlake-Eastern Regional Health Authority
PMH	Prairie Mountain Health
NH	Northern Regional Health Authority

Reporting Weeks

Time trends in this report are presented by epidemiological week, a schedule used by the national FluWatch program coordinated by the Public Health Agency of Canada (PHAC).

Week	Start	End	Week	Start	End
27	2017-07-02	2017-07-08	1	2017-12-31	2018-01-06
28	2017-07-09	2017-07-15	2	2018-01-07	2018-01-13
29	2017-07-16	2017-07-22	3	2018-01-14	2018-01-20
30	2017-07-23	2017-07-29	4	2018-01-21	2018-01-27
31	2017-07-30	2017-08-05	5	2018-01-28	2018-02-03
32	2017-08-06	2017-08-12	6	2018-02-04	2018-02-10
33	2017-08-13	2017-08-19	7	2018-02-11	2018-02-17
34	2017-08-20	2017-08-26	8	2018-02-18	2018-02-24
35	2017-08-27	2017-09-02	9	2018-02-25	2018-03-03
36	2017-09-03	2017-09-09	10	2018-03-04	2018-03-10
37	2017-09-10	2017-09-16	11	2018-03-11	2018-03-17
38	2017-09-17	2017-09-23	12	2018-03-18	2018-03-24
39	2017-09-24	2017-09-30	13	2018-03-25	2018-03-31
40	2017-10-01	2017-10-07	14	2018-04-01	2018-04-07
41	2017-10-08	2017-10-14	15	2018-04-08	2018-04-14
42	2017-10-15	2017-10-21	16	2018-04-15	2018-04-21
43	2017-10-22	2017-10-28	17	2018-04-22	2018-04-28
44	2017-10-29	2017-11-04	18	2018-04-29	2018-05-05
45	2017-11-05	2017-11-11	19	2018-05-06	2018-05-12
46	2017-11-12	2017-11-18	20	2018-05-13	2018-05-19
47	2017-11-19	2017-11-25	21	2018-05-20	2018-05-26
48	2017-11-26	2017-12-02	22	2018-05-27	2018-06-02
49	2017-12-03	2017-12-09	23	2018-06-03	2018-06-09
50	2017-12-10	2017-12-16	24	2018-06-10	2018-06-16
51	2017-12-17	2017-12-23	25	2018-06-17	2018-06-23
52	2017-12-24	2017-12-30	26	2018-06-24	2018-06-30

Introduction

The Epidemiology and Surveillance Unit (E&S) monitors reportable disease activity including seasonal influenza year-round. A set of both laboratory and syndromic indicators monitoring different severity levels of illness are selected for influenza surveillance.

Key findings in Manitoba between July 1, 2017 and June 30, 2018:

- A total of 7,198 respiratory specimens were tested by Cadham Provincial Laboratory (CPL). 21.4% of those specimens were positive for influenza.
- The test volume increased in winter months and peaked in Week 3 (January 14–20, 2018). Positive influenza detections peaked in Week 1 (December 31, 2017–January 6, 2018).
- Laboratory testing confirmed 1,078 influenza A cases and 603 influenza B cases.
- The influenza A season started in Week 46 (November 12–18, 2018) and peaked in Week 1 (December 31, 2017–January 06, 2018). The influenza B season started in Week 50 (December 10–16, 2017) and peaked in Week 9 (February 18–24, 2018).
- Influenza A(H3N2) was the predominant circulating strain. The population aged 65 years and older were affected the most by both influenza A and B.
- In total, 508 influenza cases were hospitalized including 35 admissions to intensive care units (ICU) and 46 individuals died. Of those hospitalized and deceased cases, 65% and 76% were aged 65 years and older.
- A total of 95 laboratory-confirmed influenza outbreaks were reported from all five regional health authorities (RHAs). The majority occurred in long term care facilities (LTCFs).
- The influenza immunization coverage in 2017–2018 was 22.5% as of March 31, 2018.
- Physicians were the most common immunization providers by delivering 38.6% of all immunizations in Manitoba. Pharmacists were the second most common providers by delivering 33.6% of all immunizations.
- Following seasonal influenza immunization, 42 individuals with adverse events were reported (13.2 cases per 100,000 administered doses), a higher rate than 2016–2017 (11.9) but lower than 2015–2016 (19.5).

We have been cautious about alternative explanations for changes in data because surveillance data can be affected by multiple factors (such as public awareness, laboratory technique, test ordering pattern, circulating strains, vaccine formulation, and staff or behaviour change) that may not reflect real changes in seasonal trends.

Syndromic Surveillance

Health Links – Info Santé

Similar to previous seasons, there were two peaks in influenza-related calls to Health Links–Info Santé in 2017–2018 (Figure 1). The first peak in Week 42 (October 15–21, 2017) coincided with the annual influenza immunization campaign. The second peak in Week 3 (January 14–20, 2018) reflected the increased influenza activity and suggested a prolonged and higher influenza activity level compared with previous seasons.

The number of calls attributable to Influenza Management-related questions accounted for the majority of calls (Figure 2).

Figure 1: Weekly influenza related calls to Health Links–Info Santé, Manitoba, 2014–2015 to 2017–2018

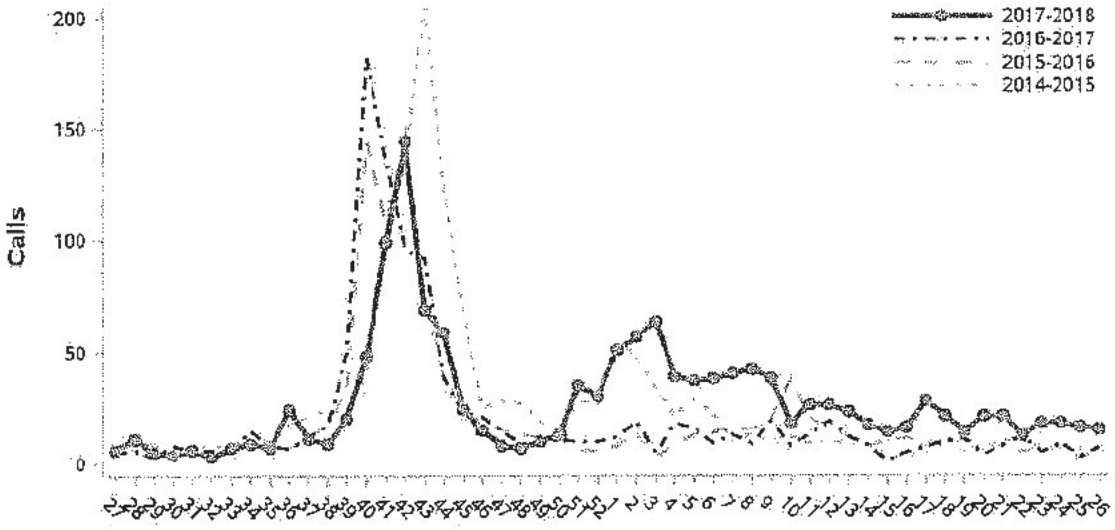
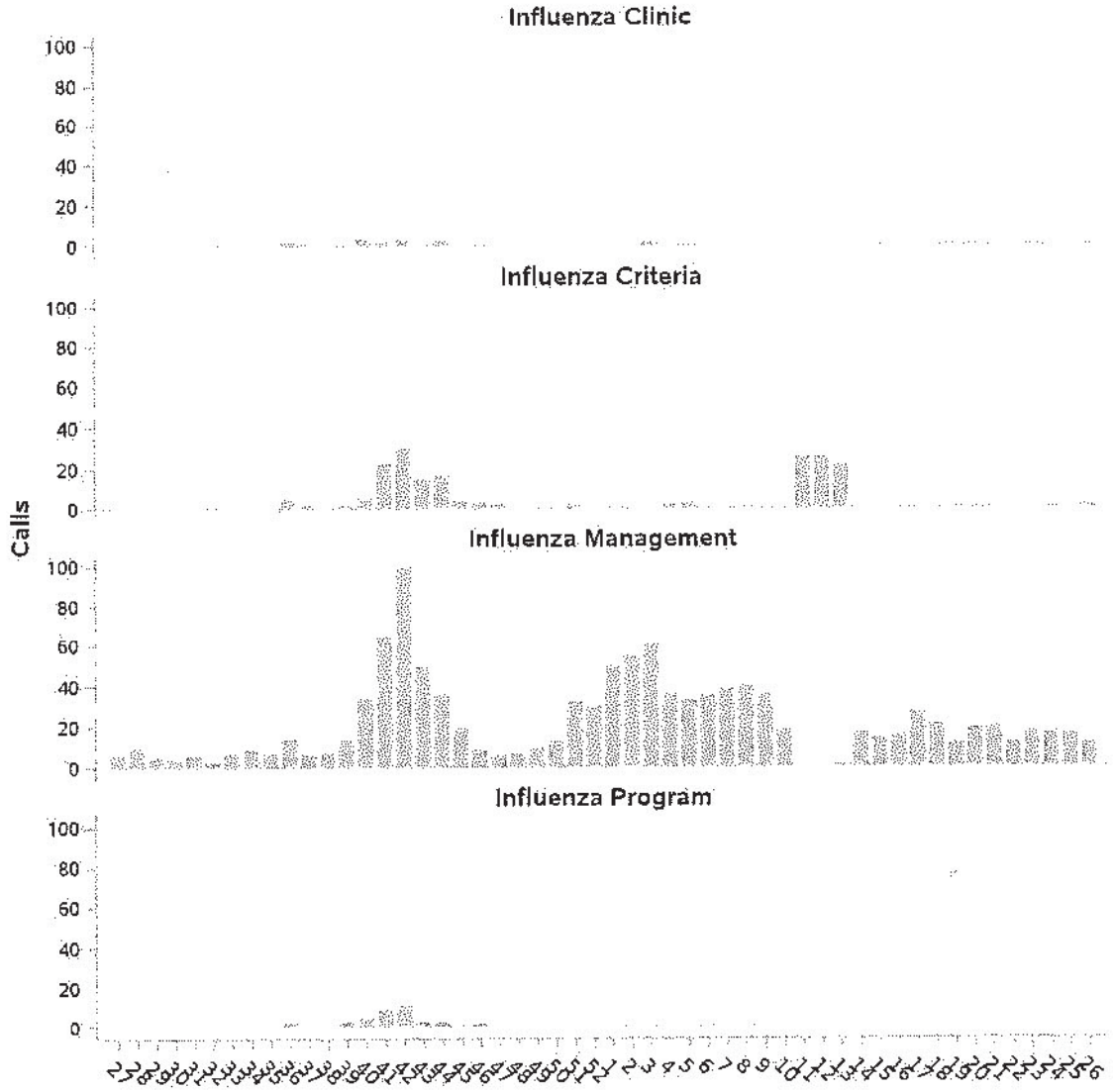


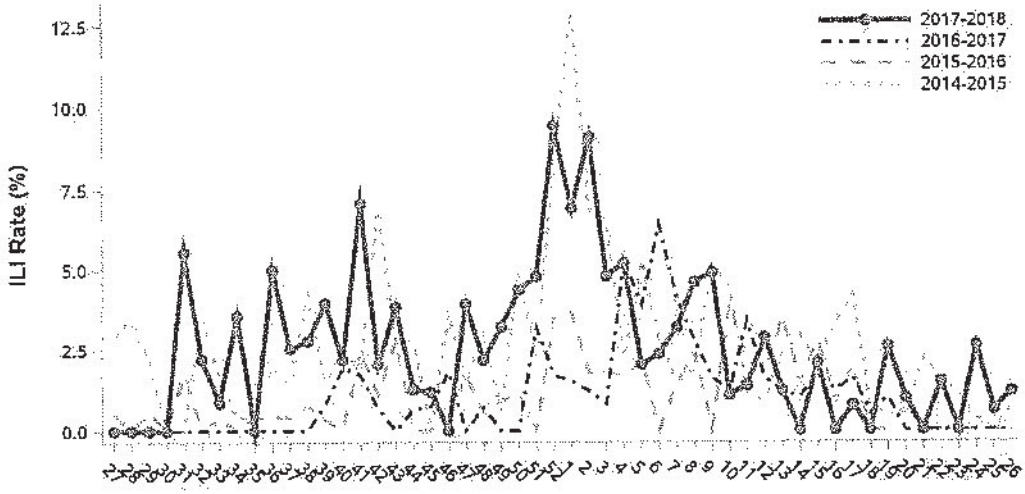
Figure 2: Types of influenza related calls to Health Links–Info Santé, Manitoba, 2017–2018



Sentinel Program

In 2017–2018, the percentage of influenza-like illness (ILI) related visits to sentinel physicians continuously increased from early November 2017 and peaked at 9.4% in Week 52 (December 24–30, 2017), one week before the laboratory-confirmed influenza activity peaked. The decrease in week 1 (December 30, 2017 – January 6, 2018) might be attributable to the reduced routine health care services during holidays (Figure 3).

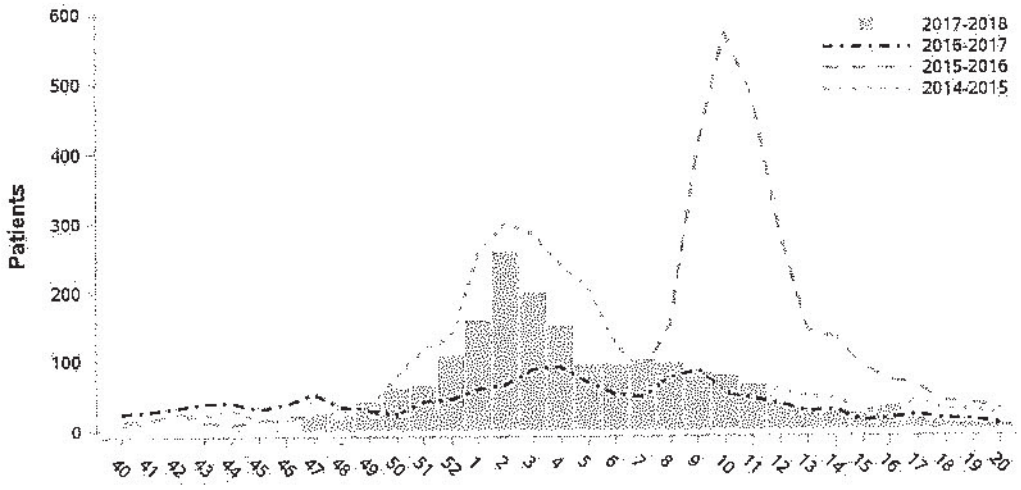
Figure 3: Weekly percentage of visits to sentinel physicians due to ILI, Manitoba, 2014–2015 to 2017–2018



Antiviral Dispensing

The number of patients treated with antivirals peaked in Week 2 (January 7–13, 2018). Compared with 2014–2015 and 2015–2016, fewer patients were treated with antivirals in 2017–2018.

Figure 4: Weekly patients receiving Oseltamivir, Manitoba, 2014–2015 to 2017–2018



Laboratory Surveillance

Testing of Specimens

In 2017–2018, CPL tested 7,198 respiratory specimens, which is a higher volume than the three previous seasons. 21.4% of specimens were tested positive for influenza (Table 1).

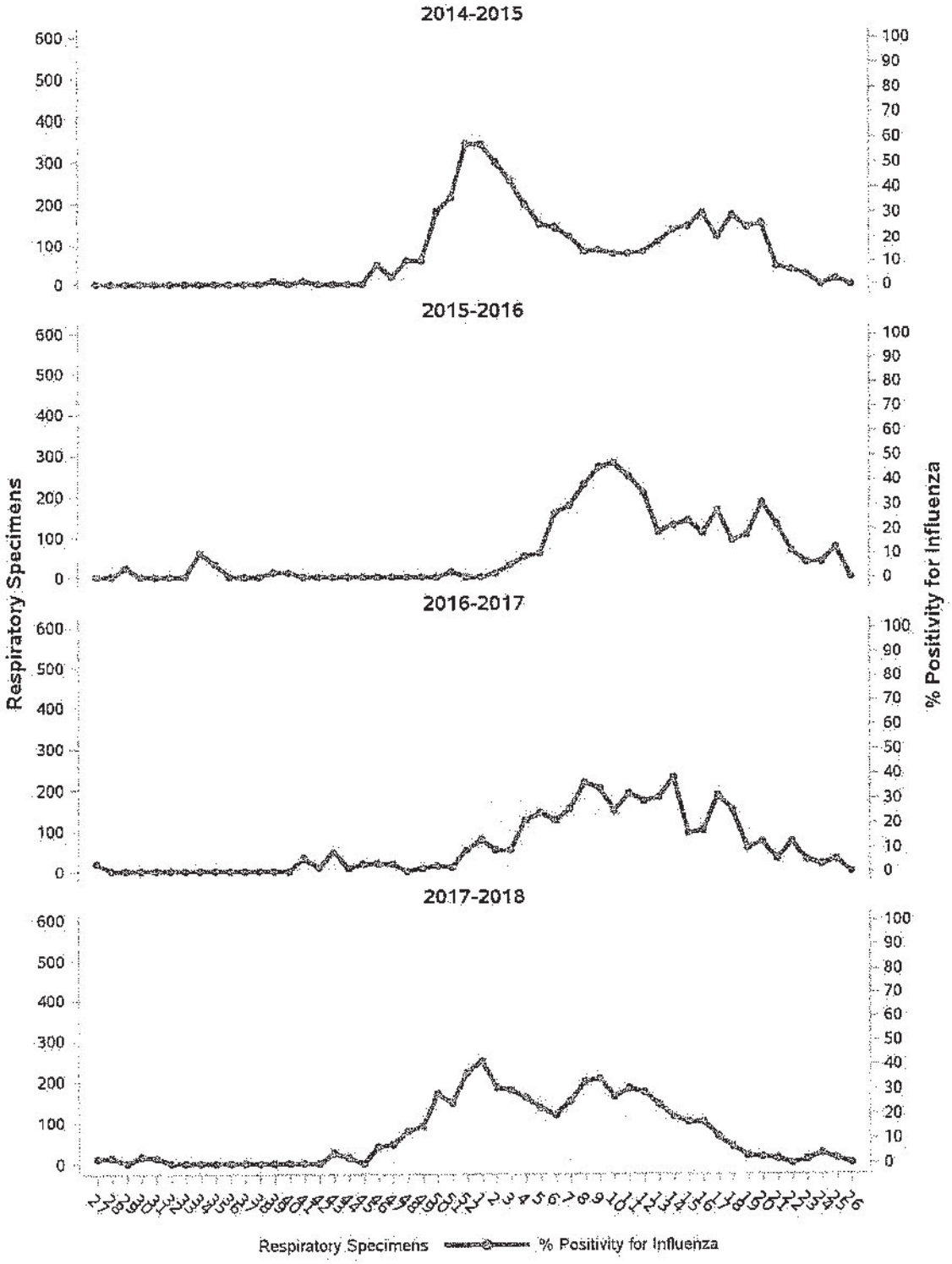
Table 1: Viral respiratory specimens and testing at Cadham Provincial Laboratory, Manitoba, 2014–2015 to 2017–2018

Season	2017–2018	2016–2017	2015–2016	2014–2015
Specimens	7,198	4,413	4,549	5,084
Influenza Positivity (%)	21.4%	15.5%	22.2%	25.7%
Tests	9,716	5,833	9,610	14,287
RTPCR flu A pandemic	N/A	N/A	1,946	5,097
RTPCR flu B	N/A	N/A	1,766	5,090
RTPCR flu A/B/RSV	4,497	2,886	2,182	N/A
XPERT flu A/B	N/A	109	364	167
Xpert flu A/B/RSV	615	444	101	N/A
Culture (MDCK)	920	472	406	870
Rapid flu A/B	233	189	200	582
Allplex	3,270	1,640	1,919	N/A
RV15	N/A	N/A	666	2,357
Referred out	181	93	60	124

Note. N/A=Not available

In 2017–2018, specimens submitted for testing increased from October 2017 and peaked in Week 3 (January 14–20, 2018). In comparison, the percentage of positivity for influenza detections increased from mid November 2017 and peaked in Week 1 (December 31, 2017–January 06, 2018) at 42%, two weeks before the peak of specimen submissions (Figure 5).

Figure 5: Weekly viral respiratory specimens and influenza positivity (%) at Cadham Provincial Laboratory, Manitoba, 2014–2015 to 2017–2018



Detection

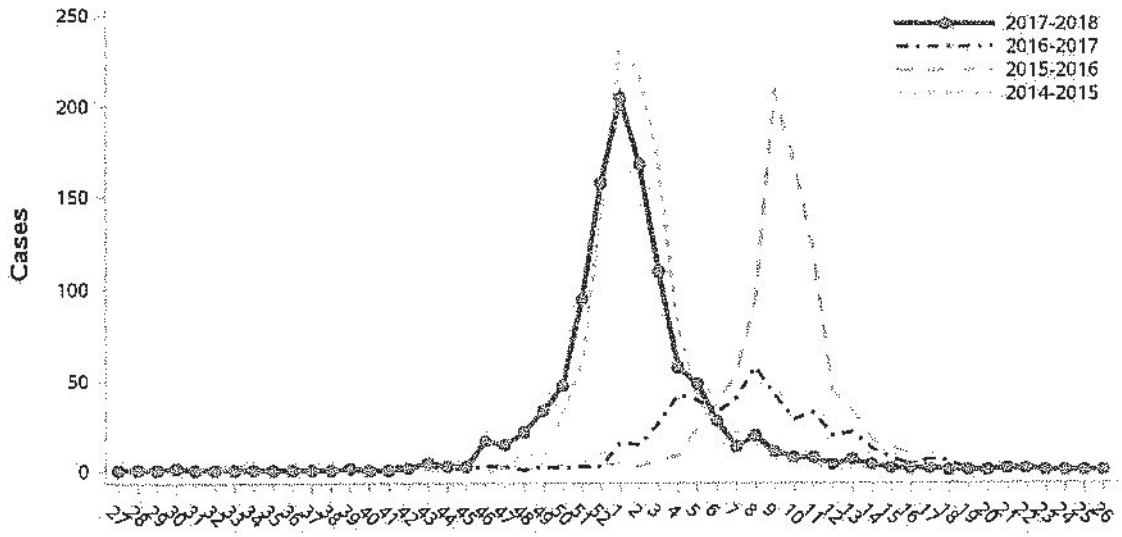
In 2017–2018, there was a total of 1,078 laboratory–confirmed influenza A and 603 influenza B cases in Manitoba residents[1] from CPL and other laboratories. The 2017–2018 season was an influenza A(H3N2)-predominant season:

- A(unsubtyped): 694 (41.3 %)
- A(H1): 2 (0.1 %)
- A(H1N1): 15 (0.9 %)
- A(H3): 325 (19.3%)
- A(H3N2): 44 (2.6 %)
- B: 603 (35.8 %)

Influenza A

The influenza A detection in 2017–2018 increased from Week 46 (November 12–18, 2017) and peaked in Week 1 (December 31, 2017–January 6, 2018). Compared with 2014–2015, the last severe influenza influenza A(H3N2)-predominant season, the influenza A detection in 2017–2018 increased earlier but peaked around the same time and at a slightly lower level (Figure 6).

Figure 6: Weekly incidence of influenza A, Manitoba, 2014–2015 to 2017–2018

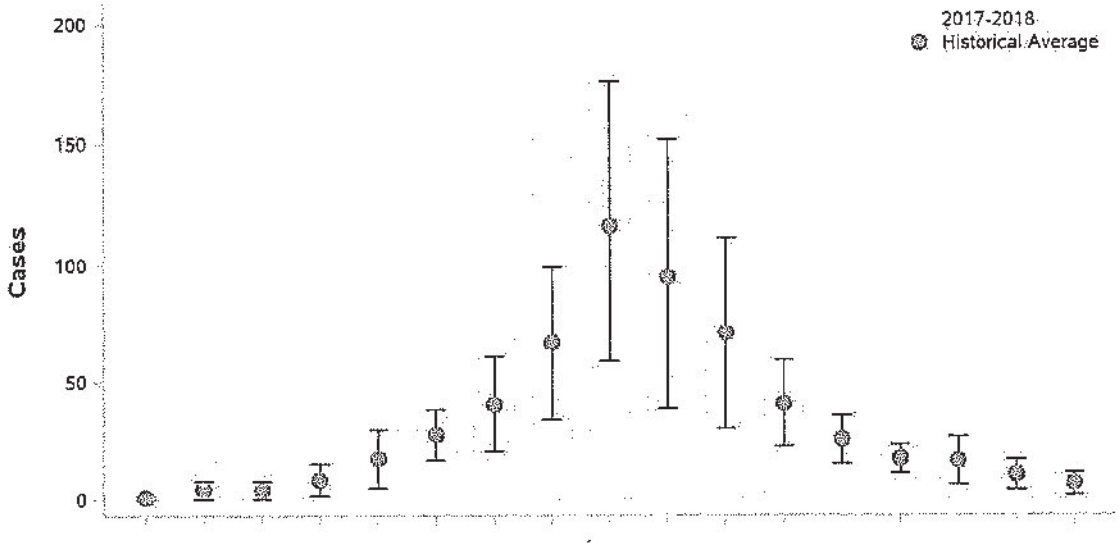


To compare the 2017–2018 season to past seasons, the incidence curves in seasons from 2010–2011 to 2016–2017 were aligned with the peak of 2017–2018. Subsequently, the average weekly incidence of influenza A and 95% confidence intervals (CIs) were calculated (Figure 7). In 2017–2018, the incidence

[1] Manitoba residents are definied as individuals registered with Manitoba Health, Seniors and Active Living (MHSAL) to receive insured health care.

was significantly and consistently higher than the historical average in the weeks until one week after the peak week.

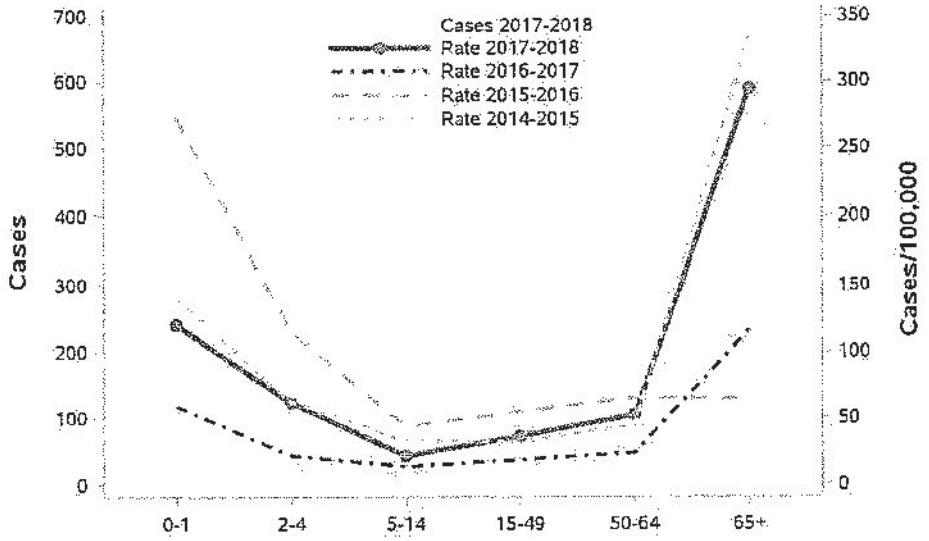
Figure 7: Weekly incidence of influenza A, Manitoba, 2017–2018 and historical average



Note. The peak week, 8 weeks prior and 8 weeks after were included.

Older populations were affected more by influenza A than younger populations in 2017–2018 (Figure 8). More than 50% of all cases were reported in the age group of 65 years and older resulting in the highest incidence rate (294 cases per 100,000 population) in all age groups. The second highest incidence rate occurred in children below two years of age (120 cases per 100,000 population). The incidence rates in all age groups in 2017–2018 were similar to 2014–2015, the last severe influenza A(H3N2)-predominant season.

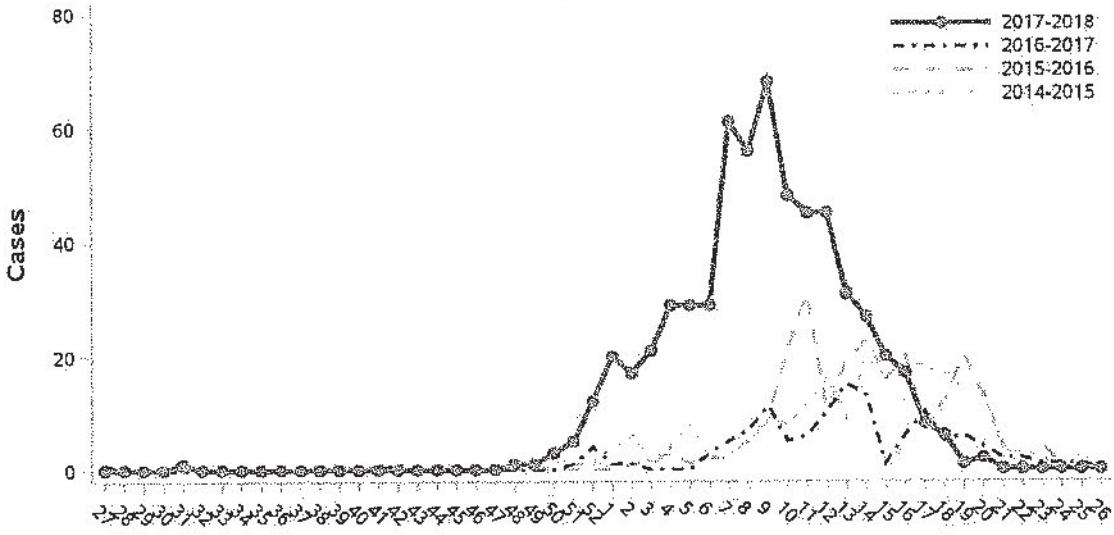
Figure 8: Incidence and incidence rate (/100,000) of influenza A by age group, Manitoba, 2017–2018



Influenza B

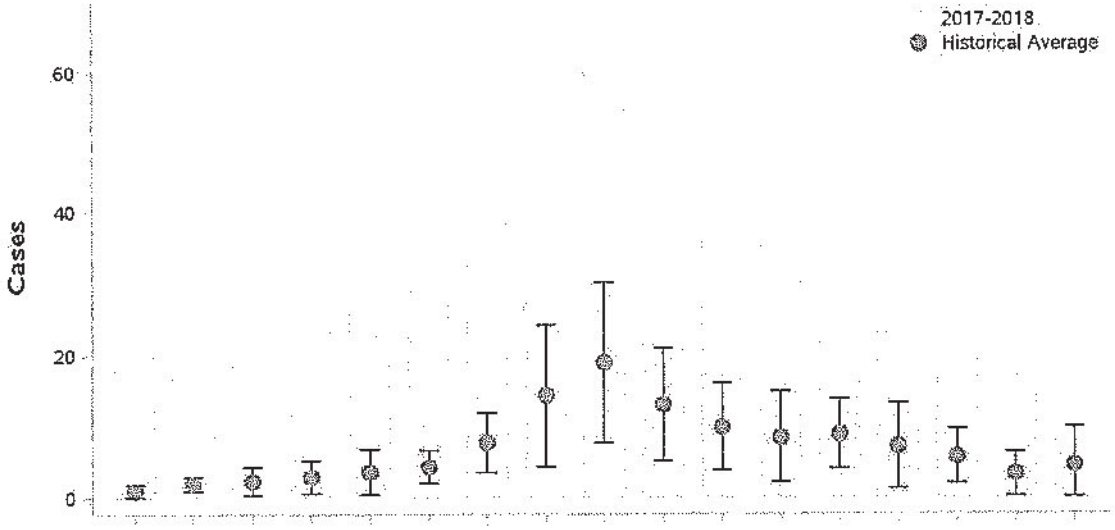
The influenza B detection in 2017–2018 increased from Week 50 (December 10–16, 2017) and peaked in Week 9 (February 25–March 03, 2018).

Figure 9: Weekly incidence of influenza B, Manitoba, 2014–2015 to 2017–2018



A similar method was used to calculate the historical average for influenza B in seasons from 2010–2011 to 2016–2017 and 95% CIs (Figure 10). The influenza B season of 2017–2018 was extended and the incidence was significantly higher compared to the historical average.

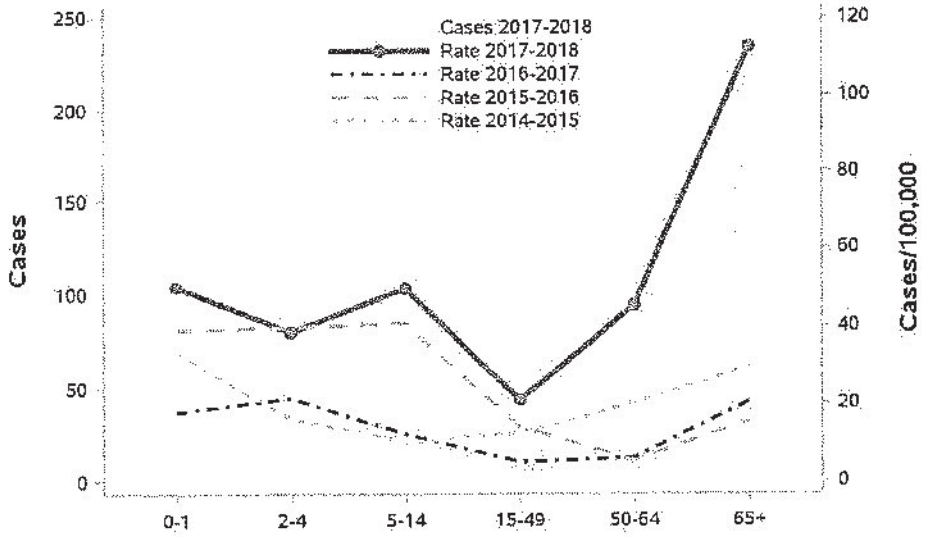
Figure 10: Weekly incidence of influenza B, Manitoba, 2017–2018 and historical average



Note. The peak week of influenza B, 8 weeks prior and 8 weeks after were included.

Unlike in previous seasons, the highest incidence rate of influenza B in 2017–2018 (112 cases per 100,000 population) was observed in the age group of 65 years and older (Figure 11). More than one third of all influenza B cases were reported from this age group.

Figure 11: Incidence and incidence rate (/100,000) of influenza B by age group, Manitoba, 2017–2018



Regional Variance

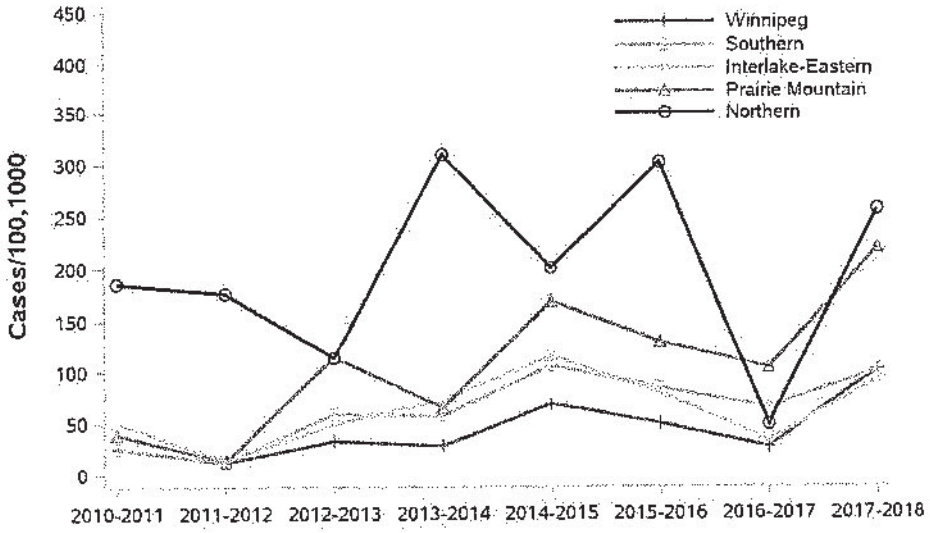
Analyses were conducted by geographic regions. Similar to previous seasons. There were regional differences in 2017–2018 (Table 2). Northern Health (NH) had the highest incidence rates of both influenza A and influenza B. Prairie Mountain Health (PMH) had the second highest incidence rate of both influenza A and B.

Table 2: Incidence and incidence rate (/100,000) of influenza A and B by region, Manitoba, 2017–2018

Region	Influenza A		Influenza B		Influenza A & B	
	Incidence	Rate (/100,000)	Incidence	Rate (/100,000)	Incidence	Rate (/100,000)
Winnipeg	545	69.9	245	31.4	790	101.4
Southern	125	62.2	78	38.8	203	101.0
Interlake–Eastern	80	62.0	37	28.7	117	90.7
Prairie Mountain	210	123.0	164	96.1	374	219.1
Northern	118	153.6	79	102.8	194	265.4

A historical review shows that the Winnipeg region generally had the lowest incidence rate of influenza infections while the Northern region had the highest especially in influenza A(H3N2)-predominant seasons (Figure 12).

Figure 12: Incidence rate (/100,000) of influenza by region, Manitoba, 2010–2011 to 2017–2018



Hospitalizations, ICU Admissions and Deaths

There were 508 influenza–associated hospitalizations in 2017–2018 (Table 3), a count much higher than in 2016–2017 (153), 2015–2016 (291) and 2014–2015 (346). Among hospitalized cases, only 35 (6.9%) were admitted to ICUs, more than 2016–2017 (N=23, 26.2%), but fewer than 2015–2016 (N=78, 7.1%) and 2014–2015 (N=62, 4.8%).

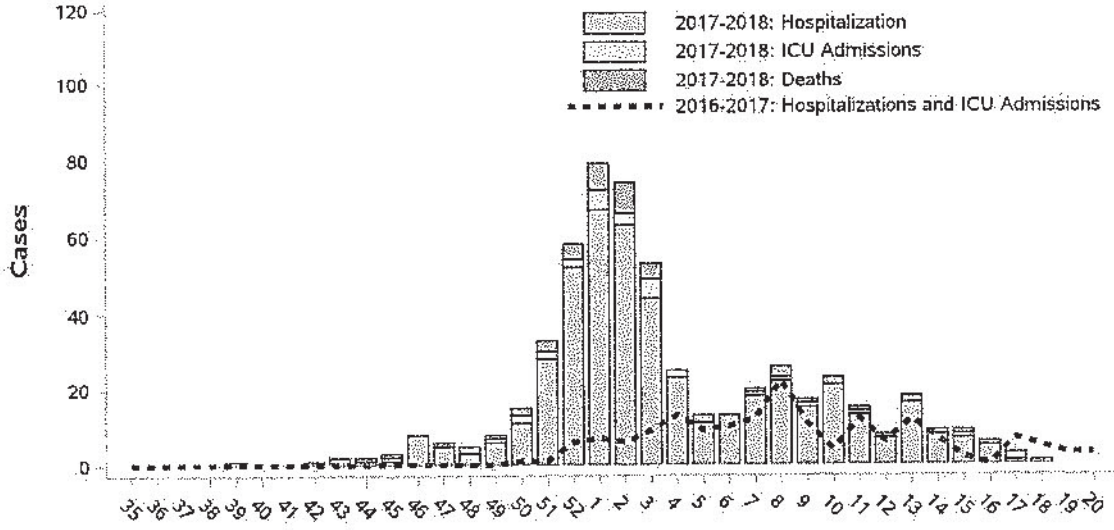
A total of 46 influenza–associated deaths were reported during the season and most occurred in hospitals. The majority of influenza–associated hospitalizations (n=344, 67.7%), ICU admissions (n=25, 71.4%), and deaths (n=34, 73.9%) were associated with influenza A.

Table 3: Hospitalizations, ICU admissions and deaths by influenza type, Manitoba, 2017–2018

Influenza Type/subtype	Hospitalizations		ICU admissions		Deaths	
	N	%	N	%	N	%
A(unsubtyped)	219	43.11%	10	28.6%	17	37.0%
A(H1)	4	0.79%	1	2.9%	0	0.0%
(H3)	121	23.82%	14	40.0%	17	37.0%
B	164	32.28%	10	28.5%	12	26.0%
Total	508		35		46	

Influenza–associated severe outcomes in 2017–2018 continued to be reported over a prolonged period of time, from Ocober 2017 to April 2018 (Figure 13).

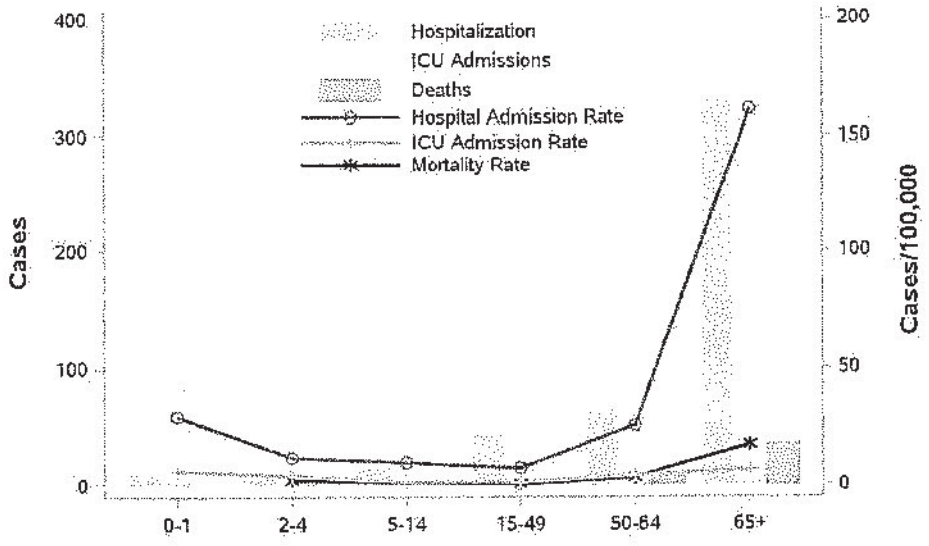
Figure 13: Weekly incidence of influenza–associated hospitalizations, ICU admissions, and deaths, Manitoba, 2017–2018



Note. ICU admissions are not included in hospitalizations.

In 2017–2018, the highest incidence rate of influenza–associated hospitalization (161 hospitalizations per 100,000 population) and the highest influenza mortality rate (17 deaths per 100,000 population) occurred in the age group of 65 years and older (Figure 14).

Figure 14: Incidence of influenza–associated hospitalizations, ICU admissions, and deaths, Manitoba, 2017–2018



Outbreaks

Between July 1, 2017 and June 30, 2018, 95 laboratory-confirmed influenza outbreaks were reported and the majority occurred in LTC facilities:

- Influenza A outbreaks: 66
- Influenza B outbreaks: 21
- Mix of influenza A and B: 8

All five regions reported influenza outbreaks:

- Winnipeg: 51
- Southern: 11
- Interlake–Eastern: 7
- Prairie Mountain: 23
- Northern: 3

There were a large number of laboratory-confirmed influenza outbreaks this season. Compared to 2014–2015, the last severe influenza A(H3N2) season, there were fewer influenza A outbreaks in LTCFs but more influenza B outbreaks (Table 4). In contrast, there were more influenza A outbreaks in acute care facilities in 2017–2018 compared with 2014–2015.

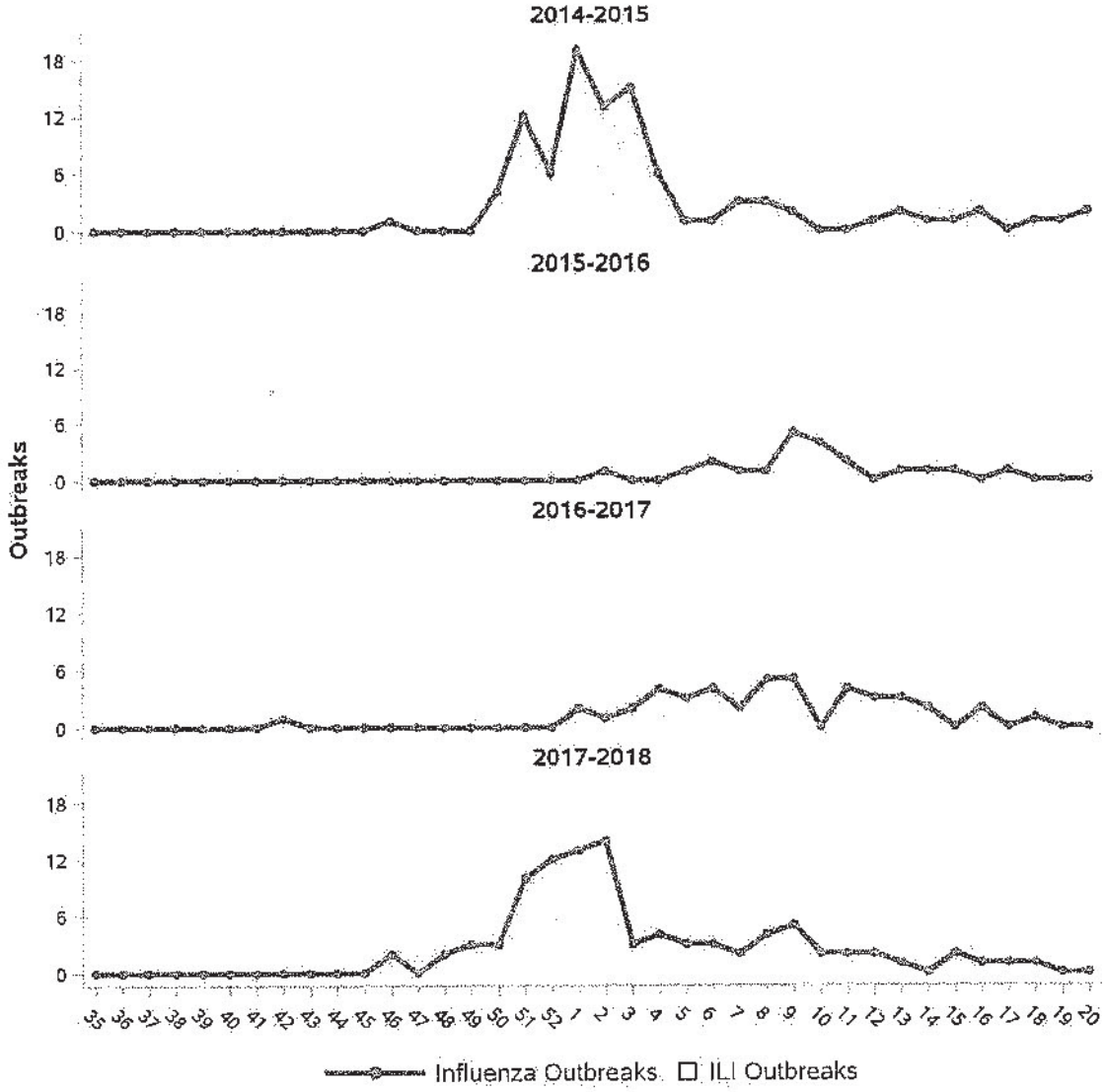
Table 4: Laboratory-confirmed influenza outbreaks in institutions, Manitoba, 2014–2015 to 2017–2018

	Acute Care Facilities		Long-term Care Facilities	
	Influenza A	Influenza B	Influenza A	Influenza B
2014–2015	2	1	85	10
2015–2016	2	0	18	3
2016–2017	3	0	37	6
2017–2018	13	0	61	29

Note. Some outbreaks were laboratory-confirmed to be associated with both influenza A and B.

In 2017–2018, the weekly outbreak reports increased in alignment with influenza A and B activity (Figure 15). During the seasonal epidemic of influenza, the majority of respiratory outbreaks in institutions were confirmed to be due to influenza.

Figure 15: Weekly institutional outbreaks of influenza and ILI, Manitoba, 2017–2018



Immunizations

Uptake in Manitoba

Between September 1, 2017 and March 31, 2018, a total of 319,281 influenza vaccine doses were administered and 309,954 residents received at least one dose. As of March 31, 2018, the overall influenza vaccine uptake rate in Manitoba residents was 22.5% (Table 5).

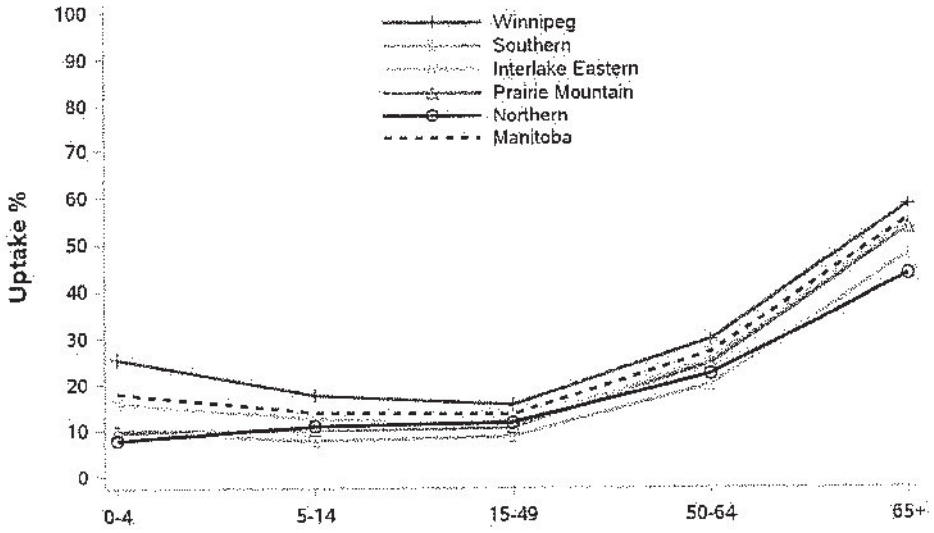
Table 5: Influenza immunization uptake (%) by region and age group, Manitoba, 2017–2018

Age (years)	Winnipeg	Southern	Interlake Eastern	Prairie Mountain	Northern	Manitoba
0 – 4	25.3%	9.5%	15.6%	9.8%	7.8%	17.9%
5 – 14	17.5%	7.6%	12.2%	9.9%	10.8%	13.7%
15 – 49	15.4%	8.5%	11%	10.4%	11.5%	13.2%
50 – 64	29.5%	19.6%	25%	24.3%	22%	26.6%
65+	58.2%	47.5%	54.3%	53.2%	43.2%	55.2%
Total	25.4%	15.6%	22.5%	20.8%	14.9%	22.5%

Note. Immunization uptake on the date of March 31, 2018.

Regional variance in uptake continued to be present (Figure 16). The size of variance differed by age group. The largest regional variance was observed in the age group of 0–4 years.

Figure 16: Influenza immunization uptake rate (%) by region and age group, Manitoba, 2017–2018



Immunization Providers

In 2017–2018, physicians, pharmacists and public health nurses were the most common service providers by delivering 38.6%, 33.6% and 17.5% of all influenza immunizations respectively (Table 6).

Compared with 2016–2017, in 2017–2018:

- Physicians administered 3,884 fewer immunizations;
- Pharmacists delivered 28,269 more immunizations;
- Public health nurses administered 10,226 fewer immunizations.

Table 6: Influenza immunizations by client age and provider type, Manitoba, 2017–2018

	RHA programs							
Age (years)	Physician	Pharmacist	Public Health	Occupation	LTC	Other	Unknown	Total
0–4	74.4%	0.3%	19.7%	0%	0%	3.7%	1.9%	20,282
5–14	47.5%	21.7%	27%	0%	0.2%	1.8%	1.8%	23,765
15–49	35.6%	34.3%	15.8%	8.3%	1.4%	1.3%	3.4%	87,161
50–64	34.6%	39.4%	15.3%	5.3%	1.9%	1.1%	2.3%	71,406
65+	35.3%	37.6%	17.8%	0.7%	6.8%	1.0%	0.7%	116,667
Total	123,311	107,154	55,904	11,774	10,622	4,283	6,233	319,281
	38.60%	33.60%	17.50%	3.70%	3.30%	1.30%	2.00%	100.00%

Note: As per The Manitoba Pharmaceutical Act and Regulations, pharmacists are authorized to administer seasonal influenza immunizations to people 7 years of age and older.

The majority of immunizations (87.3%) were delivered in October and November 2017, before the seasonal activity level became high (Figure 17).

Different providers seem to focus service in different age groups. Physicians were the most common providers for all age groups, especially for young children. In 2017–2018, approximately 74% of immunizations in the age group of 0–4 years and 50% in the age group of 5–14 years were delivered by physicians. In residents aged 15 years older, pharmacists delivered the most immunizations (Figure 18).

There was a decrease of 4,608 immunizations by unknown providers compared with 2016–2017, indicating a decrease in incomplete data entries.

Figure 17: Influenza immunizations by provider type and month, Manitoba, 2017–2018

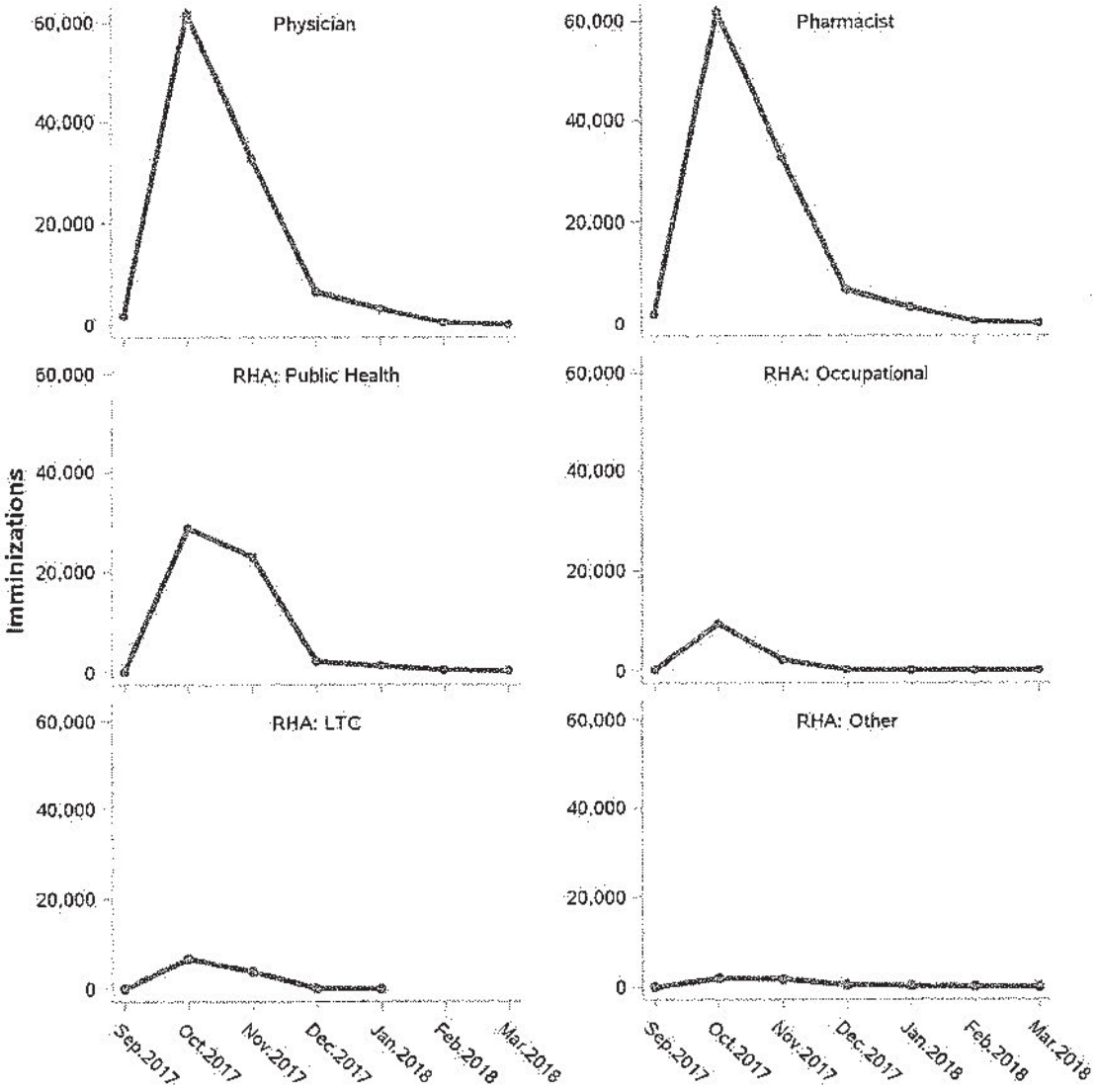
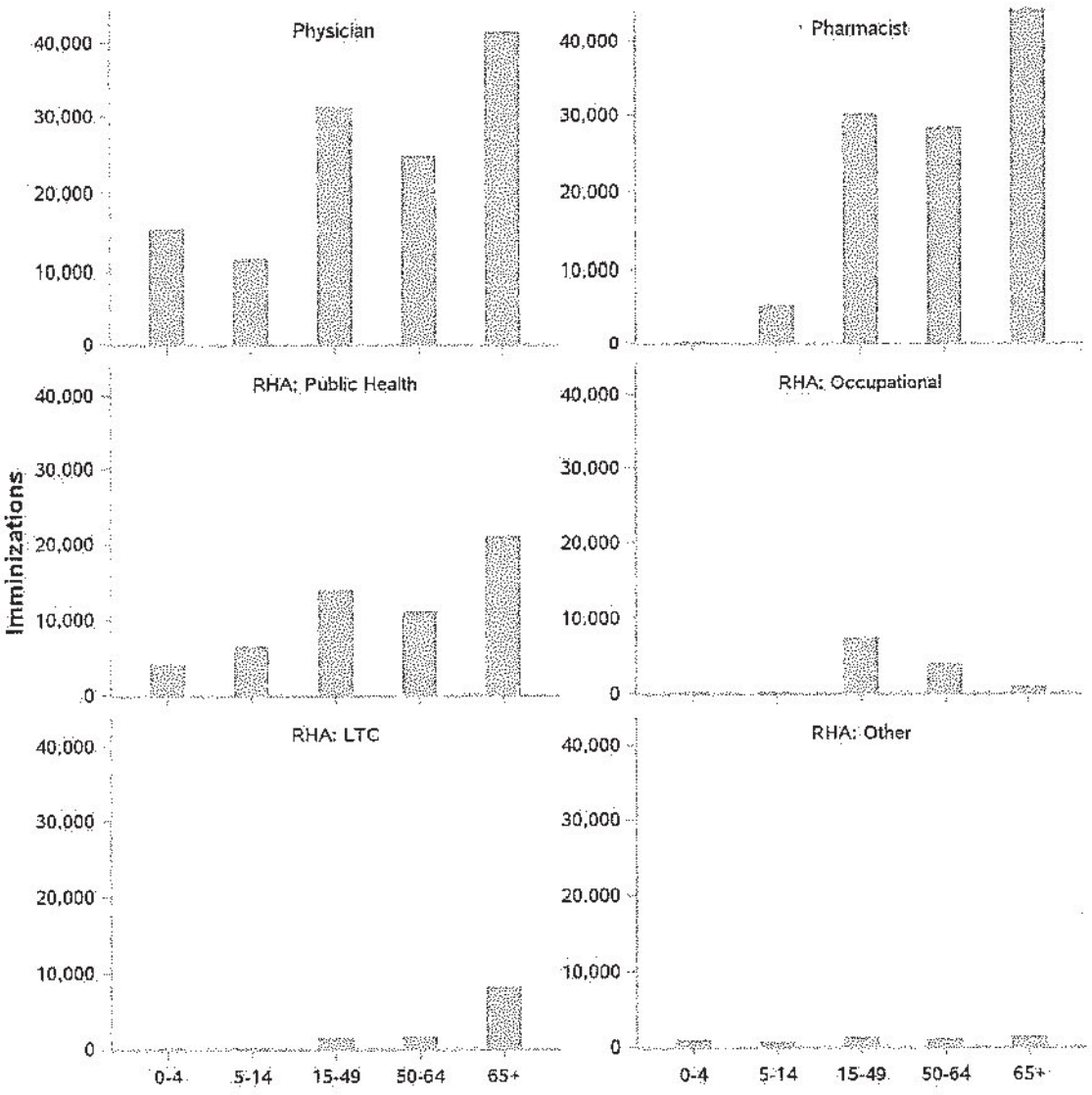


Figure 18: Influenza immunizations by provider type and client age group, Manitoba, 2017–2018



Adverse Events Following Immunization (AEFI)

A total of 42 cases associated with 49 AEFIs were reported between October 13, 2017 and January 30, 2018. A few cases experienced more than one adverse events.

The incidence rate for having AEFI was 13.2 cases per 100,000 immunizations. People at higher risk for AEFIs were children younger than 15 years (Table 7). Almost half (46.9%) of AEFIs were local reactions (Table 8).

Table 7: Cases with adverse event following influenza immunization by age group, Manitoba, 2017–2018

Age (years)	Cases	Rate (/100,000 doses)
0–4	4	19.7
5–14	8	33.7
15–49	13	14.9
50–64	7	9.8
65+	10	8.6
Total	42	13.2

Table 8: Adverse events following influenza immunization by event type, Manitoba, 2017–2018

	Adverse events	%
Allergic or allergic–like event	8	16.3%
Local reaction	23	46.9%
Anaphylaxis	0	0.0%
Neurologic events	3	6.1%
Other defined event of interest	15	30.6%
Total	49	

The majority of cases required no or low–level care. Five cases were treated in emergency rooms and only one was hospitalized (Table 9). At the time of reporting, 17 cases had fully recovered and there were two AEFIs-associated deaths (Table 10). It is important to note that AEFI reports only reflected temporal association but not causal relationship between adverse events and immunizations.

Table 9: Cases with adverse events following influenza immunization by level of care, Manitoba, 2017–2018

Care	Cases	%
None	18	42.9%
Non-urgent visit	10	23.8%
Telephone advice	3	7.1%
Emergency visit	5	11.9%
Hospitalization	1	2.4%
Unknown	5	11.9%
Total	42	

Table 10: Cases with adverse events following influenza immunization by outcome, Manitoba, 2017–2018

Outcome	Cases	%
Fully recovered	17	40.48%
Not yet recovered	15	35.71%
Permanent disability	0	0.00%
Death	2	4.76%
Unknown	8	19.05%
Total	42	

Strain Characterization and Antiviral Resistance

Strain Characterization

Similar to elsewhere in Canada, the 2017–2018 season in Manitoba was predominated by the A/Hong Kong/4801/2014(H3N2)–like strain, the influenza A(H3N2) component in the 2017–2018 Northern Hemisphere influenza vaccine (Table 11). Influenza B viruses predominating the influenza B detections were characterized as B/Phuket/3073/2013–like, the Yamagata lineage and one of the two influenza B components in the quadrivalent vaccine.

Table 11: Strain characterization of influenza isolates, Manitoba and Canada, 2017–2018

Influenza Strain	Canada	Manitoba
A/Hong Kong/4801/2014(H3N2)–like	409	30
A/Michigan/45/2015(H1N1)–like	330	9
B/Phuket/3073/2013–like	1,845	77
B/Brisbane/60/2008–like	81	5

Note. Data between September 1, 2017 and June 29, 2018

For influenza A(H3N2) viruses that did not grow to sufficient hemagglutination titers for antigenic characterization by hemagglutination inhibition (HI) assays, genetic characterization was performed. Sequence analysis of the hemagglutinin (HA) gene of 1,154 viruses (59 from Manitoba) as of June 29, 2018 showed that 1,033 influenza A(H3N2) viruses belonged to a genetic group in which most viruses were antigenically related to A/Hong Kong/4801/2014.

Antiviral Resistance

Between September 1, 2017 and June 29, 2018, all influenza isolates submitted from Manitoba were sensitive to Oseltamivir and Zanamivir. Nationally, one influenza A(H3N2) isolate, one influenza A(H1N1) isolate and one influenza B isolate demonstrated resistance to Oseltamivir (Tables 11). In comparison, almost all viruses tested in Canada were resistant to Amantadine.

Table 12: Antiviral resistance of influenza isolates, Manitoba and Canada, 2017–2018

Virus	Zanamivir		Oseltamivir		Amantadine	
	Resistant	Sensitive	Resistant	Sensitive	Resistant	Sensitive
Manitoba						
A(H3N2)	0	51	0	52	89	0
A(H1N1)	0	7	0	7	9	0
B	0	64	0	64	N/A	N/A
						Canada
A(H3N2)	0	590	1	593	1,588	8
A(H1N1)	0	271	1	270	318	0
B	2	861	1	862	N/A	N/A

Appendix: Data Sources

Health Links – Info Santé

Health Links–Info Santé is a province-wide around-the-clock telephone medical triage service in Manitoba. It is staffed by 80 full-time and part-time nurses, with interpreters available for over 100 languages. This service is open at all times to any person in Manitoba.

During each call, a nurse will obtain information about symptoms and follow clinical protocols to offer advice on whether to treat the symptoms at home, see a family doctor, or visit an emergency room. Calls range from concerns about abdominal pain to sentinel surveillance of influenza-like illness (ILI) symptoms. Callers to Health Links–Info Santé who select "Influenza Service" are given five options: (1) to obtain information to assist with arranging an influenza vaccination, (2) to learn who is at increased risk of serious illness from influenza, (3) to obtain information about the influenza vaccine, (4) to obtain information about the management of influenza symptoms and possible complications, and (5) to speak with a nurse. E&S receives aggregate data from Health Links–Info Santé weekly.

Sentinel Program

ILI in the general population is defined as acute onset of respiratory illness with fever and cough, and with one or more of the symptoms, sore throat, joint or muscle pain, or fatigue, that are likely due to influenza. In children under the age of 5 years, gastrointestinal symptoms may also be present. In patients under 5 or over 65 years of age, fever may not be prominent.

FluWatch, Canada's national surveillance system co-ordinated by the Public Health Agency of Canada (PHAC), monitors ILI and influenza activity on a year-round basis. A network of laboratories, hospitals, sentinel physicians, and provincial and territorial ministries of health routinely provide information to this system.

In Manitoba, sentinel physicians have been recruited throughout the province. They report ILI related visits to *FluWatch* weekly. They can also opt into the voluntary specimen collection component of the sentinel program. This consists of the submission of either two posterior pharyngeal swabs or two nasopharyngeal swabs within 48 hours of symptom onset from patients presenting with ILI. Requisitions, swabs, and viral transport media are available from CPL. Weekly report from *FluWatch* on the ILI rate from participating sentinel physicians in Manitoba is available to E&S.

Antiviral Dispensing

The number of patients who received the antiviral drug, Oseltamivir (Tamiflu®) and Zanamivir (Relenza®), dispensed to Manitoba residents from community retail pharmacies are obtained from the Drug Programs Information Network (DPIN) on a weekly basis during an influenza season. Those dispensed in hospitals or nursing stations are not available in DPIN.

Laboratory Surveillance

CPL is Manitoba's public health laboratory. It provides laboratory investigative services that include screening, diagnosis, disease and pathogen characterization, and outbreak response support to:

- Physicians and other practitioners;
- MHSAL to support disease control programs;
- Medical Officers of Health (MOH), Public Health Inspectors, and Public Health Nurses in investigating outbreaks and cases of public health significance; and
- Other laboratories that use CPL as a reference centre for special investigations.

The Virus Detection Section at CPL is responsible for detection, surveillance and laboratory epidemiology of respiratory, vaccine–preventable, enteric and sexually transmitted infection of viral etiology, including influenza. Different techniques are available to detect and characterize influenza and other respiratory viruses.

In the reporting season, the investigative protocols at CPL for respiratory viral specimens employed one or more of the following approaches:

- Triplex real time Reverse Transcription Polymerase Chain Reaction (RTPCR) for influenza A/B and Respiratory Syncytial Virus (RSV);
- Tissue culture for a variety of respiratory viral infections;
- Rapid antigen detection for influenza A/B and RSV;
- Cepheid Xpert® FLU/RSV XC kit; and
- Seegene Allplex™ Respiratory Panel Assays.

During an influenza season, CPL produces weekly reports on respiratory viral disease activity to public health and key program authorities. CPL also contributes to the weekly FluWatch and national respiratory viral surveillance structure.

Detections of influenza nucleic acid, culture isolation and enzyme immunoassay (EIA) from CPL and occasionally other laboratories are routinely forwarded to E&S within 24 hours of confirmation. Additionally, a subset of influenza isolates are subtyped by RTPCR.

In Manitoba, a selected sample (approximately 10%) of influenza isolates retrieved by culture is referred from CPL to National Microbiology Laboratory (NML) for strain characterization and antiviral susceptibility testing.

Hospitalizations, ICU Admissions and Deaths

E&S routinely monitors severe illness associated with influenza. Each influenza season on a weekly basis, the central public health office in each RHA is requested to report hospital admissions, ICU admissions and deaths for laboratory–confirmed influenza cases who were admitted to hospitals in the reporting RHA, or deceased as the registered residents of the reporting RHA.

Influenza–associated deaths may also be reported from other sources including:

- Chief Medical Examiner;
- MOHs in RHAs; and
- Infection Control Practitioners in LTC facilities.

The reason for the hospital admissions and ICU admissions or the cause of death does not need to be attributable to influenza. A temporal association with a positive influenza laboratory result is sufficient for reporting. Submissions are validated by E&S to remove duplicate reports for the same case within the same infection episode. For national surveillance, aggregate numbers of cases admitted to hospitals and ICUs, and deceased in a reporting week and cumulative for the season are submitted to PHAC on a weekly basis.

Outbreaks

As outlined in Manitoba's Communicable Disease Management Protocol–Seasonal Influenza, an institutional outbreak is defined as:

> *Two or more cases of ILI (including at least one laboratory–confirmed case) occurring within a seven–day period in an institution. An institution includes but is not limited to hospitals, long–term care facilities for both adults and children (e.g., personal care homes, nursing homes, chronic care facilities) and correctional facilities.*

CPL notifies E&S of outbreaks, for which specimens have been collected and submitted to CPL for laboratory confirmation. CPL submits both positive and negative laboratory results related to CPL–registered outbreaks to E&S. A small number of outbreaks may be notified by RHAs to E&S directly for which specimens may not be submitted to CPL. Outbreak investigations are reported from RHAs to E&S by completing an respiratory outbreak summary report form electronically through the Canadian Network for Public Health Intelligence. An outbreak is considered an influenza outbreak if an respiratory outbreak has at least one laboratory confirmed influenza case.

Immunizations

The seasonal influenza vaccine is available free–of–charge to all Manitoba residents over 6 months of age. MHSAL conducts a Seasonal Influenza Immunization Program every season that focuses on those at increased risk of serious illness from influenza, their caregivers and close contacts, including:

- Seniors aged 65 and older,
- Residents of a LTC facility,
- Health care workers and first responders,
- Children 6 to 59 months of age,
- Individuals of Aboriginal ancestry,
- Those with chronic illness, such as:
    - Cardiac or pulmonary disorders (including bronchopulmonary dysplasia, cystic fibrosis and asthma),

- Diabetes mellitus and other metabolic disorders,
- Cancer, immune compromising conditions (due to underlying disease and/or therapy),
- Renal disease,
- Anemia or hemoglobinopathy,
- Conditions that compromise the management of respiratory secretions and are associated with an increased risk of aspiration, and
- Children 6 months to adolescents 18 years of age on long–term acetylsalicylic acid (i.e. Aspirin) therapy,

- People who are severely overweight or obese,
- Healthy pregnant women.

In addition, international students, visitors and newcomers are eligible to receive the seasonal influenza vaccine free–of–charge regardless of the third party insurance or MHSAL coverage.

A small number of residents receive more than one dose due to medical or unknown reasons. For example, residents under the age of nine years who were not previously immunized with the seasonal influenza vaccine should receive two doses, four weeks apart.

For the reporting season, as per the World Health Organization (WHO), all seasonal trivalent influenza vaccines in the northern hemisphere contain:

- A/Hong Kong/4801/2014 (H3N2)–like virus
- A/Michigan/45/2008 (H1N1)pdm09–like virus
- B/Brisbane/60/2008–like virus

Quadrivalent vaccines contain one additional influenza B viruse:

- B/Phuket/3073/2013–like virus

In the reporting season in Manitoba, four vaccine products are included in the province's Publicly–Funded Seasonal Influenza Immunization Program:

For general population:

Quadrivalent inactivated vaccine (QIV):

- Fluzone® Quadrivalent (Sanofi Pasteur)
- FluLaval® Tetra (GlaxoSmithKline)

Quadrivalent live attenuated influenza vaccine (QLAIV)

- FluMist® Quadrivalent (AstraZeneca)

For people 65 years of age or older who are living in long-term care facilities:

Trivalent inactivated vaccine (TIV)

- Fluzone® High-Dose

Immunization data are extracted from the provincial immunization registry residing in the Public Health Information Management System (PHIMS), an electronic application for disease surveillance and management. PHIMS contains five modules. Two modules related to the Manitoba Immunization Program are fully functional from 2015:

- Immunization Management – records immunization events. All the immunization data in MIMS have been imported into PHIMS.
- Vaccine Inventory Management – manages and monitors vaccine storage, distribution and inventories.

Seasonal influenza immunizations are captured in PHIMS in one of three ways:

- Immunizations administered by fee–for–service physicians are imported into PHIMS from the Manitoba Physician Billing System.
- Immunizations administered by certified pharmacists are imported into PHIMS from DPIN.
- Immunizations provided by all other health care providers including public health nurses are entered directly into PHIMS by immunization providers or data entry staff.

Immunization data in PHIMS are considered comprehensive. However, it has been identified that some immunizations may not be captured, typically in facilities without access to PHIMS, the Manitoba Physician Billing system or DPIN. Doses administered to clients who are not registered residents with MHSAL may not be captured in PHIMS.

Immunization Providers

Immunization providers are determined from the immunization data. Immunization providers in this reporting season are categorized by the organizations or programs that the providers belong to when delivering immunizations. More information pertaining to the provider and the regional program the providers work for is available if an immunization record was entered directly into PHIMS as opposed to being transmitted from other systems. Providers are categorized as:

- Physician,
- Pharmacist,
- RHA–Public health,
- RHA–Occupational,
- RHA–Long term care (LTC),
- RHA–Other programs,
- Other providers including occupational health providers and correction facilities,
- Unknown providers due to missing values.

Adverse Events Following Immunization (AEFI)

Health care professionals who become aware of reportable AEFIs are required to report an event within seven days by creating an AEFI report in PHIMS or completing the AEFI form and submitting to the

regional MOH. The form is then entered into PHIMS by the regional office. Data for this report are extracted from PHIMS.

Per *The Food and Drugs Act* and Regulations, vaccine manufacturers are required to report to PHAC all serious AEFI reports with vaccines for which they are the Market Authorization Holder, within 15 days of knowledge of their occurrence. No other legal requirement for reporting AEFI exists nationally.

In Manitoba, an AEFI is reportable under *The Public Health Act* as prescribed in the Immunization Regulation (C.C.S.M. c.P210) if it is temporally associated with an immunizing agent, cannot be attributed to a co–existing condition, and if it meets at least one of the following criteria:

a. The event is serious in nature:
    - Life–threatening,
    - Could result in permanent disability,
    - Requires hospitalization or urgent medical attention,
    - Or for any other reason considered to be of a serious nature.
b. The event is unusual or unexpected, including but without limitation:
    - An event not previously identified,
    - An event previously identified but with an increased frequency.
c. At the time of the report, the event cannot be explained by anything in the patient's medical history, such as a recent disease or illness, or the taking of medication.

Strain Characterization and Antiviral Resistance

The Influenza and Respiratory Viruses Section (IRVS) at NML performs enhanced surveillance, investigations and research on influenza and other respiratory pathogens, in close partnership with provincial public health laboratories. As a routine practice, IRVS at NML antigenically characterizes influenza viruses received from Canadian provincial laboratories. Routine testing for antiviral resistance is also performed at NML. Aggregate results of strain characterization and antiviral resistance are shared with provinces and territories on a weekly basis.

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This is Exhibit "H" referred to in the Affidavit of Carla Loeppky affirmed before me this 30th day of April, 2021.

A Barrister-at-law in and for the
Province of Manitoba.

epiREPORT

Manitoba Health, Seniors and Active Living

ANNUAL INFLUENZA REPORT

2016–2017

Epidemiology and Surveillance

Active Living, Population and Public Health

Cadham Provincial Laboratory

March 2018

Manitoba

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Executive Summary

Seasonal influenza can cause severe morbidity and mortality, especially in vulnerable populations, and the burden is highly variable. In Manitoba, influenza is a reportable disease under *The Public Health Act*. Routine monitoring and reporting of influenza is performed by Epidemiology and Surveillance (E&S) in collaboration with Cadham Provincial Laboratory (CPL) at Manitoba Health, Seniors and Active Living (MHSAL) through a variety of indicators. During each season, which typically occurs between November and May, the influenza activity in Manitoba is reported weekly in seasonal influenza reports. Annual report summarizes all the influenza related information between July 1, 2016 and June 30, 2017.

In 2016–2017, the influenza A(H3N2) virus was the predominant circulating strain in Manitoba. As would be expected with an influenza A(H3N2)-predominant season, higher rates of illness were observed in older populations than in the younger populations, especially in those 65 years of age and older.

The 2016–2017 influenza season in Manitoba was characterized by a lower activity level and was less severe compared with 2015–2016, an influenza A(H1N1)-predominant season, or with 2014–2015, the last influenza A(H3N2)-predominant season. In 2016–2017, there were fewer influenza-positive cases and fewer cases who were severely ill after infection of influenza. Activity remained low through November and December 2016, increased in January 2017, and peaked in late February 2017, similar to 2015–2016.

Influenza B viruses also co-circulated in 2016–2017. The majority of viruses characterized this season were antigenically similar to the reference viruses representing the recommended components in the 2016–2017 Northern Hemisphere quadrivalent influenza vaccine. Three quadrivalent influenza vaccine products were available in Manitoba for the 2016–2017 season. It was estimated that 22.3% of all Manitoba residents had been immunized with the influenza vaccine as of March 31, 2017, similar to the coverage rate in the three seasons prior.

Reporting Weeks

Time trends in this report are presented in epidemiology weeks. This schedule is used by the national FluWatch program at the Public Health Agency of Canada (PHAC).

Week	Start	End
27	2016-07-03	2016-07-09
28	2016-07-10	2016-07-16
29	2016-07-17	2016-07-23
30	2016-07-24	2016-07-30
31	2016-07-31	2016-08-06
32	2016-08-07	2016-08-13
33	2016-08-14	2016-08-20
34	2016-08-21	2016-08-27
35	2016-08-28	2016-09-03
36	2016-09-04	2016-09-10
37	2016-09-11	2016-09-17
38	2016-09-18	2016-09-24
39	2016-09-25	2016-10-01
40	2016-10-02	2016-10-08
41	2016-10-09	2016-10-15
42	2016-10-16	2016-10-22
43	2016-10-23	2016-10-29
44	2016-10-30	2016-11-05
45	2016-11-06	2016-11-12
46	2016-11-13	2016-11-19
47	2016-11-20	2016-11-26
48	2016-11-27	2016-12-03
49	2016-12-04	2016-12-10
50	2016-12-11	2016-12-17
51	2016-12-18	2016-12-24
52	2016-12-25	2016-12-31

Week	Start	End
1	2017-01-01	2017-01-07
2	2017-01-08	2017-01-14
3	2017-01-15	2017-01-21
4	2017-01-22	2017-01-28
5	2017-01-29	2017-02-04
6	2017-02-05	2017-02-11
7	2017-02-12	2017-02-18
8	2017-02-19	2017-02-25
9	2017-02-26	2017-03-04
10	2017-03-05	2017-03-11
11	2017-03-12	2017-03-18
12	2017-03-19	2017-03-25
13	2017-03-26	2017-04-01
14	2017-04-02	2017-04-08
15	2017-04-09	2017-04-15
16	2017-04-16	2017-04-22
17	2017-04-23	2017-04-29
18	2017-04-30	2017-05-06
19	2017-05-07	2017-05-13
20	2017-05-14	2017-05-20
21	2017-05-21	2017-05-27
22	2017-05-28	2017-06-03
23	2017-06-04	2017-06-10
24	2017-06-11	2017-06-17
25	2017-06-18	2017-06-24
26	2017-06-25	2017-07-01

Acronyms

AEFI	Adverse event following immunization
CI	Confidence Interval
CPL	Cadham Provincial Laboratory
DPIN	Drug Programs Information Network
E&S	Epidemiology and Surveillance, unit of MHSAL
EIA	Enzyme immunoassay
ICU	Intensive Care Unit
ILI	Influenza-like illness
IRVS	Influenza and Respiratory Viruses Section
LTC	Long Term Care
MHSAL	Manitoba Health, Seniors and Active Living
MIMS	Manitoba Immunization Monitoring System
MOH	Medical Officer of Health
NML	National Microbiology Laboratory
PCR	Polymerase chain reaction
PHCC	Provincial Health Contact Centre
PHAC	Public Health Agency of Canada
RHA	Regional Health Authority
RSV	Respiratory Syncytial Virus
RTPCR	Reverse transcription polymerase chain reaction

Introduction

Epidemiology and Surveillance (E&S) of the Active Living, Population and Public Health Branch of Manitoba Health, Seniors and Active Living (MHSAL) monitors disease activity including seasonal influenza throughout Manitoba and year-round. During the 2016–2017 influenza season, E&S produced weekly influenza reports to provide timely updates on the influenza activity within the province as well as national and international updates with support from Cadham Provincial Laboratory (CPL). This annual report further analyzes information on the influenza activity in Manitoba between July 1, 2016 and June 30, 2017. Overall:

- In total, 4,413 respiratory specimens were tested by Cadham Provincial Laboratory (CPL) for pathogens. 15.5% of those specimens tested were positive for the influenza virus.
- Laboratory testing of respiratory specimens occurred year-round. The test volume was higher between October 2016 and May 2017 with a peak in Week 3 (January 15–21, 2017), five weeks before the peak of positive influenza detections.
- Laboratory testing confirmed 462 influenza A patients and 123 influenza B patients.
- Influenza A(H3N2) was the predominant circulating strain. Older populations were affected more than younger populations in 2016–2017.
- The influenza A season started in Week 1 (January 1–7, 2017) and peaked in Week 8 (February 19–25, 2017). The influenza B season started in Week 6 (February 5–11, 2017) and peaked in Week 13 (March 26–April 1, 2017).
- In total, 153 influenza cases were hospitalized including 23 admissions to intensive care units (ICU), and 14 influenza cases died. Of those hospitalized and deceased, 57% were aged 65 years and older.
- The five regional health authorities (RHAs) in Manitoba reported 46 laboratory-confirmed influenza outbreaks. The majority occurred in long term care (LTC) facilities.
- The influenza immunization coverage in Manitoba in 2016–2017 was 22.3% as of March 31, 2017, similar to the three previous seasons.
- Physicians were the most common immunization provider. Pharmacists became the second most common provider by delivering 25.4% of all immunizations.

- Following seasonal influenza immunization, 37 clients with adverse events were reported in Manitoba, which resulted in a rate of 11.9 cases per 100,000 doses administered, lower than the previous two seasons.

A variety of data sources and surveillance indicators were evaluated to monitor the arrival, intensity and severity of seasonal influenza including characterization of those infected and the broader trends. Surveillance data analyzed for this report include data for:

- Influenza-related calls to Health Links–Info Santé;
- Sentinel surveillance of influenza-like illness (ILI) in the community;
- Antiviral dispensing;
- Laboratory testing of respiratory specimens and positive influenza detections;
- Hospitalizations, ICU admissions, and deaths associated with laboratory-confirmed influenza detections;
- Respiratory and laboratory-confirmed influenza outbreaks;
- Influenza immunizations;
- Adverse events following immunization (AEFI);
- Strain characterization of influenza viruses and antiviral resistance.

Syndromic Surveillance

Health Links – Info Santé

Health Links–Info Santé is a province-wide around-the-clock telephone medical triage service in Manitoba. It is staffed by 80 full-time and part-time nurses, with interpreters available for over 100 languages. This service is open at all times to any person in Manitoba.

During each call, a nurse will obtain information about symptoms and follow clinical protocols to offer advice on whether to treat the symptoms at home, see a family doctor, or visit an emergency room. Calls range from concerns about abdominal pain to Sentinel surveillance of influenza-like illness (ILI) symptoms. Callers to Health Links–Info Santé who select "Influenza Service" are given five options: (1) to obtain information to assist with arranging an influenza vaccination, (2) to learn who is at increased risk of serious illness from influenza, (3) to obtain information about the influenza vaccine, (4) to obtain information about the management of influenza symptoms and possible complications, and (5) to speak with a nurse. E&S receives aggregate data from Health Links–Info Santé weekly.

Unlike in previous seasons, in 2016–2017, there was only one peak in influenza-related calls to Health Links–Info Santé (Figure 1). The only peak in Week 40 (October 2–8, 2016) coincided with the onset of the annual influenza immunization campaign.

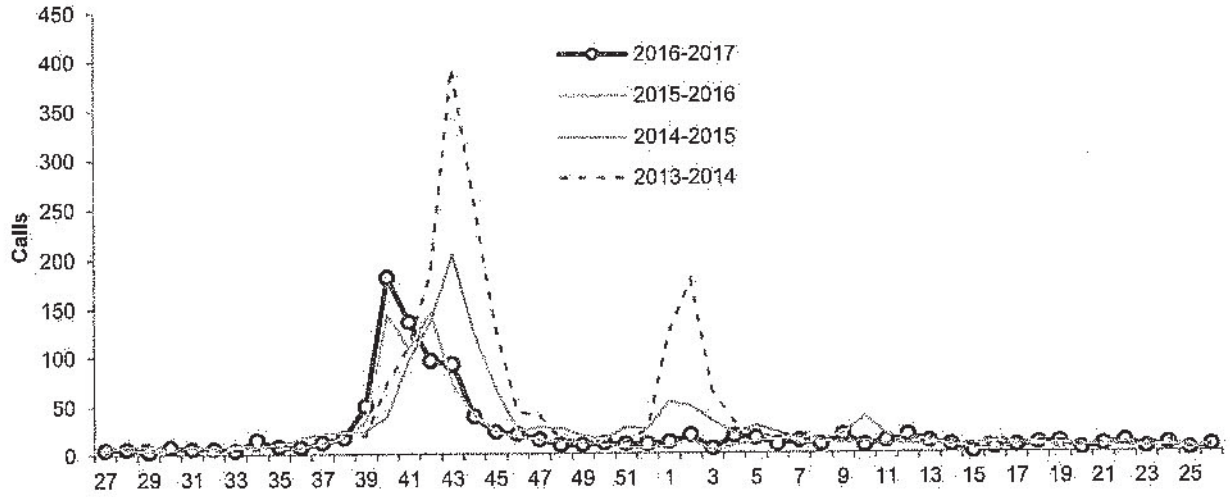

Figure 1 Weekly influenza related calls to Health Links–Info Santé, Manitoba, 2013–2014 to 2016–2017

The proportion of calls attributed to questions related to the influenza clinics and influenza program also peaked in Week 40 (Figure 2). The lack of additional peaks during the

seasonal epidemics in 2016–2017 suggests a low degree of public concern for the onset of the 2016–2017 influenza season.

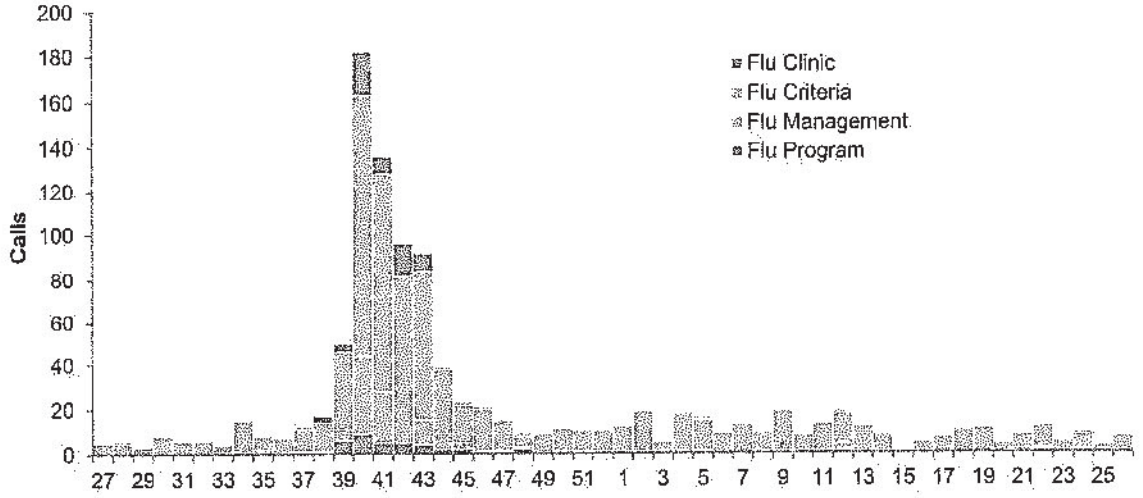

Figure 2 Types of influenza related calls to Health Links–Info Santé, Manitoba, 2016–2017

Sentinel Program

ILI in the general population is defined as acute onset of respiratory illness with fever and cough and with one or more of the symptoms, sore throat, joint or muscle pain, or fatigue, that are likely due to influenza. In children under the age of 5 years, gastrointestinal symptoms may also be present. In patients under 5 or over 65 years of age, fever may not be prominent.

FluWatch, Canada's national surveillance system co-ordinated by the Public Health Agency of Canada (PHAC), monitors ILI and influenza activity on a year-round basis. A network of laboratories, hospitals, sentinel physicians, and provincial and territorial ministries of health routinely provide information to this system.

In Manitoba, sentinel physicians have been recruited throughout the province. They report ILI related visits to *FluWatch* weekly. They can also opt into the voluntary specimen collection component of the sentinel program. This consists of the submission of either two posterior pharyngeal swabs or two nasopharyngeal swabs within 48 hours of symptom onset from patients presenting with ILI. Requisitions, swabs, and viral transport media are available from CPL. E&S receives a weekly report from *FluWatch* on the ILI rate from participating sentinel physicians in Manitoba.

In 2016–2017, there were 19 sentinel physicians in Manitoba. ILI related visits to sentinel physicians occurred year-round. However, the percentage of ILI related visits in all visits to sentinel physicians increased from the beginning of January 2017, when laboratory-confirmed influenza activity also increased, and peaked at 6.4% in Week 6 (February 05–11, 2017), two weeks before laboratory-confirmed influenza activity peaked. Compared with 2015–2016, this indicator in 2016–2017 demonstrated more seasonal changes (Figure 3).

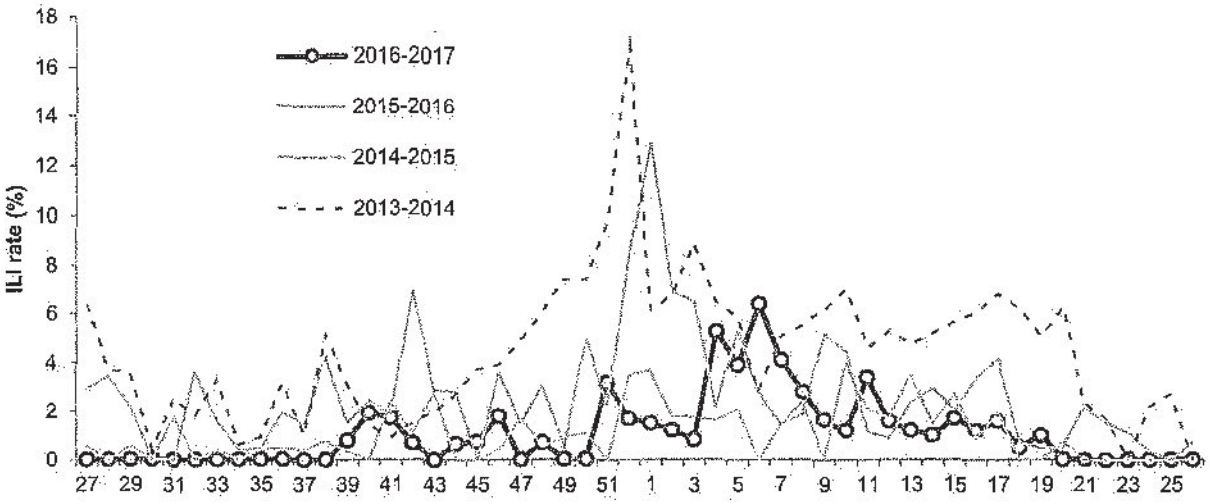

Figure 3 Weekly percentage of visits to sentinel physicians due to ILI, Manitoba, 2013–2014 to 2016–2017

Antiviral Dispensing

The number of patients who received the antiviral drug, Oseltamivir (Tamiflu®), dispensed to Manitoba residents from community retail pharmacies after October 1 were obtained from the Drug Programs Information Network (DPIN) on a weekly basis during each influenza season. Those dispensed in hospitals or nursing stations could not be included in this report as DPIN does not contain such data.

Between October 1, 2016 and May 21, 2017, a total of 1,348 patients received Oseltamivir dispensed from community retail pharmacies. The number of patients treated with Oseltamivir each week peaked twice, once in Week 4 (January 22–28, 2017) and again in Week 9 (February 26–March 4, 2017). The second peak was almost aligned with the peak of laboratory detections of influenza (Figure 4). Compared with previous seasons, especially 2015–2016, considerably fewer patients were treated with Oseltamivir in 2016–2017, likely an indication of a lower influenza activity level.

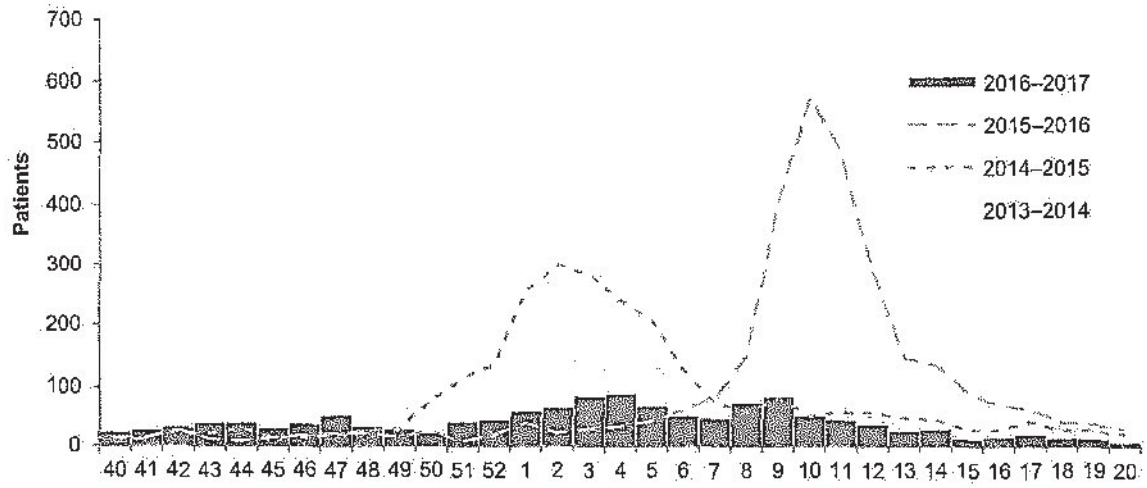

Figure 4 Weekly patients receiving Oseltamivir, Manitoba, 2016–2017

Laboratory Surveillance

CPL is Manitoba's public health laboratory. It provides laboratory investigative services that include screening, diagnosis, disease and pathogen characterization, and outbreak response support to:

- Physicians and other practitioners;
- MHSAL to support disease control programs;
- Medical Officers of Health (MOH), Public Health Inspectors, and Public Health Nurses in investigating outbreaks and cases of public health significance; and
- Other laboratories that use CPL as a reference centre for special investigations.

The Virus Detection Section at CPL is responsible for detection, surveillance and laboratory epidemiology of respiratory, vaccine-preventable, enteric and sexually transmitted infection of viral etiology, including influenza. Different techniques are available to detect and characterize influenza as well as other respiratory viruses. In 2016–2017, the investigative protocols at CPL for respiratory viral specimens employed one or more of the following approaches:

- Triplex real time Reverse Transcription Polymerase Chain Reaction (RTPCR) for influenza A/B and Respiratory Syncytial Virus (RSV);
- Tissue culture for a variety of respiratory viral infections;
- Rapid antigen detection for influenza A/B and RSV;
- Cepheid Xpert® FLU/RSV XC kit; and
- Seegene Allplex™ Respiratory Panel Assays.

During each influenza season, CPL produces weekly reports on respiratory viral disease activity to public health and key program authorities, and also contributes to the weekly FluWatch and national respiratory viral surveillance structure.

Detections of influenza nucleic acid, culture isolation and enzyme immunoassay (EIA) from CPL and occasionally other laboratories were routinely forwarded to E&S within 24 hours of confirmation. Additionally, a subset of influenza isolates were subtyped by RTPCR and approximately 10% of isolates were selected and sent to the National Microbiology Laboratory (NML) for strain typing and antiviral susceptibility testing.

Testing

The respiratory virus specimen submission and test volumes at CPL for each season is reported in Table 1. Note that multiple specimens might be submitted for one case during a season. From 2013–2014 to 2016–2017, CPL tested between 4,000 and 5,000 respiratory specimens each season, and overall between 18.9% and 25.7% of specimens were tested positive for influenza. In 2016–2017, CPL tested 4,413 respiratory specimens, and 15.5% respiratory speciments were tested positive for influenza.

Table 1 Volume of viral respiratory specimens and testing at Cadham Provincial Laboratory, Manitoba, 2013–2014 to 2016–2017

Season	2016–2017	2015–2016	2014–2015	2013–2014
Specimens	**4,413**	**4,549**	**5,084**	**3,905**
Influenza Positivity (%)	**15.5%**	**22.2%**	**25.7%**	**18.9%**
Tests	**5,833**	**9,610**	**14,287**	**9,009**
RTPCR flu A pandemic	N/A	1,946	5,097	4,072
RTPCR flu B	N/A	1,766	5,090	2,856
RTPCR flu A/B/RSV	2,886	2,182	N/A	N/A
XPERT flu A/B	109	364	167	N/A
Xpert flu A/B/RSV	444	101	N/A	N/A
Culture (MDCK)	472	406	870	539
Rapid flu A/B	189	200	582	205
Allplex	1,640	1919	N/A	N/A
RV15	N/A	666	2,357	1,273
Referred out	93	60	124	64

Note. N/A=Not available

Depending on seasonal, clinical and epidemiological criteria, a varying number of tests might be conducted on one specimen. From 2013–2014 to 2015–2016, CPL conducted between 9,000 and 14,000 tests each season. In 2016–2017, only 5,833 tests were conducted. Besides the lower influenza activity in 2016–2017, the reduction in tests was also largely due to the replacement of two separate assays, RTPCR for pandemic influenza A(H1N1) 2009 and

RTPCR for influenza B, by one assay, RTPCR for influenza A/B and RSV, in 2016–2017. To maximize efficiency and effectiveness in detection, response and surveillance, new technologies are adopted in some years that result in new viral detection platforms. Confirmatory assays are used at differing rates depending largely on the prevalence of disease due to influenza in Manitoba. As a result, not all test platforms are used in all years and some platforms are no longer available. When they are used, they may be used to varying degrees.

The laboratory activity to detect respiratory pathogens including influenza occurs year-round. The test volume is higher in fall and winter when activity of most respiratory viruses increases (Figure 5). In 2016–2017, specimen submissions slowly increased from October 2016 to a peak in Week 3 (January 15–21, 2017) which was lower than in the three previous seasons. The positivity for influenza detections is usually close to zero during summer and increases in fall and winter. In seasons 2013–2014 to 2015–2016, influenza positivity peaked between 36% and 57%. In 2016–2017, the peak positivity for influenza at 36% in Week 8 (February 19–25, 2017) when at least 100 speciments were tested, was lower than in 2014–2015 and 2015–2016, but similar to 2013–2014. It is noted that, unlike in the three previous seasons, the volume of specimen submissions peaked five weeks before the peak of positive influenza detections. In the previous seasons, peaks of positivity usually occurred one or two weeks before peaks of specimen submissions.

Detection

In 2016–2017, there were 462 laboratory-confirmed influenza A and 123 influenza B patients in Manitoba residents who registered with MHSAL for health care coverage, much fewer than in the previous three seasons. Specifically:

- A(unsubtyped): 272 (46.5%)
- A(H1N1): 1 (0.1%)
- A (H3): 154 (26.3%)
- A(H3N2): 35 (6.0%)
- B: 123 (21.0%)

The 2016–2017 season was predominated by the influenza A(H3N2) subtype and a smaller number of influenza B subtypes. Note that not all individuals experiencing symptoms will

seek medical attention and not all clinicians will routinely test symptomatic patients for influenza. As such, reported cases represent only a proportion of influenza cases in the community.

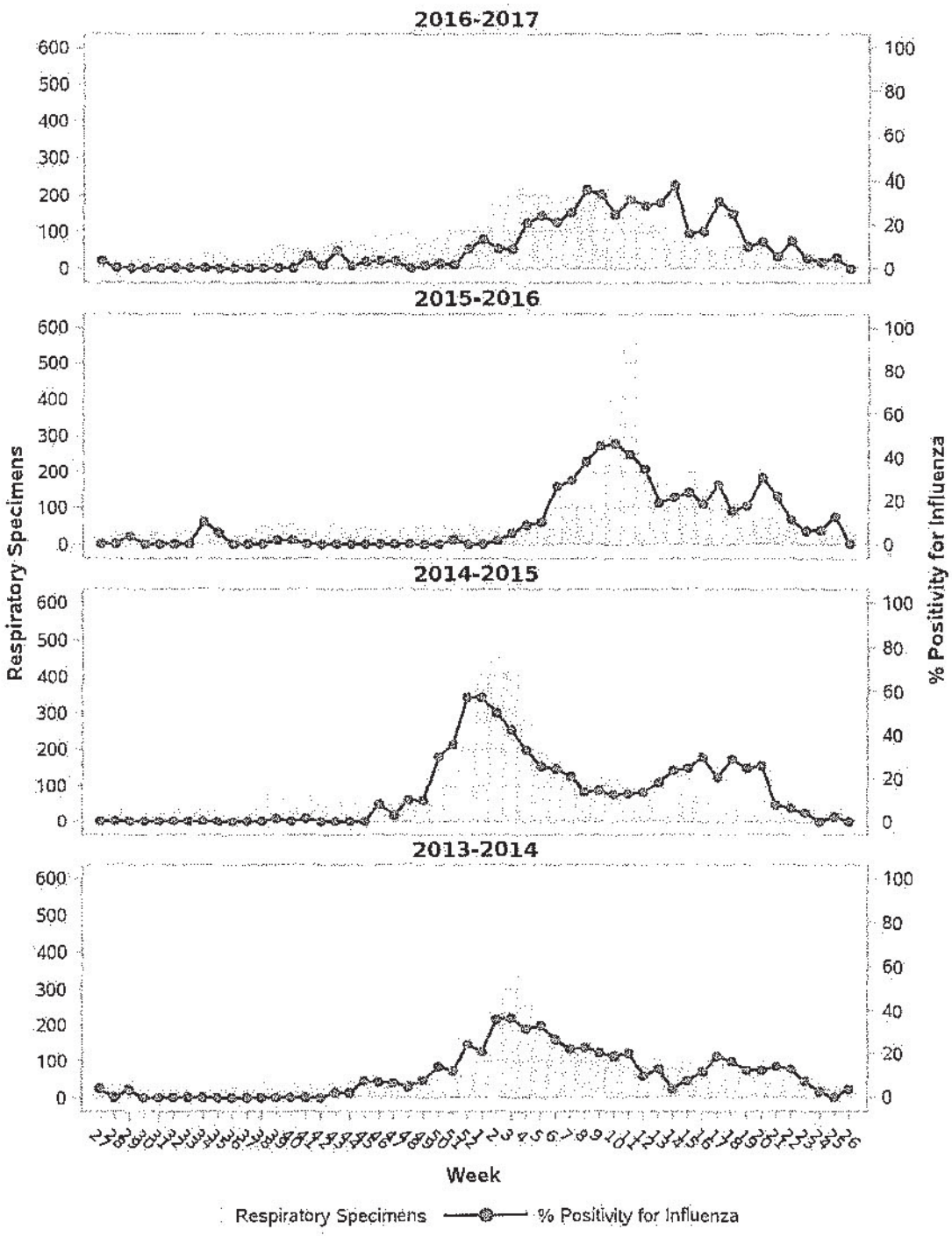

Figure 5 Weekly respiratory specimens tested and influenza positivity (%) at Cadham Provincial Laboratory, Manitoba, 2013–2014 to 2016–2017

Influenza A

The season of influenza A in 2016–2017 began in Week 1 (January 1–7, 2017) and peaked in Week 8 (February 19–25, 2017). Compared to the three previous seasons, this season increased slowly and to a lesser peak (Figure 6). Note that the 2015–2016 and 2013–2014 seasons were predominated by influenza A(H1N1) and the 2014–2015 season was predominated by influenza A(H3N2).

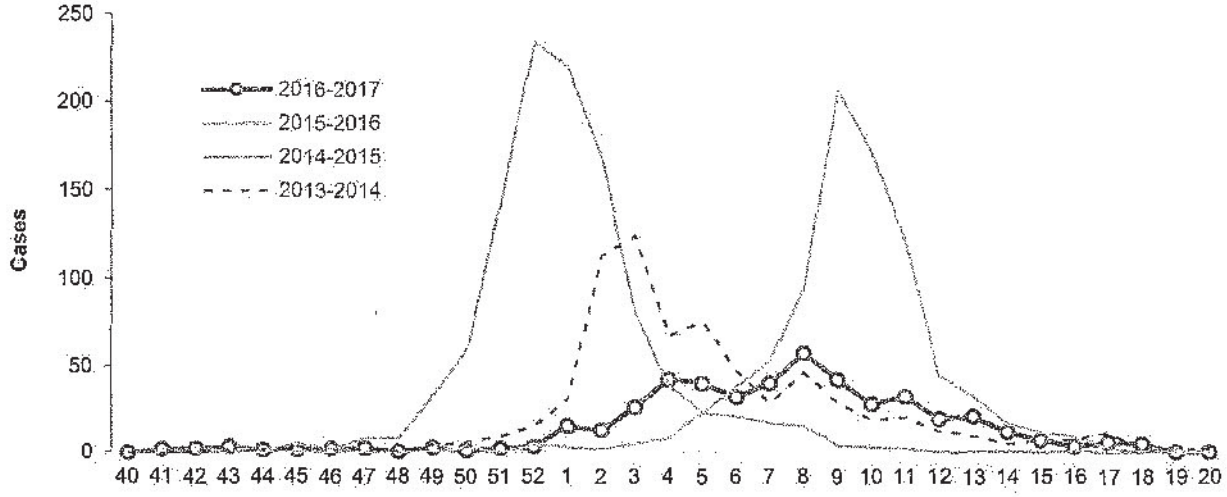

Figure 6 Weekly incidence of laboratory-confirmed influenza A infection, Manitoba, 2013–2014 to 2016–2017

Peak activity varies widely by season. To compare the 2016–2017 season to past seasons, the incidence curves of influenza A in seasons 2010–2011 to 2015–2016 were aligned with the curve in 2016–2017 by aligning their peaks on the peak of 2016–2017. Subsequently, the average weekly incidence of influenza A and 95% confidence intervals (CIs) were calculated (Figure 7). In 2016–2017, the incidence during peak weeks was lower than the historical average and was slightly above the lower end within the expected range or just below. Specifically, 57 influenza A cases were reported in Week 8 while the average influenza A incidence in a peak week was 129 and the lowest expected incidence was 64.

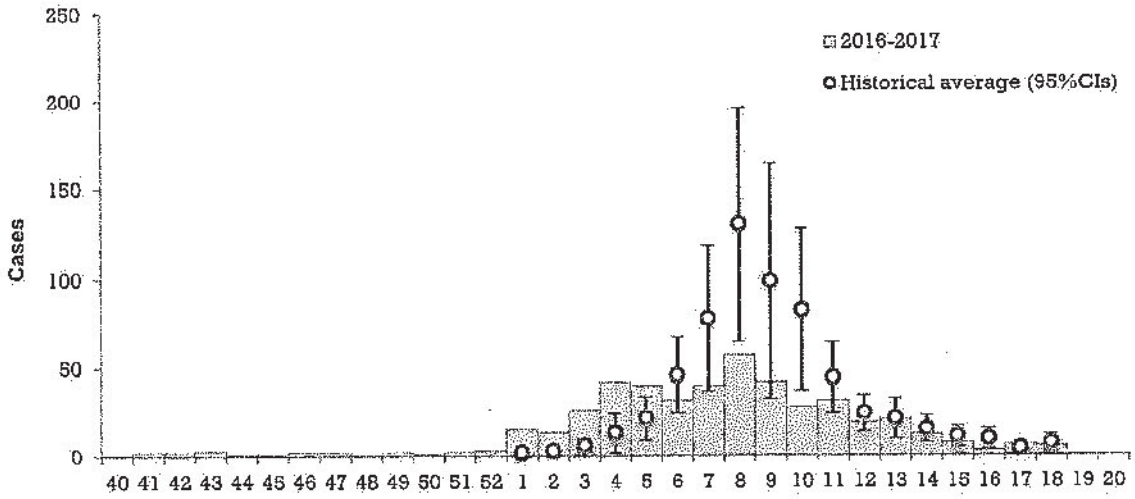

Figure 7 Weekly incidence of laboratory-confirmed influenza A infection, Manitoba, 2016–2017 and historical average

Older populations were affected more by influenza A than younger populations in the 2016–2017 season (Figure 8). The highest incidence rate was observed in the age group of 65 years and older (117 cases per 100,000 population). Almost 50% of all cases were reported from this age group. The second highest incidence rate was observed among children below two years of age (59 cases per 100,000 population). Compared to 2014–2015, the last influenza A(H3N2)-predominant season, the disease burden in those two age groups in 2016–2017 was much lower.

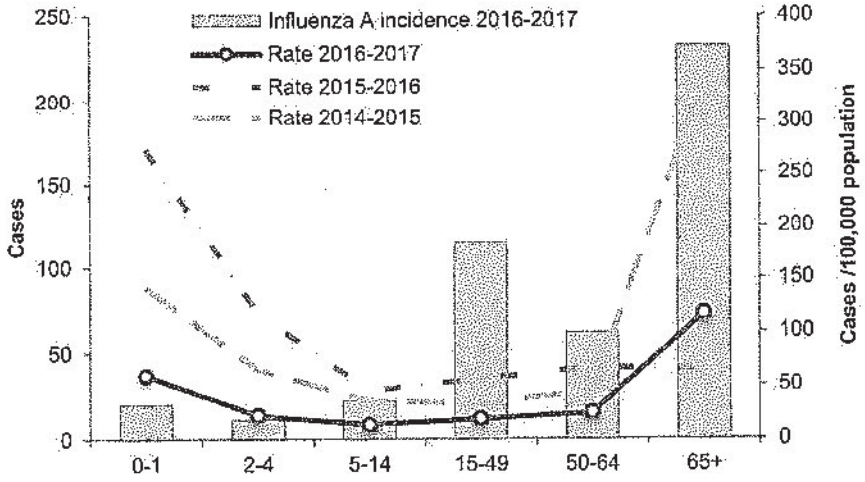

Figure 8 Incidence and incidence rate (/100,000) of laboratory-confirmed influenza A infection by age group, Manitoba, 2016–2017

Influenza B

In 2016–2017, there were 123 laboratory-confirmed influenza B cases in Manitoba. The season of influenza B began in Week 6 (February 5–11, 2017) and peaked in Week 13 (March 26–April 1, 2017), five weeks after the peak of influenza A this season (Figure 9).

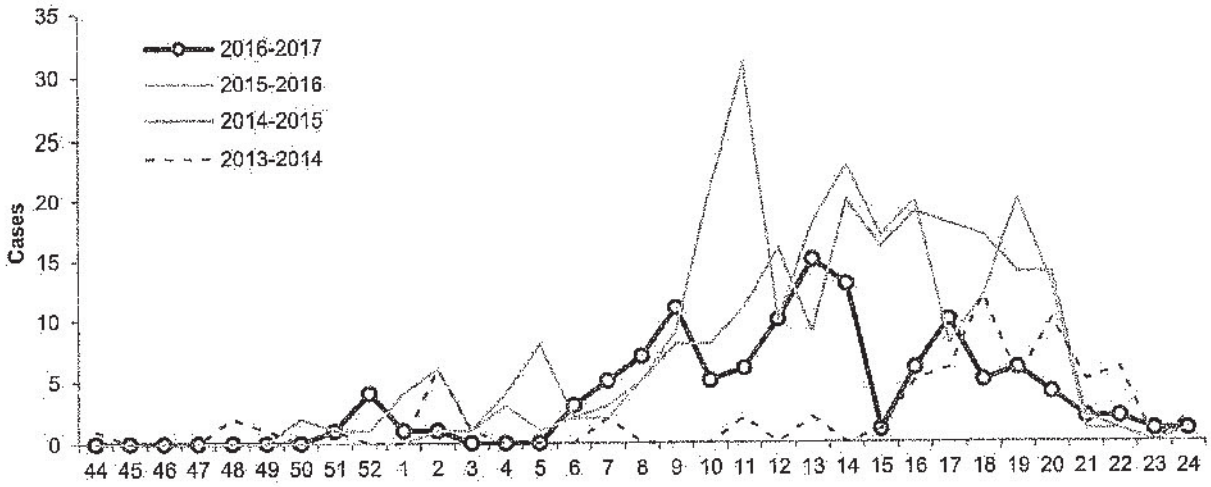

Figure 9 Weekly incidence of laboratory-confirmed influenza B infection, Manitoba, 2013–2014 to 2016–2017

A similar method was used to calculate the historical average incidence each week for influenza B (Figure 10). In 2016–2017, the incidence of laboratory-confirmed influenza B during peak weeks was lower than but close to the historical average except in Week 15 (April 9–15, 2017).

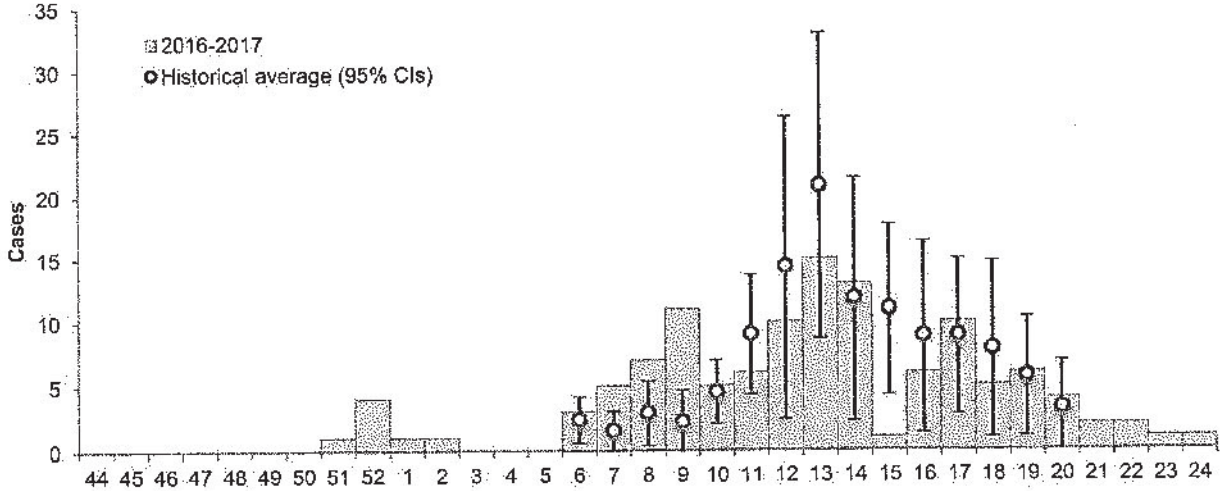

Figure 10 Weekly incidence of laboratory-confirmed influenza B infection, Manitoba, 2016–2017 and historical average

In 2016–2017, only one third of the influenza B cases were aged 65 years and older. The disease burden was similar in young children aged 2–4 years and seniors aged 65 and older with an incidence rate of 21 cases per 100,000 population (Figure 11).

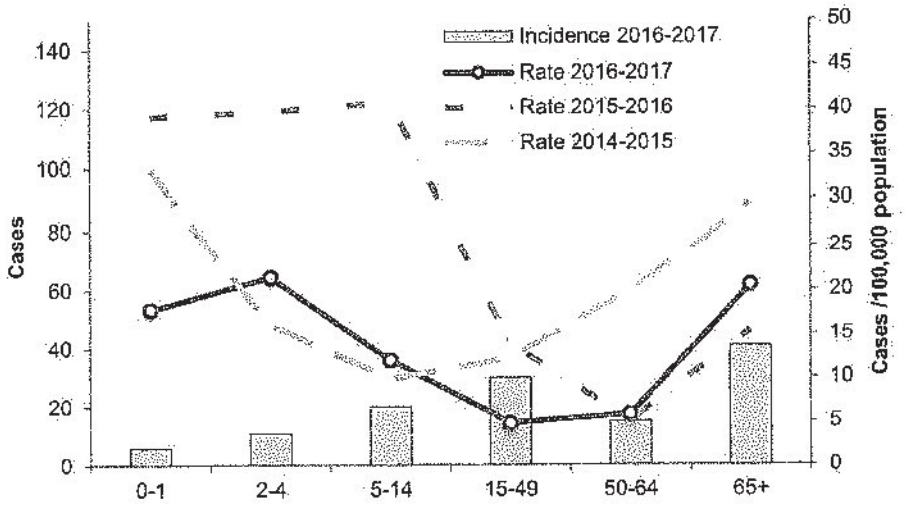

Figure 11 Incidence and incidence rate (/100,000) of influenza B infection by age group, Manitoba, 2016–2017

Regional Variance

Manitoba has five regional health authorities (RHAs) that largely represent the five geographic regions in Manitoba with the exception that Churchill is in Winnipeg Regional Health Authority. Similar to previous seasons, there were regional differences in 2016–2017 (Table 2). Prairie Mountain Health had the highest incidence rate of both influenza A (80 cases per 100,000 population) and B (24 cases per 100,000 population). Southern Health-Santé Sud and Northern Health Region had the second highest incidence rate of influenza A (43 cases per 100,000 population). Southern Health-Santé Sud also had the second highest incidence rate of influenza B (20 cases per 100,000 population).

Table 2 Incidence and incidence rate (/100,000) of laboratory-confirmed influenza A and B infection by RHA, Manitoba, 2016–2017

Region	Influenza A		Influenza B		Total	
	Cases	Incidence rate (/100,000)	Cases	Incidence rate (/100,000)	Cases	Incidence rate (/100,000)
Winnipeg	174	22.7	30	3.9	204	26.6
Southern	85	43.0	40	20.3	125	63.3
Interlake-Eastern	34	26.5	8	6.2	42	32.8
Prairie Mountain	136	80.1	41	24.2	177	104.3
Northern	33	43.2	4	5.2	37	48.4
Manitoba	462	34.5	123	9.2	585	43.7

Generally, Winnipeg Regional Health Authority had the lowest incidence rate of influenza infection each season except for 2011–2012, the influenza B-predominant season, when four RHAs had almost the same low incidence rate (Figure 12). Prairie Mountain Health had the highest incidence rate among all RHAs in 2016–2017 (104 cases per 100,000 population). In the past, the incidence rate was usually the highest in Northern Health Region.

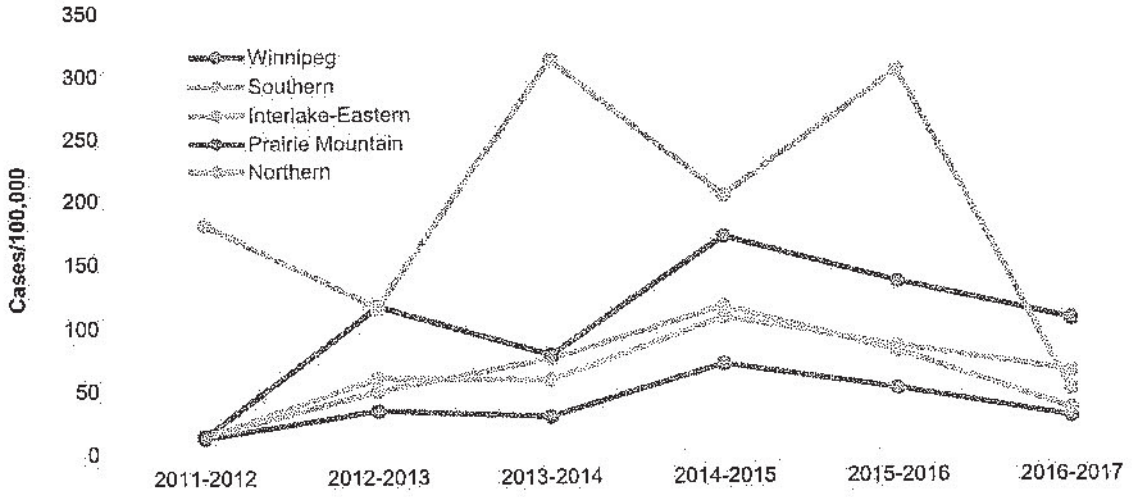

Figure 12 Incidence rate (/100,000) of laboratory-confirmed influenza infection by RHA, Manitoba, 2011–2012 to 2016–2017

Hospitalizations, ICU Admissions and Deaths

E&S also routinely monitors severe illness associated with influenza. Each influenza season on a weekly basis, the central public health office in each RHA is requested to submit a line list of hospitalizations, ICU admissions and deaths for laboratory-confirmed influenza cases who were admitted to hospitals in the reporting RHA, or deceased as the registered residents of the reporting RHA.

Influenza-associated deaths may also be reported from other sources including:

- Chief Medical Examiner;
- MOHs in RHAs; and
- Infection Control Practitioners in LTC facilities.

The reason for the admission of hospitals and ICUs or the cause of death may not be attributable to influenza. A temporal association with a positive influenza laboratory result is sufficient for reporting. Submissions are validated by E&S to remove duplicate reports for the same case within the same illness episode. In addition to provincial surveillance, aggregate numbers of cases admitted to hospitals and ICUs respectively, and deceased in a reporting week and cumulative for the season are submitted to PHAC for national surveillance on a weekly basis.

Amongst Manitoba residents, there were 153 influenza-associated hospitalizations in 2016–2017 (Table 3), fewer than in 2015–2016 (291) and 2014–2015 (346), but more than in 2013–2014 (127). Among those hospitalized cases, only 23 were admitted to ICUs, fewer than in 2015–2016 (78), 2014–2015 (62) and 2013–2014 (44).

In 2016–2017, 26.2% of all influenza cases were reported to have been admitted to hospitals, similar to 2015–2016 (26.6%) and 2014–2015 (27.1%), and 3.9% of all influenza cases were admitted to ICUs, lower than in 2015–2016 (7.1%) and 2014–2015 (4.8%). A total of 14 influenza-associated deaths were reported, most of which occurred in hospital. The majority of influenza-associated hospitalizations (n=120, 78.4%), ICU admissions (n=18, 78.3%), and deaths (n=13, 92.9%) were associated with influenza A.

Table 3 Influenza-associated hospitalizations, ICU admissions and deaths by influenza type, Manitoba, 2016–2017

Type/subtype	Hospitalizations		ICU admissions		Deaths	
	N	%	N	%	N	%
Influenza A(unsubtyped)	59	38.6%	2	8.7%	5	35.7%
Influenza A(H3)	61	39.9%	16	69.6%	8	57.1%
Influenza B	33	21.6%	5	21.7%	1	7.1%
Total	153		23		14	

Unlike in 2015–2016, a higher incidence of influenza-associated severe outcomes in 2016–2017 (Figure 13) occurred only in one week, Week 8 (February 19–25, 2017).

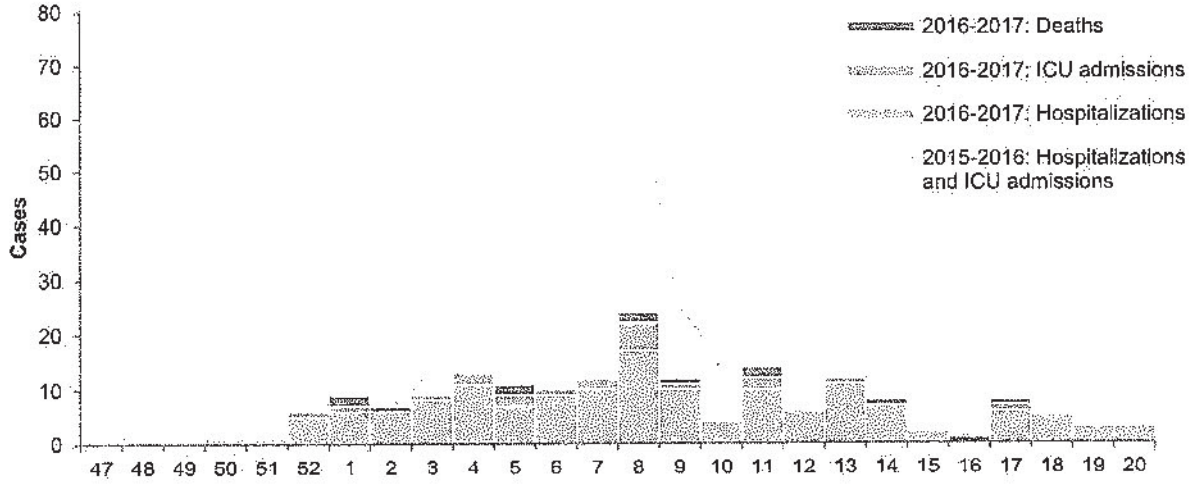

Figure 13 Weekly incidence of influenza-associated hospitalizations, ICU admissions, and deaths, Manitoba, 2016–2017

Note. ICU admissions are not included in the hospitalizations

In 2016–2017, younger populations and those aged 65 years and older were more vulnerable to severe influenza-associated illness (Figure 13). The incidence rate of influenza-associated hospitalization was highest in the population under two years old (47 hospitalizations per 100,000 population) and the population aged 65 years and older (43 hospitalizations per 100,000 population). The highest influenza mortality rate was observed in the population aged 65 years and older (4 deaths per 100,000 population).

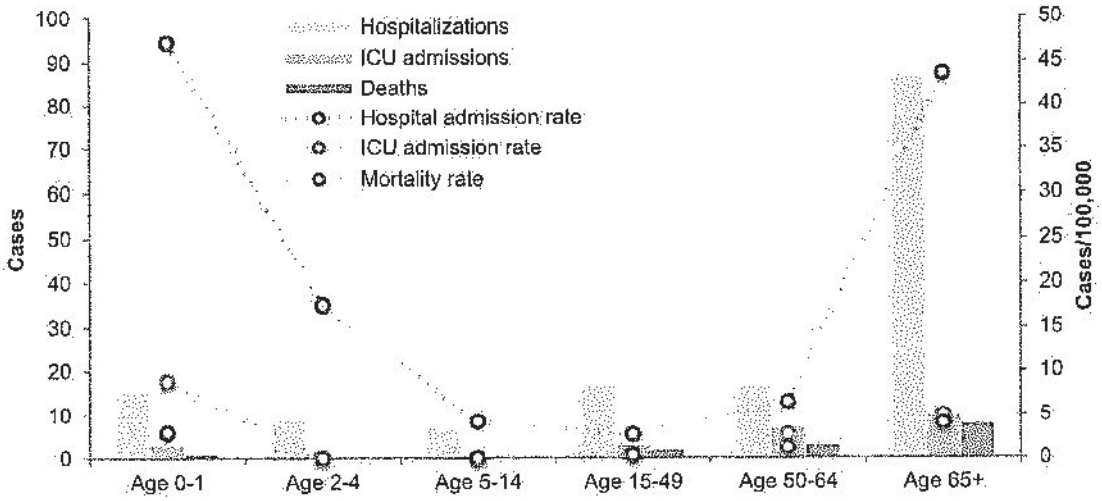

Figure 14 Incidence and incidence rate (/100,000) of influenza-associated hospitalizations, ICU admissions, and deaths by age group, Manitoba, 2016–2017

Outbreaks

As outlined in Manitoba's Communicable Disease Management Protocol–Seasonal Influenza, an institutional outbreak is defined as:

> *Two or more cases of ILI (including at least one laboratory–confirmed case) occurring within a seven-day period in an institution. An institution includes but is not limited to hospitals, long-term care facilities for both adults and children (e.g., personal care homes, nursing homes, chronic care facilities) and correctional facilities.*

CPL notifies E&S of outbreaks, for which specimens have been collected and submitted to CPL for laboratory confirmation. CPL submits both positive and negative laboratory results related to CPL-registered outbreaks to E&S. A small number of outbreaks may be notified by RHAs to E&S directly for which specimens may not be submitted to CPL. Outbreak investigations are reported from RHAs to E&S by completing an outbreak summary report form electronically through the Canadian Network for Public Health Intelligence, or on paper. In this report, an outbreak was considered an influenza outbreak if an ILI outbreak had at least one laboratory confirmed influenza case.

Between July 1, 2016 and June 30, 2017, there were 46 influenza outbreaks reported in Manitoba: 40 outbreaks of influenza A, 4 outbreaks of influenza B, and 2 mixed outbreaks of influenza A and B. The majority of those outbreaks occurred in LTC facilities.

All five RHAs reported influenza outbreaks:

- Winnipeg Regional Health Authority: 12
- Southern Health-Santé Sud: 10
- Interlake-Eastern Regional Health Authority: 4
- Prairie Mountain Health: 19
- Northern Health Region: 1

ILI or respiratory outbreaks are reported year-round but are more frequently reported in the fall and winter months. In 2016–2017, the weekly outbreak reports increased in alignment with influenza activity (Figure 15) to peak in Week 8 (February 19–25, 2017). During the seasonal epidemic of influenza, the majority of ILI outbreaks were laboratory confirmed to be influenza outbreaks, such as in Week 8 and 9 (February 19–March 4, 2017).

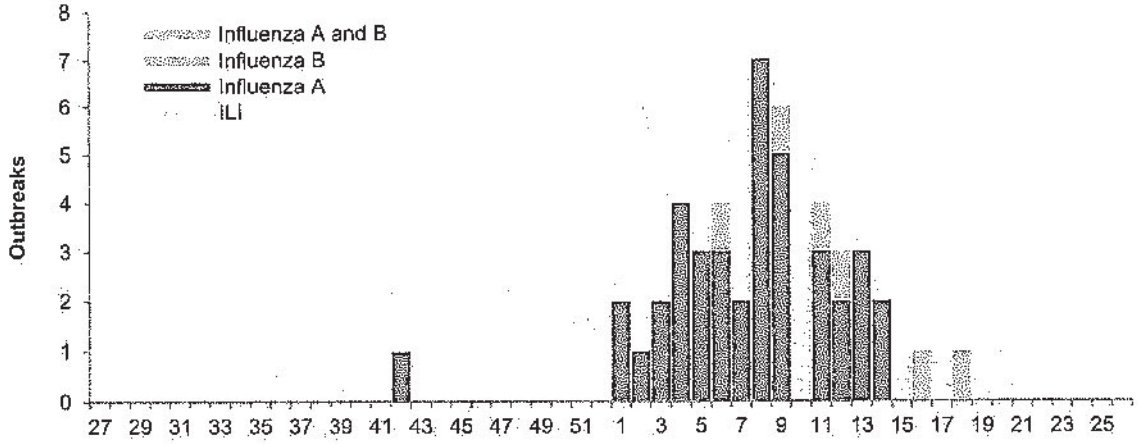

Figure 15 Weekly institutional outbreaks of ILI and influenza, Manitoba, 2016–2017

Immunizations

Uptake

In 2016–2017, the seasonal influenza vaccine was available free-of-charge to all Manitoba residents over 6 months of age. As in previous seasons, MHSAL conducted a Seasonal Influenza Immunization Program that focused on those at increased risk of serious illness from influenza, their caregivers and close contacts, including:

- Seniors aged 65 and older,
- Residents of a LTC facility,
- Health care workers and first responders,
- Children 6 to 59 months of age,
- Individuals of Aboriginal ancestry,
- Those with chronic illness, such as:
    - Cardiac or pulmonary disorders (including bronchopulmonary dysplasia, cystic fibrosis and asthma),
    - Diabetes mellitus and other metabolic disorders,
    - Cancer, immune compromising conditions (due to underlying disease and/or therapy),
    - Renal disease,
    - Anemia or hemoglobinopathy,
    - Conditions that compromise the management of respiratory secretions and are associated with an increased risk of aspiration, and
    - Children 6 months to adolescents 18 years of age on long-term acetylsalicylic acid (i.e. Aspirin) therapy,
- People who are severely overweight or obese,
- Healthy pregnant women.

In addition, international students, visitors and newcomers were eligible to receive the seasonal influenza vaccine free-of-charge regardless of the third party insurance or MHSAL coverage.

As per the World Health Organization (WHO), all seasonal quadrivalent influenza vaccines for the 2016–2017 season in the northern hemisphere contained:

- A/Hong Kong/4801/2014 (H3N2)-like virus

- A/California/7/2009 (H1N1)pdm09-like virus
- B/Brisbane/60/2008-like virus
- B/Phuket/3073/2013-like virus

In 2016–2017, three vaccine products were included in the province's Publicly-Funded Seasonal Influenza Immunization Program:

- Quadrivalent inactivated vaccine (QIV)
  - Fluzone® Quadrivalent (Sanofi Pasteur)
  - FluLaval® Tetra (GlaxoSmithKline)
- Quadrivalent live attenuated influenza vaccine (QLAIV)
  - FluMist® Quadrivalent (AstraZeneca)

Immunization data for previous annual influenza reports were extracted from the Manitoba Immunization Monitoring System (MIMS). MIMS contains all childhood immunizations administered to children born in 1980 or later since 1988 and all adult immunizations since 2000. Since 2015–2016, immunization data for an annual influenza report have been extracted from the new provincial immunization registry residing in Panorama. Panorama is an electronic Public Health application for disease surveillance and management. It contains five modules. Two modules are related to the Manitoba Immunization Program and both became fully functional in 2015:

- Immunization Management – records immunization events. All the immunization data in MIMS have been imported into Panorama.
- Vaccine Inventory Management – manages and monitors vaccine storage, distribution and inventories.

Seasonal influenza immunizations were captured in Panorama in one of three ways:

- Immunizations administered by fee-for-service physicians were imported into Panorama from the Manitoba Physician Billing System.
- Immunizations administered by certified pharmacists were imported into Panorama from DPIN.
- Immunizations provided by all other health care providers including public health nurses were entered directly into Panorama by immunization providers or data entry staff.

In facilities where Panorama has not yet been implemented, immunizations were entered into MIMS and loaded from MIMS to Panorama weekly. Immunization data in Panorama are considered comprehensive. However, it has been identified that some immunizations may not be captured in either Panorama or MIMS, typically in facilities without access to either system and/or access to the Manitoba Physician Billing system or DPIN. Addtionally, doses administered to clients who were not registered residents with MHSAL were not captured in Panorama. The impact of missing records on immunization assessment is under investigation.

Between September 1, 2016 and March 31, 2017, a total of 311,123 influenza vaccine doses were administered and 304,895 clients received at least one dose. Only a small number of clients received more than one dose due to medical or unknown reasons. For example, clients under the age of nine years who were not previously immunized with the seasonal influenza vaccine should receive two doses, four weeks apart.

The overall influenza vaccine uptake rate in Manitoba was 22.3% as of March 31, 2017 in active Manitoba residents. The age group of 65 years and older had the highest uptake rate (53.9%) followed by the age groups of 50–64 (26.3%) and 0–4 (19.8%). In comparison, the age group of 15–49 had the lowest uptake, only 13.1% (Table 4).

Table 4 Influenza immunization uptake rate (%) by RHA and age group, Manitoba, 2016–2017

Age	Winnipeg	Southern	Interlake-Eastern	Prairie Mountain	Northern	Manitoba
0 – 4	28.1	10.0	17.4	10.0	9.7	19.8
5 – 14	17.8	7.5	12.4	9.6	12.0	13.9
15 – 49	15.2	8.5	10.9	10.0	12.2	13.1
50 – 64	29.2	19.6	24.6	23.3	22.3	26.3
65+	56.8	47.8	52.2	51.3	42.9	53.9
Total	**25.3**	**15.6**	**22.0**	**20.1**	**15.6**	**22.3**

Note. Immunization uptake on the date of March 31, 2017.

Regional variance continued to be observed in immunization uptake. Winnipeg Regional Health Authority had the highest uptake, 25.3%. In contrast, Southern Health-Santé Sud and Northern Health Region had the same and lowest uptake, 15.6%. This regional variance was

not even across age groups (Figure 16). In some age groups, the variance was more prominent. In young children below the age of five years, the uptake in Winnipeg Regional Health Authority (28.1%) was almost three times the uptake in Northern Health Region (9.7%), Southern Health-Santé Sud (10.0%), and Prairie Mountain Health (10.0%).

In Northern Health Region, the uptake in the age group of 5–49 was similar to the provincial average. However, the uptake in young children aged below five, and seniors aged 65 and older, was the lowest among all regions.

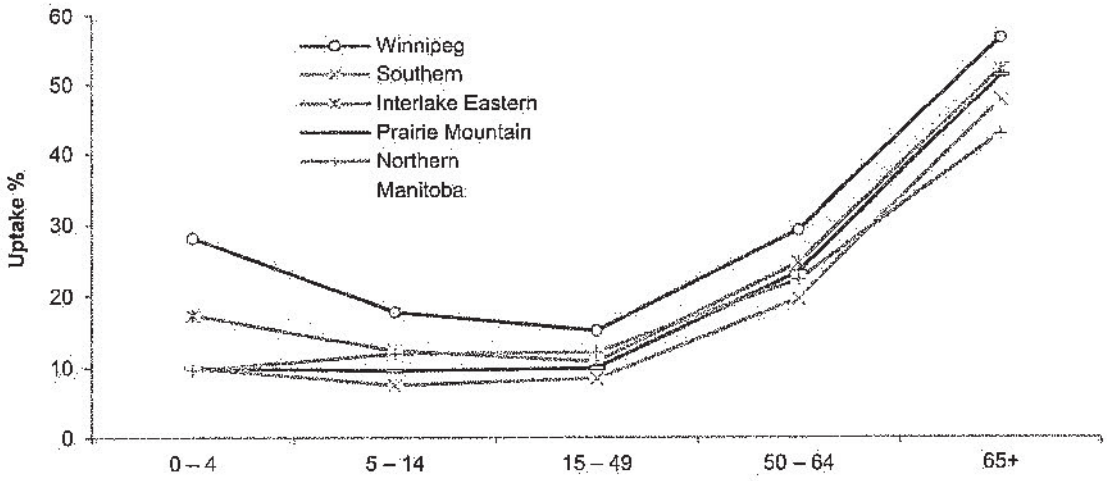

Figure 16 Influenza immunization uptake rate (%) by RHA and age group, Manitoba, 2016–2017

Immunization Providers

Immunization providers in this report were categorized by the organizations or programs that the providers belonged to when delivering immunizations. More information pertaining to the provider and the regional program the provider worked for was captured if an immunization record was entered directly into Panorama as opposed to being transmitted from other systems. For this report, providers were categorized as:

- Physician,
- Pharmacist,
- RHA–Public health,
- RHA–Occupational,
- RHA–Long term care (LTC),

- RHA–Other programs,
- Other providers including private physicians and correction facilities,
- Unknown providers due to missing values.

In 2016–2017, physicians, pharmacists, and various RHA programs delivered 96.5% of all influenza immunizations. More specifically, physicians, pharmacists and public health nurses were the most common service providers by delivering 40.9%, 25.4% and 21.3% of all influenza immunizations respectively (Table 5). Compared with 2015–2016, physicians administered 8,377 more immunizations in 2016–2017. In their third year eligible to administer the seasonal influenza vaccines to clients over the age of seven years, pharmacists became the second most common service providers. They delivered 78,885 immunizations, an increase of 19,970 immunizations from the previous season. In contrast, this season, public health nurses administered 9,219 fewer influenza immunizations.

Table 5 Influenza immunizations by client age and provider type, Manitoba, 2016–2017

Age	Public Health	Physician	Pharmacist	Occupational	LTC	Other Programs	Unknown	Total
0-4	19.3%	72.0%	0.2%	0.01%	0.0%	4.9%	3.5%	22,342
5-14	29.5%	48.5%	15.4%	0.1%	0.1%	3.6%	2.8%	23,444
15-49	18.8%	37.2%	27.3%	5.3%	3.1%	2.9%	5.4%	84,566
50-64	19.2%	37.1%	30.5%	3.8%	3.2%	2.5%	3.8%	70,245
65+	23.1%	38.2%	27.8%	0.5%	6.2%	2.1%	2.0%	110,526
Total	**66,130**	**127,195**	**78,885**	**7,783**	**11,851**	**8,438**	**10841**	**311,123**
	21.3%	**40.9%**	**25.4%**	**2.5%**	**3.8%**	**2.7%**	**3.5%**	

Note. As per The Manitoba Pharmaceutical Act and Regulations, pharmacists are authorized to administer seasonal influenza immunizations to people 7 years of age and older.

The immunization season began in September 2016, and up until March 2017, a small number of immunizations continued to be provided, but the majority of immunizations (86%) were delivered in October and November 2016, before the seasonal activity became apparent (Figure 17). Three RHA programs including Public Health, Occupational Health, and LTC facilities delivered 94%–97% of their influenza immunization service in October

and November 2016. Physicians also delivered close to 80% of their influenza immunization service in those two months.

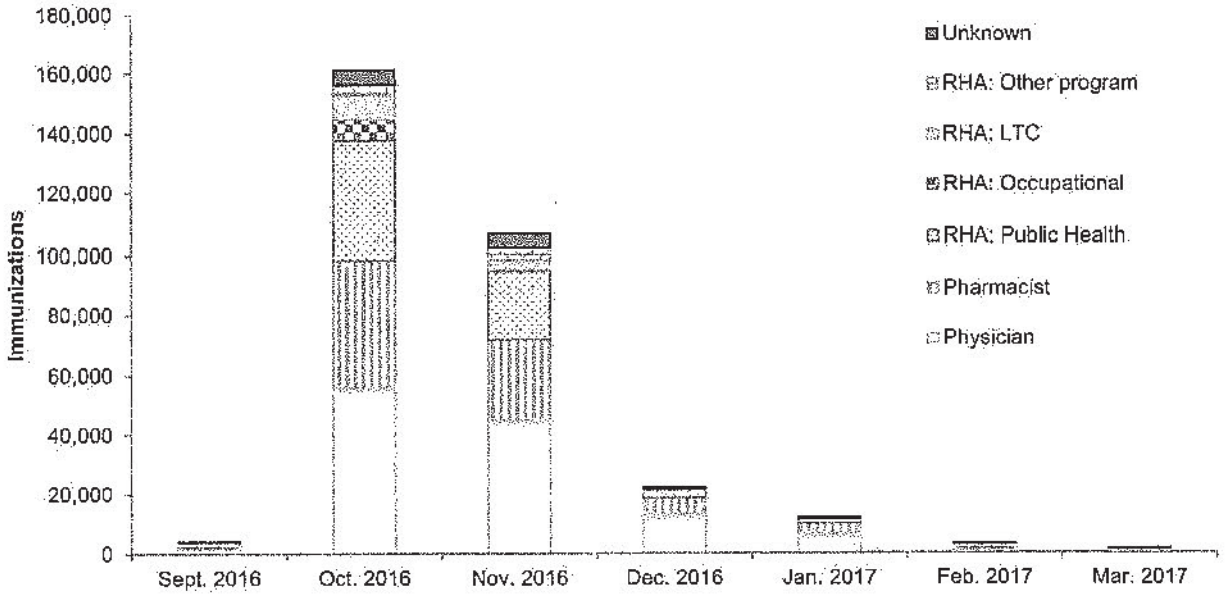

Figure 17 Influenza immunizations by provider type and month of service, Manitoba, 2016–2017

Each type of immunization provider appears to focus their service in different age groups. Physicians were the most common service provider for all age groups, especially for young children. Of the total immunizations, 72% in the age group of 0–4 and almost 50% in the age group of 5–14 were delivered by physicians. As the second most common immunization provider in 2016–2017, pharmacists delivered more immunizations than public health nurses. In the age group older than 14 years (Figure 18).

There was an increase of 5,233 immunizations by unknown providers compared with 2015–2016, indicating an increased amount of incomplete data entries.

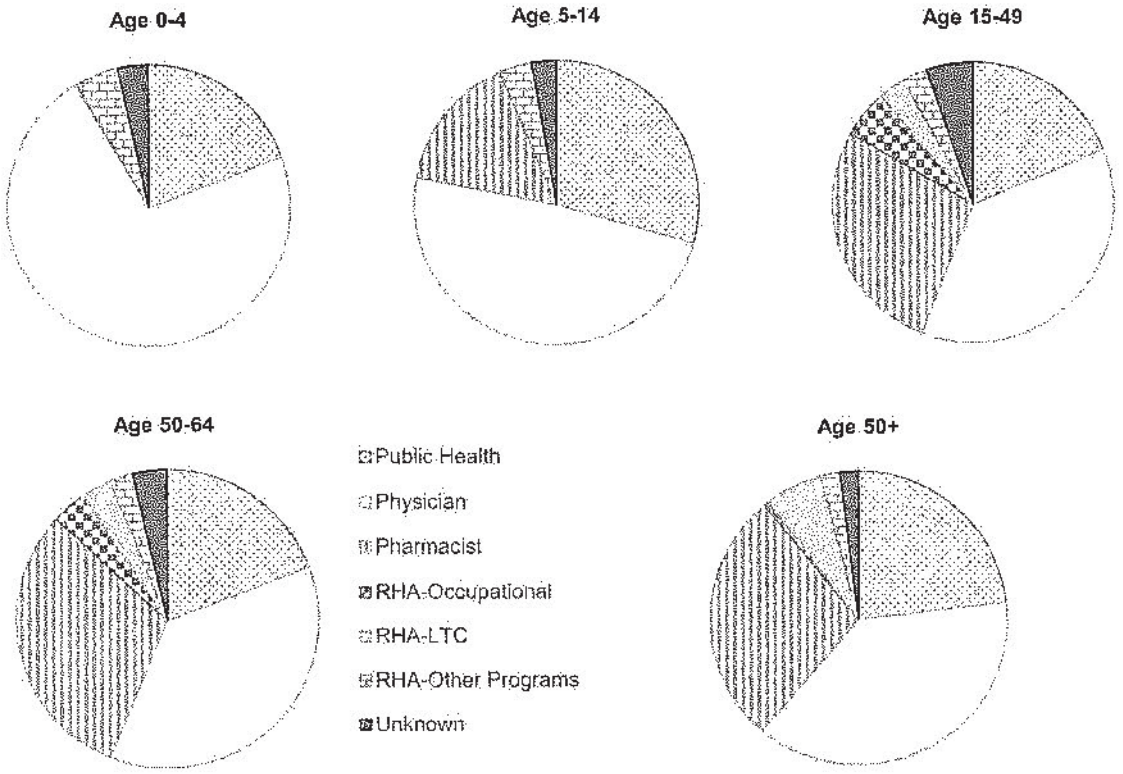

Figure 18 Influenza immunizations by provider type and client age group, Manitoba, 2016–2017

Adverse Events Following Immunization (AEFI)

Per *The Food and Drugs Act* and Regulations, vaccine manufacturers are required to report to PHAC all serious AEFI reports with vaccines for which they are the Market Authorization Holder, within 15 days of knowledge of their occurrence. No other legal requirement for reporting AEFI exists nationally.

In Manitoba, an AEFI is reportable under *The Public Health Act* as prescribed in the Immunization Regulation (C.C.S.M. c.P210) if it is temporally associated with an immunizing agent, cannot be attributed to a co-existing condition, and if it meets at least one of the following criteria:

a. The event is serious in nature:
   - Life-threatening,
   - Could result in permanent disability,

- Requires hospitalization or urgent medical attention,
- Or for any other reason considered to be of a serious nature.

b. The event is unusual or unexpected, including but without limitation:
   - An event not previously identified,
   - An event previously identified but with an increased frequency.

c. At the time of the report, the event cannot be explained by anything in the patient's medical history, such as a recent disease or illness, or the taking of medication.

Health care professionals who become aware of reportable AEFIs are required to report an event within seven days by creating an AEFI report in Panorama or completing the AEFI form and submitting to their regional MOHs. Data for this report were extracted from Panorama.

A total of 37 influenza immunizations between October 7, 2016 and January 7, 2017 were associated with 45 AEFIs in Manitoba. A few cases experienced more than one adverse events. Overall, the incidence rate for having AEFI was 11.9 cases per 100,000 immunizations. Clients at higher risk for AEFI were children under the age of fifteen years (Table 6).

Table 6 Adverse events following influenza immunization by age group, Manitoba, 2016–2017

Age group	Cases	Rate (/100,000)
0–4	7	31.3
5–14	6	25.6
15–49	7	8.3
50–64	11	15.7
65+	6	5.4
Total	**37**	11.9

The majority of those adverse events (Table 7) were local reactions (48.9%), followed by allergic or allergic-like reactions (31.1%).

Table 7 Adverse events following influenza immunization by event type, Manitoba, 2016–2017

	Events	% of 37 cases
Allergic or allergic-like event	14	31.1%
Local reaction	22	48.9%
Neurologic event	1	2.2%
Other defined event of interest	8	17.8%
Total events	45	

Overall, AEFIs in 2016–2017 were not serious. The majority of cases required only low-level care or no care. Only six cases were treated in emergency rooms and none were hospitalized (Table 8).

Table 8 Adverse events following influenza immunization by level of care, Manitoba, 2016–2017

Care required	Cases	%
None	15	40.5%
Non-urgent visit	11	29.7%
Telephone advice from health professional	2	5.4%
Emergency visit	6	16.2%
Hospitalization	0	0.0%
Prolongation of existing hospitalization	0	0.0%
Unknown	3	8.1%
Total cases	37	

At the time of reporting, there were no deaths associated with AEFIs and 16 cases had fully recovered (Table 9).

Table 9 Adverse events following influenza immunization by outcome, Manitoba, 2016–2017

Outcome	Cases	%
Fully recovered	16	43.2%
Not yet recovered	14	37.8%
Permanent disability	0	0.0%
Death	0	0.0%
Unknown	7	18.9%
Total cases	37	

Strain Characterization and Antiviral Resistance

The Influenza and Respiratory Viruses Section (IRVS) at NML performs enhanced surveillance, investigations and research on influenza and other respiratory pathogens, in close partnership with provincial public health laboratories. As a routine practice, IRVS at NML antigenically characterizes influenza viruses received from Canadian provincial laboratories. Routine testing for antiviral resistance is also performed at NML. Aggregate results of strain characterization and antiviral resistance are shared with Canadian provinces and territories on a weekly basis. In Manitoba, a selected sample of influenza isolates retrieved by culture is referred from CPL to NML for strain characterization and antiviral resistance testing.

Similar to elsewhere in Canada, the 2016–2017 season in Manitoba was predominated by the A/Hong Kong/4801/2014(H3N2)-like strain, the influenza A(H3N2) component in the 2016–2017 Northern Hemisphere influenza vaccine (Table 10). Influenza viruses of the B/Yamagata lineage predominating the influenza B detections were characterized as B/Phuket/3073/2013-like, one of the influenza B components in the quadrivalent vaccine.

NML also performed genetic characterization to 1,229 influenza A(H3N2) viruses that did not grow to sufficient hemagglutination titers for antigenic characterization by hemagglutination inhibition (HI) assays. Sequence analysis of the hemagglutinin (HA) gene of these viruses showed that 1,228 influenza A(H3N2) viruses belonged to a genetic group in which most viruses were antigenically related to A/Hong Kong/4801/2014. Of those viruses, 49 were from Manitoba.

Table 10 Strain characterization of influenza isolates, Manitoba and Canada, 2016–2017

Influenza Strain	Canada	Manitoba
A/Hong Kong/4801/2014(H3N2)-like	390	12
A/California/7/2009(H1N1)-like	56	1
B/Phuket/3073/2013-like	456	24
B/Brisbane/60/2008-like	114	5

Note: Reports between September 1, 2016 and June 29, 2017

Between September 1, 2016 and June 29, 2017, NML reported that all influenza isolates submitted from Manitoba were sensitive to Oseltamivir and Zanamivir. Nationally, two influenza A(H3N2) isolates and one influenza B isolate demonstrated resistance to Oseltamivir (Tables 11). In comparison, all viruses tested in Canada were resistant to Amantadine.

Table 11 Antiviral resistance of influenza isolates, Manitoba and Canada, 2016–2017

Virus	Zanamivir		Oseltamivir		Amantadine	
	Resistant	Sensitive	Resistant	Sensitive	Resistant	Sensitive
Manitoba						
A(H3N2)	0	35	0	37	14	0
A(H1N1)	0	1	0	1	1	0
B	0	29	0	29	N/A	N/A
Canada						
A(H3N2)	0	755	2	754	217	0
A(H1N1)	0	49	0	49	50	0
B	0	418	1	416	N/A	N/A

Note. Reports between September 1, 2016 and June 29, 2017

Discussion

Overall, the 2016–2017 season demonstrated lower activity and was less severe compared with the three previous influenza seasons. There were fewer laboratory confirmed influenza cases and fewer cases were severely ill. Influenza A(H3N2) was the predominating virus in 2016–2017. There were higher rates of illness in older populations than in younger populations in 2016–2017.

The majority of influenza viruses characterized this season were antigenically similar to the reference viruses representing the recommended components for the 2016–2017 Northern Hemisphere quadrivalent influenza vaccine. As a result, the vaccine effectiveness, though lower than in 2015–2016, an influenza A(H1N1)-predominant season, was higher than in 2014–2015, the last influenza A(H3N2)-predominant season when there was a mismatch between the circulating strains and the composition of the vaccine. In 2016–2017, the mid-season estimate of vaccine effectiveness against medically attended and laboratory-confirmed influenza infection in Canada was 42% (95% ICs: 18–59%)[1]. In the United States, between November 28, 2016 and April 14, 2017, the influenza vaccination this season reduced the overall risk for influenza-associated medical visits by 42% (95% CIs: 35%–48%)[2].

The population coverage of influenza immunizations has been relatively stable over the past several seasons including 2016–2017, lying between 20% and 23%. Regional variance continued to be present in 2016–2017, especially in certain age groups. In young children 0–4 years of age, the coverage rate in Winnipeg Regional Health Authority was almost three times the coverage rate in Northern Health Region, Prairie Mountain Health, and Southern Health-Santé Sud. Of course, the large amount of vaccine doses shipped to service providers or facilities but not captured in the immunization registry need to be addressed before a more concrete conclusion could be made.

This annual influenza report aims to summarize the season in its broad trends while being cautious about alternative explanations to changes in data. There are a number of challenges in influenza surveillance. First, influenza surveillance is inherently biased towards more severe outcomes. The real burden of influenza is likely underestimated because not all individuals experiencing symptoms will seek medical attention and not all symptomatic patients will be tested for influenza. As such, a set of indicators monitoring different severity levels of illness were selected for surveillance. Second, surveillance data

can be affected by multiple factors, such as public awareness, laboratory technique, test ordering pattern, circulating strains, vaccine formulation, and staff or behaviour change, etc. The change in data caused by those factors may or may not represent a real change in seasonal activity.

References

1. Skowronski, D.M., et al., *Interim estimates of 2016/17 vaccine effectiveness against influenza A(H3N2), Canada, January 2017.* Euro Surveill, 2017. **22**(6).

2. Blanton, L., et al., *Update: Influenza Activity in the United States During the 2016-17 Season and Composition of the 2017-18 Influenza Vaccine.* MMWR Morb Mortal Wkly Rep, 2017. **66**(25): p. 668-676.

Please email comments and questions to:
flusurveillance@gov.mb.ca

This is Exhibit "I" referred to in the Affidavit of Carla Loeppky affirmed before me this 30th day of April, 2021.

A Barrister-at-law in and for the
Province of Manitoba.

epiREPORT

Manitoba Health, Seniors and Active Living

ANNUAL INFLUENZA REPORT

2015–2016

Epidemiology and Surveillance

Active Living, Population and Public Health

March 2017

Manitoba

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Executive Summary

Seasonal influenza (herein referred to as "influenza") can cause severe morbidity and mortality at extremes of life. In Manitoba, influenza is a reportable disease under *The Public Health Act*. Routine monitoring of influenza is performed by Manitoba Health, Seniors and Active Living (MHSAL) through a variety of mechanisms. In each season usually between November and May, influenza activity is reported in a publicly available weekly bulletin. This annual report summarizes all influenza related information between July 1, 2015 and June 30, 2016 in Manitoba.

The start and peak of the 2015–2016 season in Manitoba was delayed in comparison with the previous three seasons (2012–2013, 2013–2014, and 2014–2015), which was consistent with elsewhere in Canada and the United States. The activity level increased in late January 2016 and peaked at the end of February 2016. In comparison, the three previous seasons all peaked within the first three weeks of January.

In 2015–2016, the influenza A(H1N1)pdm09 virus was the predominant circulating strain. As expected with this particular influenza strain, there were higher rates of illness and hospital admissions in the younger populations, especially young children below the age of five, in comparison with the population over the age of 65. Overall, compared with 2014–2015, the influenza A(H3N2)-predominant season, the 2015–2016 season had a lower influenza activity level and was less severe. Compared with 2013–2014, the last influenza A(H1N1)-predominant season, the activity in 2015–2016 was at a similar level. Though there were higher numbers of laboratory-confirmed patients, outbreaks, and severe outcomes in 2015–2016 than in 2013–2014, this may be due to the fact that more physicians are requesting laboratory confirmation.

Influenza B and a smaller number of influenza A(H3N2) viruses also co-circulated. The majority of viruses characterized this season were antigenically similar to the reference viruses representing the recommended components of the 2015–2016 Northern Hemisphere quadrivalent influenza vaccine. Two quadrivalent influenza vaccine products were available in Manitoba for the season. It was estimated that 21.7% of all Manitoba residents in 2015–2016 were immunized with the influenza vaccine, similar to the coverage rate in the three previous seasons.

Reporting Weeks

Time trends in this report were presented by epidemiological week, a schedule used by the national FluWatch Program coordinated by the Public Health Agency of Canada (PHAC).

Week	Start	End
27	2015-07-05	2015-07-11
28	2015-07-12	2015-07-18
29	2015-07-19	2015-07-25
30	2015-07-26	2015-08-01
31	2015-08-02	2015-08-08
32	2015-08-09	2015-08-15
33	2015-08-16	2015-08-22
34	2015-08-23	2015-08-29
35	2015-08-30	2015-09-05
36	2015-09-06	2015-09-12
37	2015-09-13	2015-09-19
38	2015-09-20	2015-09-26
39	2015-09-27	2015-10-03
40	2015-10-04	2015-10-10
41	2015-10-11	2015-10-17
42	2015-10-18	2015-10-24
43	2015-10-25	2015-10-31
44	2015-11-01	2015-11-07
45	2015-11-08	2015-11-14
46	2015-11-15	2015-11-21
47	2015-11-22	2015-11-28
48	2015-11-29	2015-12-05
49	2015-12-06	2015-12-12
50	2015-12-13	2015-12-19
51	2015-12-20	2015-12-26
52	2015-12-27	2016-01-02
1	2016-01-03	2016-01-09
2	2016-01-10	2016-01-16
3	2016-01-17	2016-01-23
4	2016-01-24	2016-01-30
5	2016-01-31	2016-02-06
6	2016-02-07	2016-02-13
7	2016-02-14	2016-02-20
8	2016-02-21	2016-02-27
9	2016-02-28	2016-03-05
10	2016-03-06	2016-03-12
11	2016-03-13	2016-03-19
12	2016-03-20	2016-03-26
13	2016-03-27	2016-04-02
14	2016-04-03	2016-04-09
15	2016-04-10	2016-04-16
16	2016-04-17	2016-04-23
17	2016-04-24	2016-04-30
18	2016-05-01	2016-05-07
19	2016-05-08	2016-05-14
20	2016-05-15	2016-05-21
21	2016-05-22	2016-05-28
22	2016-05-29	2016-06-04
23	2016-06-05	2016-06-11
24	2016-06-12	2016-06-18
25	2016-06-19	2016-06-25
26	2016-06-26	2016-07-02

Acronyms

AEFI	Adverse event following immunization
CI	Confidence Interval
CPL	Cadham Provincial Laboratory
DPIN	Drug Programs Information Network
E&S	Epidemiology and Surveillance
EIA	Enzyme immunoassay
ICU	Intensive Care Unit
ILI	Influenza–like illness
IRVS	Influenza and Respiratory Viruses Section
LTC	Long Term Care
MHSAL	Manitoba Health, Seniors and Active Living
MIMS	Manitoba Immunization Monitoring System
MOH	Medical Officer of Health
NML	National Microbiology Laboratory
ORS	Oculo-Repiratory Syndrome
PCR	Polymerase chain reaction
PHCC	Provincial Health Contact Centre
PHAC	Public Health Agency of Canada
RHA	Regional Health Authority

Introduction

Epidemiology and Surveillance (E&S), Active Living, Population and Public Health Branch of MHSAL monitors influenza activity year-round and produces regular bulletins during the season[1], usually between November and May. This annual report summarizes information on influenza activity in Manitoba between July 1, 2015 and June 30, 2016.

Overall:

- a total of 864 laboratory-confirmed influenza A patients and 229 laboratory-confirmed influenza B patients were reported to E&S;
- influenza A(H1N1)pdm09 was the predominant circulating strain. As expected with this influenza strain, younger populations were affected more than older populations this season;
- the influenza A season started in Week 3 (January 17–23, 2016) and peaked in Week 9 (February 28–March 5, 2016). The influenza B season started in Week 8 (February 21–27, 2016) and peaked in Week 11 (March 13–19, 2016);
- in total, 291 patients with influenza were hospitalized, 78 of whom were admitted to intensive care units (ICU). In those hospitalized patients, 75% were younger than 65 years of age. There were 25 deceased influenza patients, 64% of whom were younger than 65 years of age;
- a total of 21 laboratory-confirmed influenza outbreaks, mostly in long term care (LTC) facilities, were reported;
- the provincial immunization coverage in 2015–2016 was 21.7%, similar to the three previous seasons;
- pharmacists delivered 20% of all influenza immunizations in their second season authorized to administer immunizations, an increase from 17% in the previous season; and
- the rate of adverse events following seasonal influenza immunizations was 19.5 reports per 100,000 doses administered.

[1] *Regular bulletins are published online at* http://www.gov.mb.ca/health/publichealth/surveillance/influenza/index.html

A variety of data sources and surveillance indicators were evaluated to monitor the arrival, intensity and severity of influenza to characterize those infected as well as the broader trends. Surveillance data analyzed for this report include data from:

- syndromic surveillance
    a. sentinel surveillance of influenza-like illness (ILI) in the community
    b. influenza-related calls to Health Links–Info Santé;
- laboratory reports of influenza infections;
- hospitalizations, ICU admissions, and deaths associated with laboratory-confirmed influenza diagnosis;
- laboratory-confirmed influenza outbreaks;
- antiviral dispensing;
- influenza immunizations;
- adverse events following immunization (AEFIs); and
- strain characterization of influenza viruses and antiviral resistance.

Syndromic Surveillance

Sentinel Surveillance

ILI in the general population is defined as acute onset of respiratory illness with fever and cough and with one or more of the symptoms, sore throat, joint or muscle pain, or fatigue, that are likely due to influenza. In children under the age of 5, gastrointestinal symptoms may also be present. In patients under 5 or over 65 years of age, fever may not be prominent.

FluWatch, Canada's national surveillance system co-ordinated by Public Health Agency of Canada (PHAC), monitors the spread of influenza and influenza like illness (ILI) on a year-round basis. A network of laboratories, hospitals, doctor's offices and provincial and territorial ministries of health are routinely providing information to this system.

In Manitoba, sentinel physicians in this network throughout the province report to *FluWatch* weekly. Sentinels can also opt into the voluntary swabbing component of the program. This consists of the submission of either two posterior pharyngeal swabs or two nasopharyngeal swabs within 48 hours of symptom onset from patients presenting with ILI. Requisitions, swabs, and antiviral transport media are available from Cadham Provincial Laboratory (CPL). In response, E&S receives a weekly report from *FluWatch* on the ILI rate for Manitoba and for each participating sentinel physician. In 2015–2016, there were 19 sentinel physicians in Manitoba, a decrease from 24 in 2014–2015.

During the 2015–2016 season, ILI consultations to sentinel physicians occurred year-round. The increase in the percentage of patient visits due to ILI during Weeks 52 and 1 (December 7, 2015–January 9, 2016) might be partially attributable to reduced routine health care services during the holidays. The peak occurred in Week 10 (March 10–12, 2016) with an approximate ILI rate of 4%. This indicator in 2015–2016 demonstrated less seasonality compared with previous seasons (Figure 1), probably due to lower influenza activity. But this could also be attributed to fewer participating physicians this season.

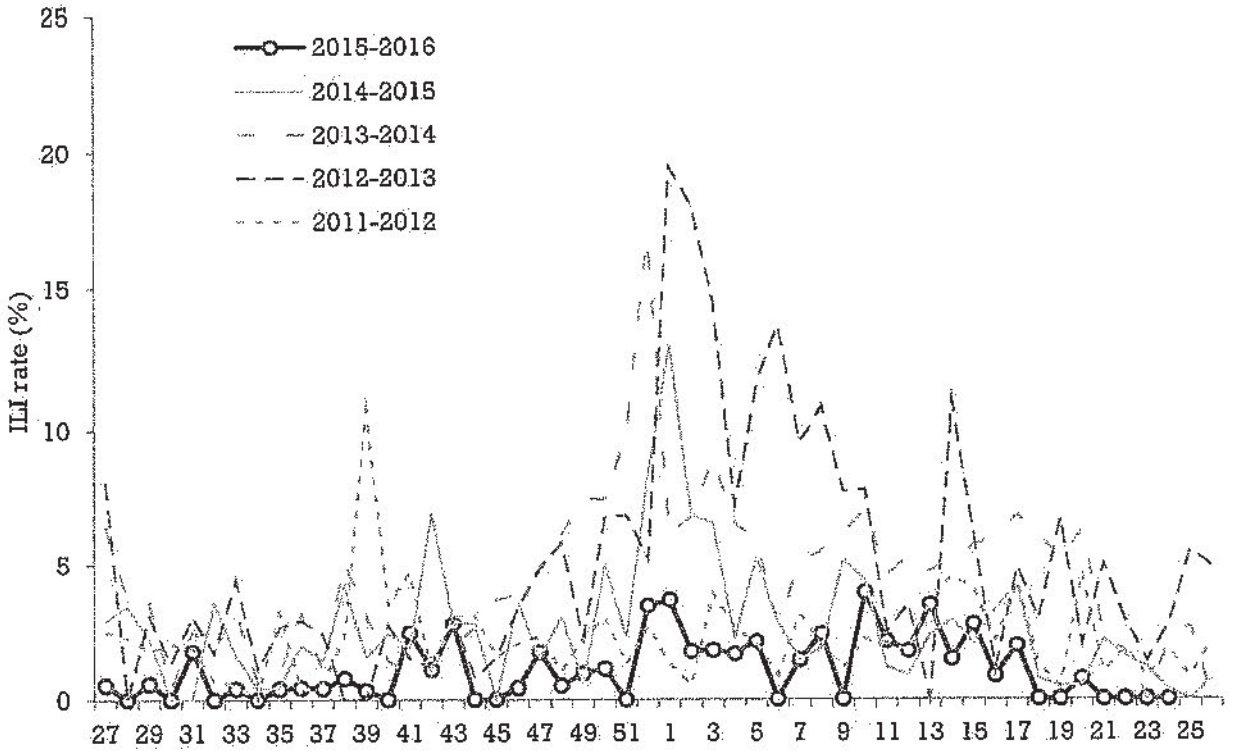

Figure 1 Weekly percentage of patient visits to sentinel physicians due to ILI, Manitoba, 2015–2016

Health Links – Info Santé

Health Links–Info Santé is one of 30 inbound and outbound calling programs offered by the Provincial Health Contact Centre (PHCC). Implemented in 1994, this bilingual program was the first telephone, nurse-based triage system in Canada. It is operated by Misericordia Health Centre in partnership with MHSAL and the Winnipeg Regional Health Authority (RHA). There are 80 full-time and part-time registered nurses working for this triage system, answering calls 24 hours a day, 365 days a year. Interpreters are available for over 100 different languages.

During each call, a nurse will obtain information about symptoms and follow clinical protocols to offer advice on whether to treat the symptoms at home, see a family doctor, or visit an emergency room. Calls range from concerns about abdominal pain to influenza virus symptoms[2]. Callers to Health Links–Info Santé who select "Influenza Service" are given five options: (1) to obtain information to assist with arranging a flu vaccination, (2) to learn who is

[2] http://www.misericordia.mb.ca/Programs/PHCC.html

at increased risk of serious illness from the flu, (3) to obtain information about the flu vaccine, (4) to obtain information about the management of flu symptoms and possible complications, and (5) to speak with a nurse. E&S receives aggregate data from Health Links–Info Santé weekly.

Similar to previous seasons, there were two clear peaks in influenza-related calls to Health Links–Info Santé in 2015–2016 (Figure 2). The first peak in Week 40 (October 4–10, 2015) coincided with the launch of the annual Seasonal Influenza Immunization Program.

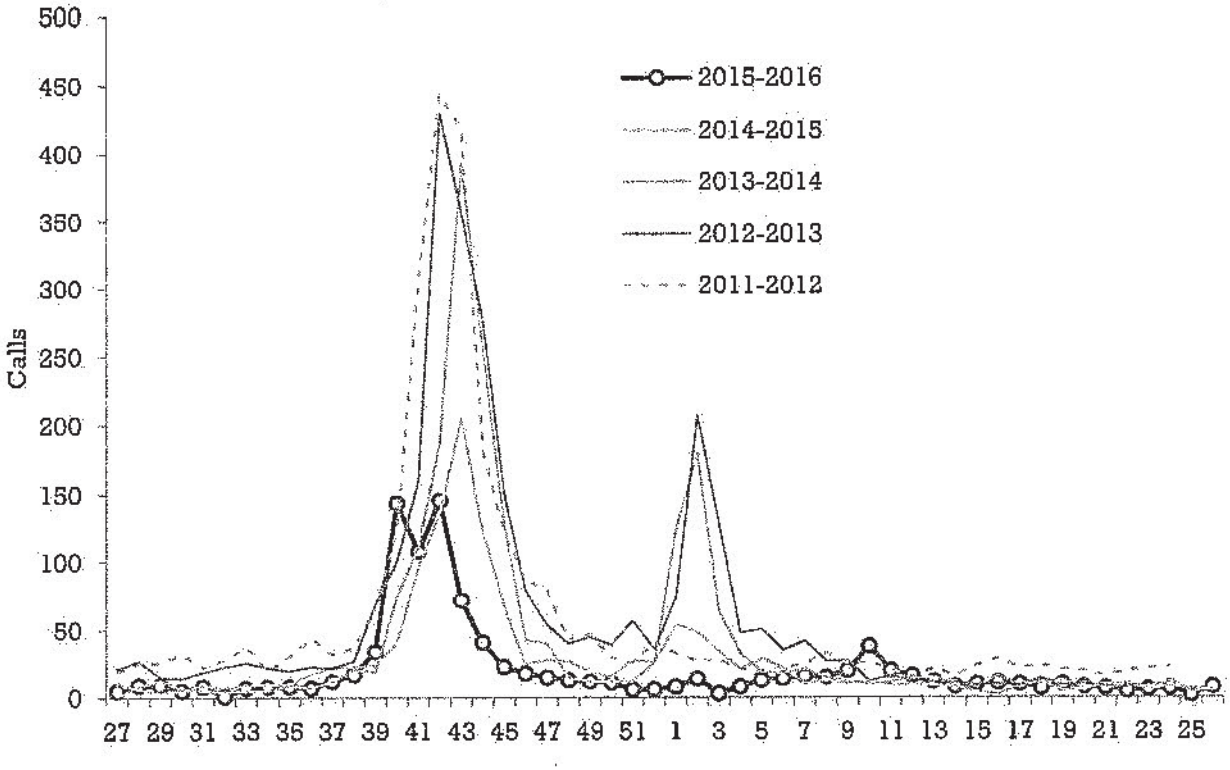

Figure 2 Weekly influenza related calls to Health Links–Info Santé, Manitoba, 2015–2016

The proportion of calls attributed to questions related to the influenza clinics and influenza program also peaked around the same time (Figure 3). The second, and considerably lower peak, occurred in Week 10 (March 10–12, 2016). Compared with the previous seasons, the two peaks in 2015–2016 were much lower.

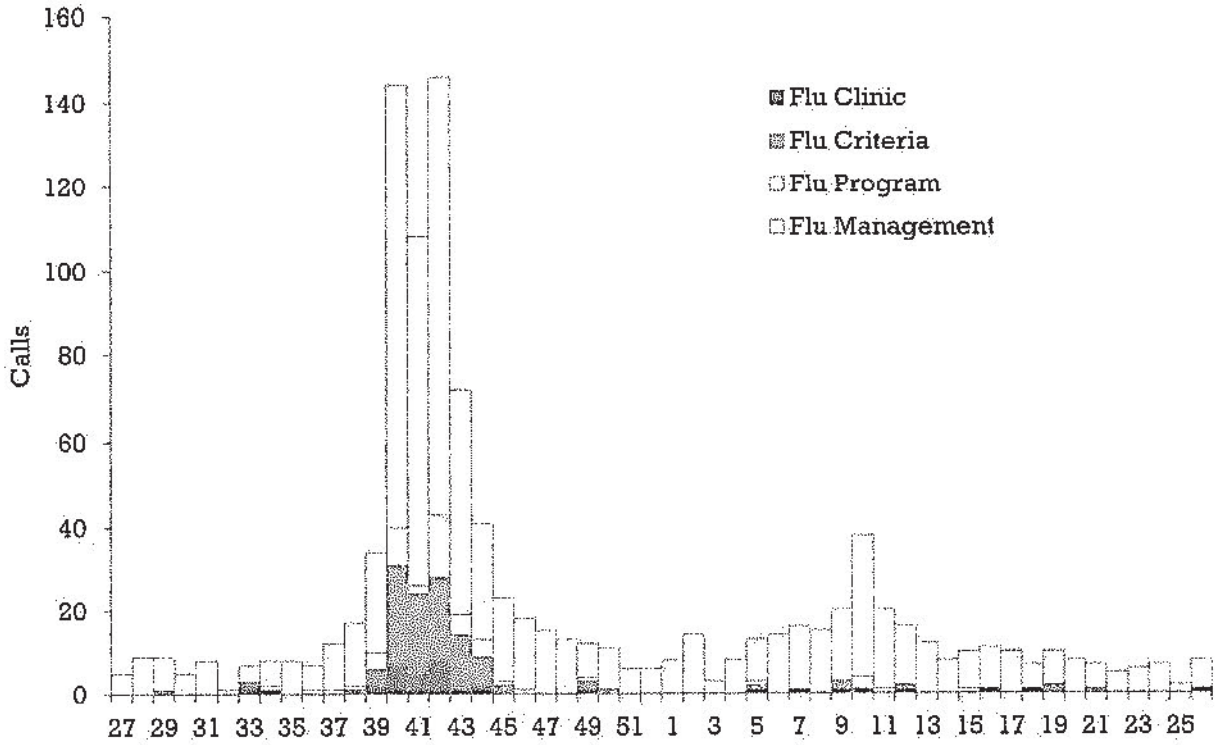

Figure 3 Types of influenza related calls to Health Links–Info Santé, Manitoba, 2015–2016

Laboratory Reporting

Reports of influenza nucleic acid detection, culture isolation and enzyme immunoassay (EIA) detections from CPL (and occasionally other labs) are routinely forwarded to E&S within 24 hours of confirmation. Only Manitoba residents who were registered with MHSAL for health care coverage were included in this report and the specimen collection date was used to assign cases to reporting weeks.

In 2015–2016, there were 864 laboratory-confirmed influenza A cases and 229 influenza B cases among Manitoba residents reported to E&S. Specifically:

- A(unsubtyped): 594 (54.3%)
- A(H1N1): 229 (21.0%)
- A(H3N2): 41 (3.8%)
- B: 229 (21.0%)

The laboratory detection had been predominated by the influenza A(H1N1) subtype. Note that not all individuals experiencing symptoms will seek medical attention and not all clinicians will routinely test cases of ILI for influenza. As such, the number of reports received by E&S will be smaller than the real number of cases in the community.

Influenza A

The seasonal epidemic of influenza A in 2015–2016 began in Week 3 (January 17–23, 2015), then increased and peaked in Week 9 (February 28–March 5, 2016). This season was delayed by almost two months compared with the three previous influenza A seasons (Figure 4). Note that 2013–2014 was the last influenza A(H1N1)-predominant season and 2011–2012 was the influenza B-predominant season.

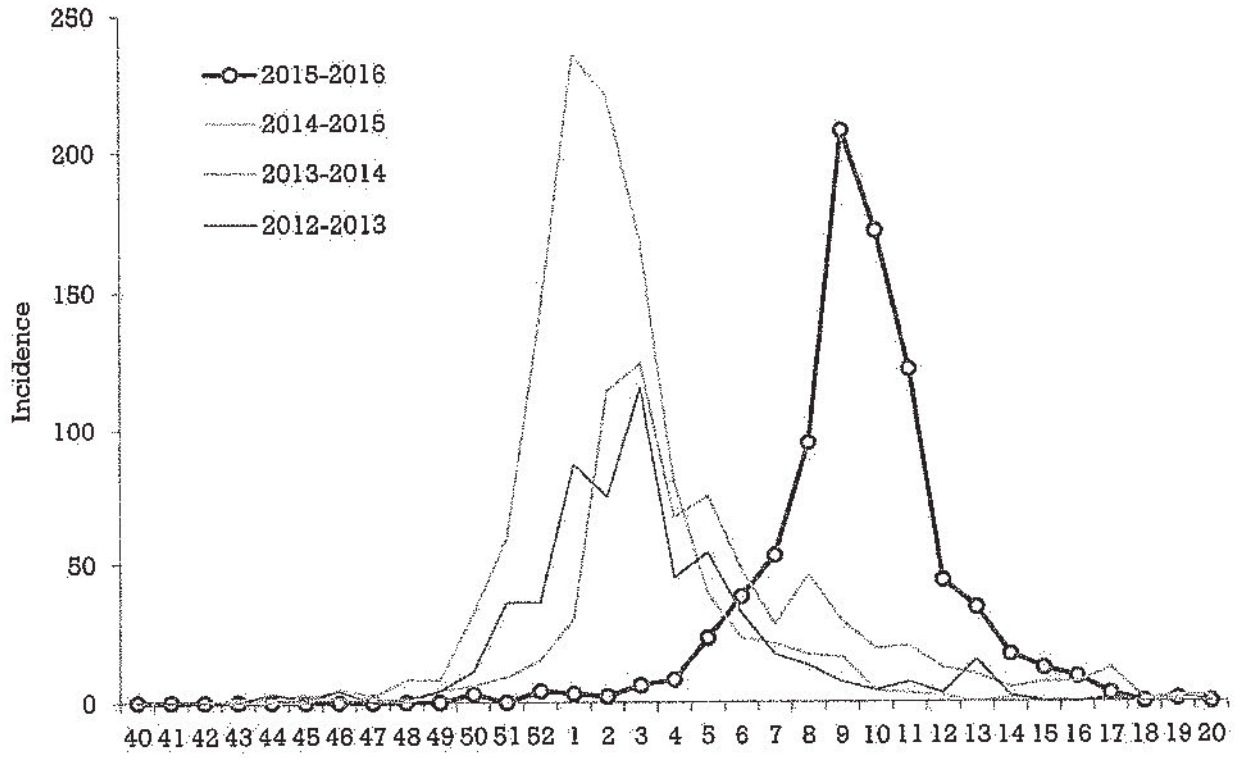

Figure 4 Weekly incidence of influenza A, Manitoba, 2012–2013 to 2015–2016

Peak transmission varies widely in different seasons. To compare the current season to previous seasons, the incidence curves of influenza A in previous seasons were aligned with the curve in 2015–2016 by aligning on the peak. Subsequently, the average weekly incidence and 95% confidence intervals (CIs) for influenza A were calculated (Figure 5). In 2015–2016, the incidence in Week 9 and 10 (February 28–March 12, 2014) was significantly higher than the average. Specifically, 208 cases were reported in Week 9 compared to 114, the average peak incidence in previous influenza A seasons.

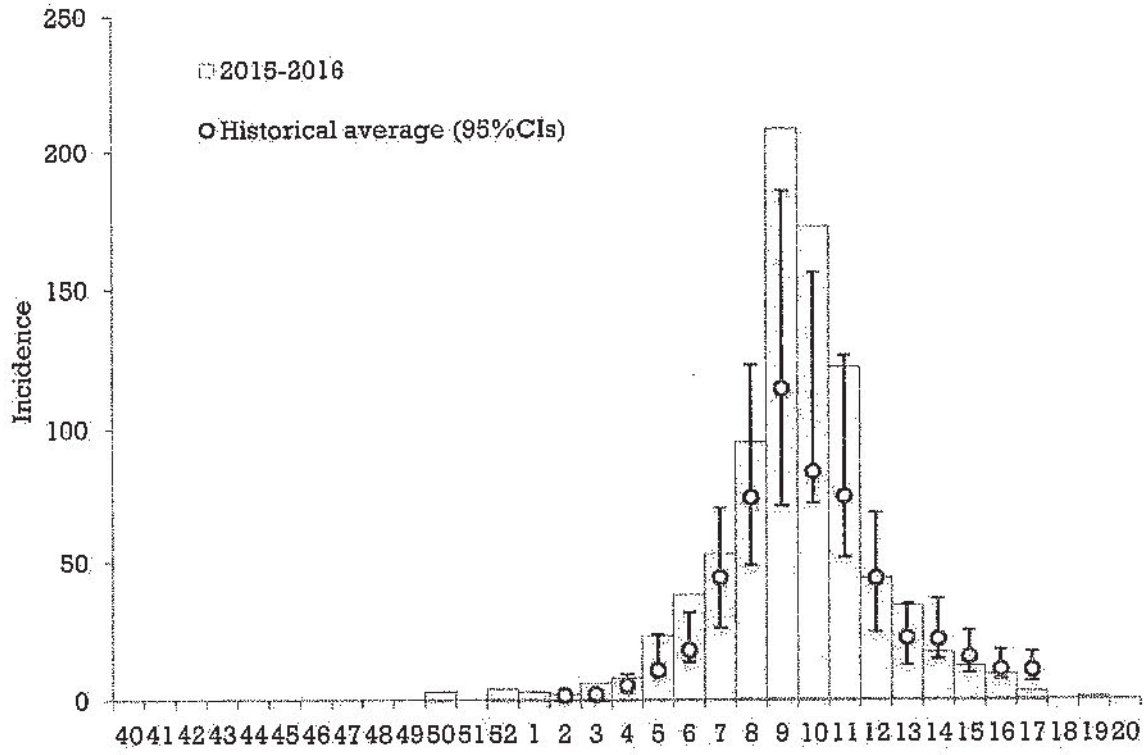

Figure 5 Weekly incidence of influenza A, Manitoba, 2015–2016 and historical average

Note. Only influenza A predominant seasons were included.

Unlike 2014–2015, younger populations were affected more than older populations in 2015–2016 due to the predominant A(H1N1) subtype (Figure 6). The highest incidence rate was observed among young children two years of age and younger (273 cases per 100,000 population). A total of 91 cases (10.5% of all cases) were reported in this age group[3]. The second highest incidence rate was observed also among children aged between two and four years (117 cases per 100,000 population). The incidence rate among those older than 65 years of age was much lower than in 2014–2015. In general, the disease burden by age group in 2015–2016 was comparable to the last A(H1N1) predominant season, 2013–2014.

[3] *Population counts as denominators in this report were based on all registered residents with MHSAL on June 1, 2015*

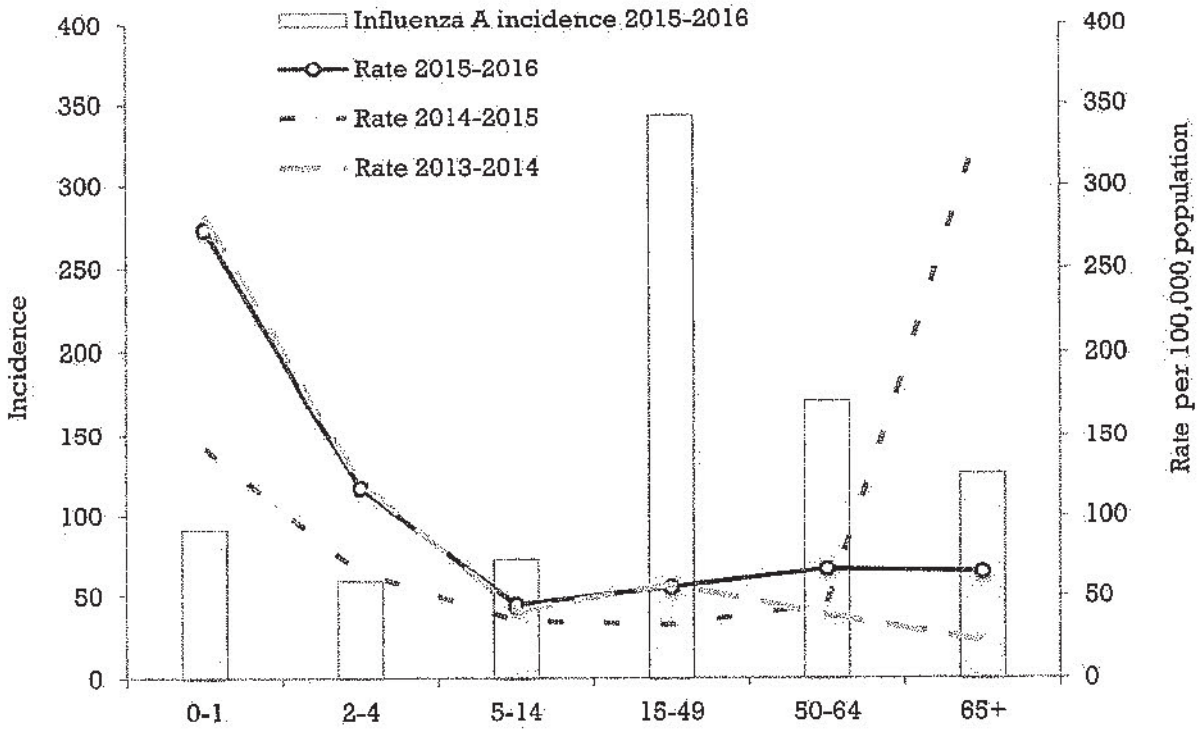

Figure 6 Incidence and incidence rate (per 100,000 population) of influenza A by age group, Manitoba, 2015–2016

Influenza B

In 2015–2016, there were 229 laboratory-confirmed influenza B cases among Manitoba residents. The seasonal epidemic of influenza B began in Week 8 (February 21–27, 2016) and peaked in Week 11 (March 13–19, 2016), two weeks after the peak of influenza A (Figure 7). The elevated influenza B activity sustained until Week 20 (May 15–21, 2016) and resulted in a prolonged influenza B season compared with previous influenza B seasons. Though the peak incidence was the highest in 2011–2012, the influenza B predominant season, the epidemic ended much earlier in that season (Figure 7).

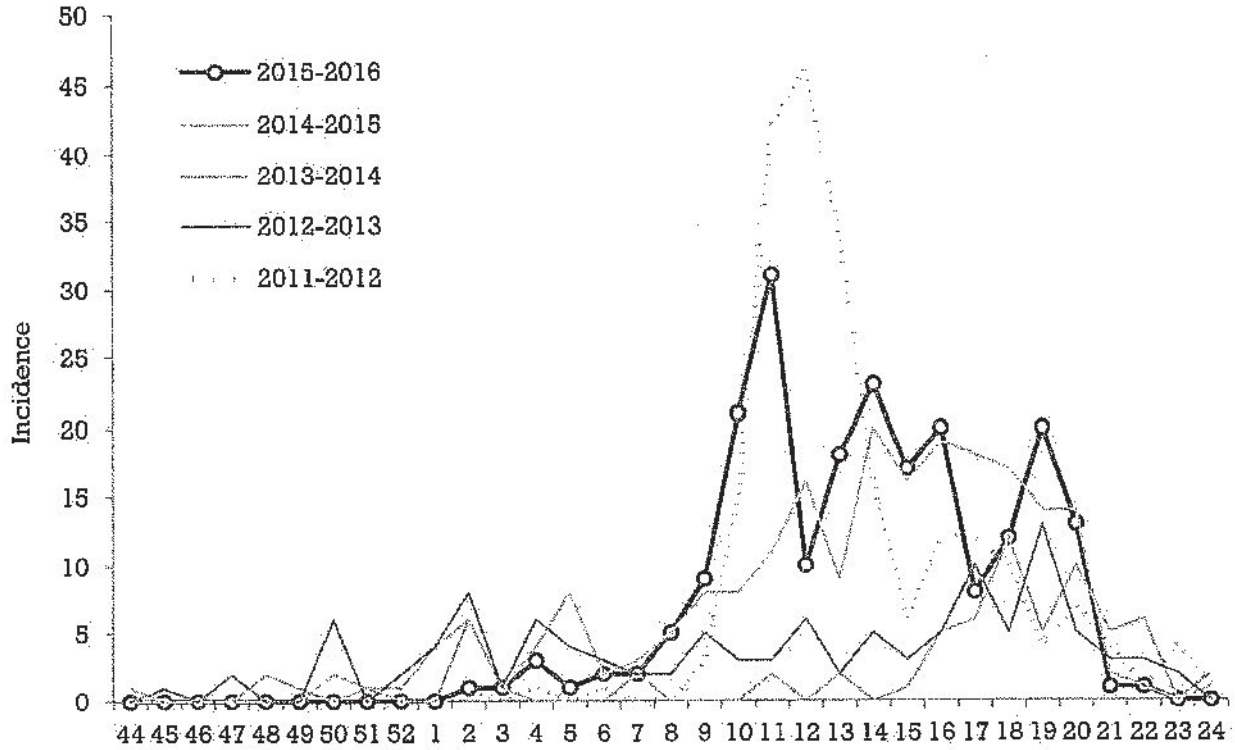

Figure 7 Weekly incidence of influenza B, Manitoba, 2011–2012 to 2015–2016

A similar method was used to calculate the historical average incidence each week for influenza B (Figure 8). In 2015–2016, the peak incidence of influenza B was not significantly higher than the historical average. However, from Week 13 (March 27–April 2, 2016), the incidence became significantly higher than the average, indicating a prolonged season.

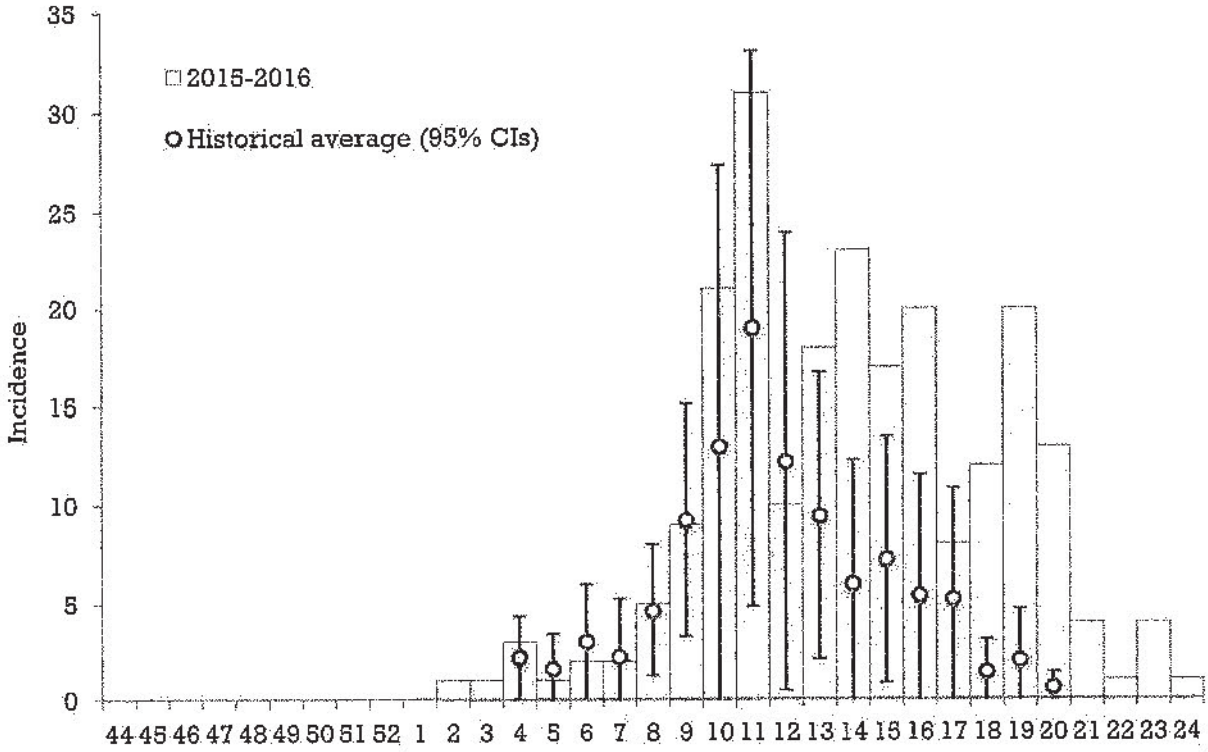

Figure 8 Weekly incidence of influenza B, Manitoba, 2015–2016 and historical average

In 2015–2016, most influenza B cases (86.9%) were under the age of 65 (Figure 9) and young children up to 15 years of age were affected the most (around 40 cases per 100,000 population). Compared to the previous two influenza B seasons, the incidence rate in young children in 2015–2016, especially in those 2 to 14 years of age, was the highest.

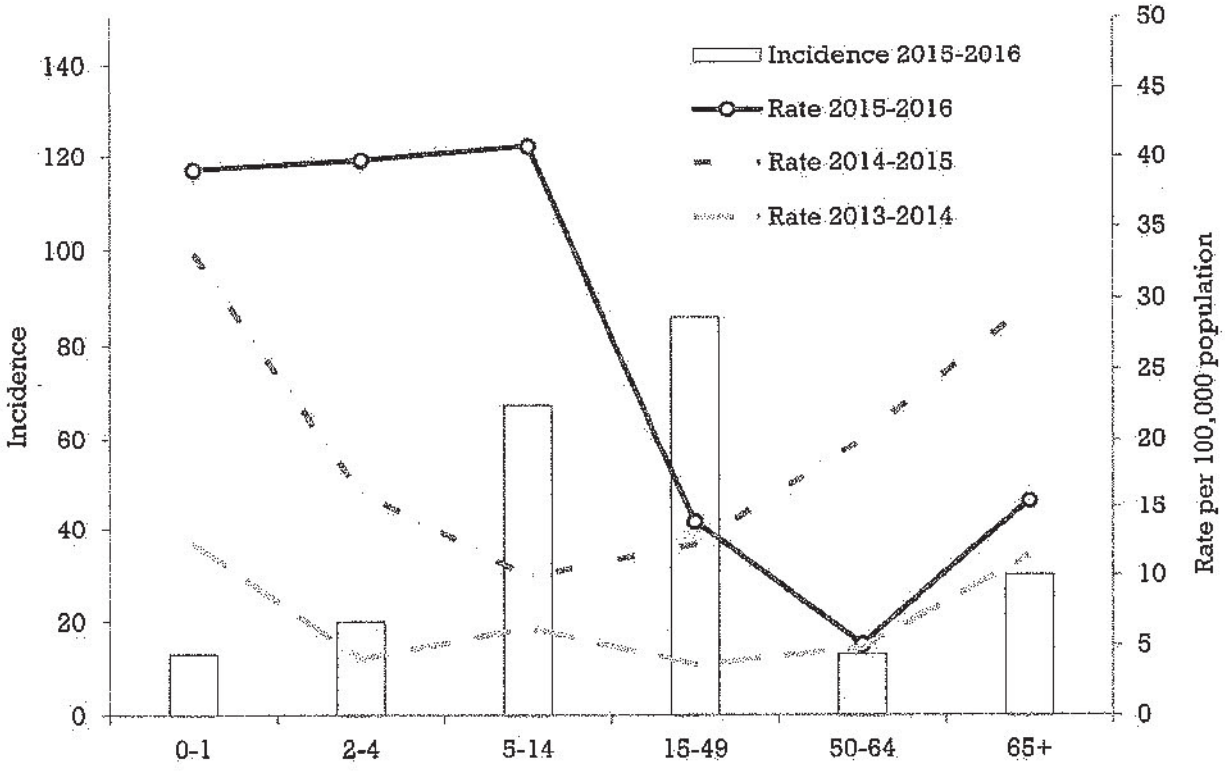

Figure 9 Incidence and incidence rate (per 100,000 population) of influenza B by age group, Manitoba, 2015–2016

Regions

Similar to previous seasons, there were regional differences in 2015–2016 (Table 1). Northern Health Region had the highest incidence rate of influenza A (233 cases per 100,000 population) and influenza B (70 cases per 100,000 population). Prairie Mountain Health had the second highest incidence rate of influenza A (109 cases per 100,000 population) and influenza B (24 cases per 100,000 population).

Table 1 Incidence and incidence rate (per 100,000 population) of influenza A and B by RHA, Manitoba, 2015–2016

Region	Influenza A		Influenza B		Total	
	Incidence	Rate	Incidence	Rate	Incidence	Rate
Winnipeg	292	38.7	82	10.9	374	49.6
Southern	129	66.4	34	17.5	163	83.9
Interlake-Eastern	82	64.4	19	14.9	101	79.3
Prairie Mountain	184	109.2	41	24.3	225	133.5
Northern	177	233.1	53	69.8	230	302.9
Manitoba	864	65.4	229	17.3	1,093	82.7

Generally, Winnipeg RHA had the lowest incidence rate of influenza each season except for 2011–2012, the influenza B predominant season, when four RHAs had almost the same incidence rate (Figure 10). Northern Health Region consistently had the highest incidence rate than other RHAs in all seasons except 2013–2014 when Prairie Mountain Health also had a higher incidence rate, similar to Northern Health Region. Additionally, in Northern Health Region, the incidence rate of influenza in 2015–2016 was similar to 2013–2014 (303 cases per 100,000 population), the last influenza A(H1N1) predominant season. Overall, there has been an increasingly higher incidence and incidence rate of laboratory-confirmed influenza in all RHAs.

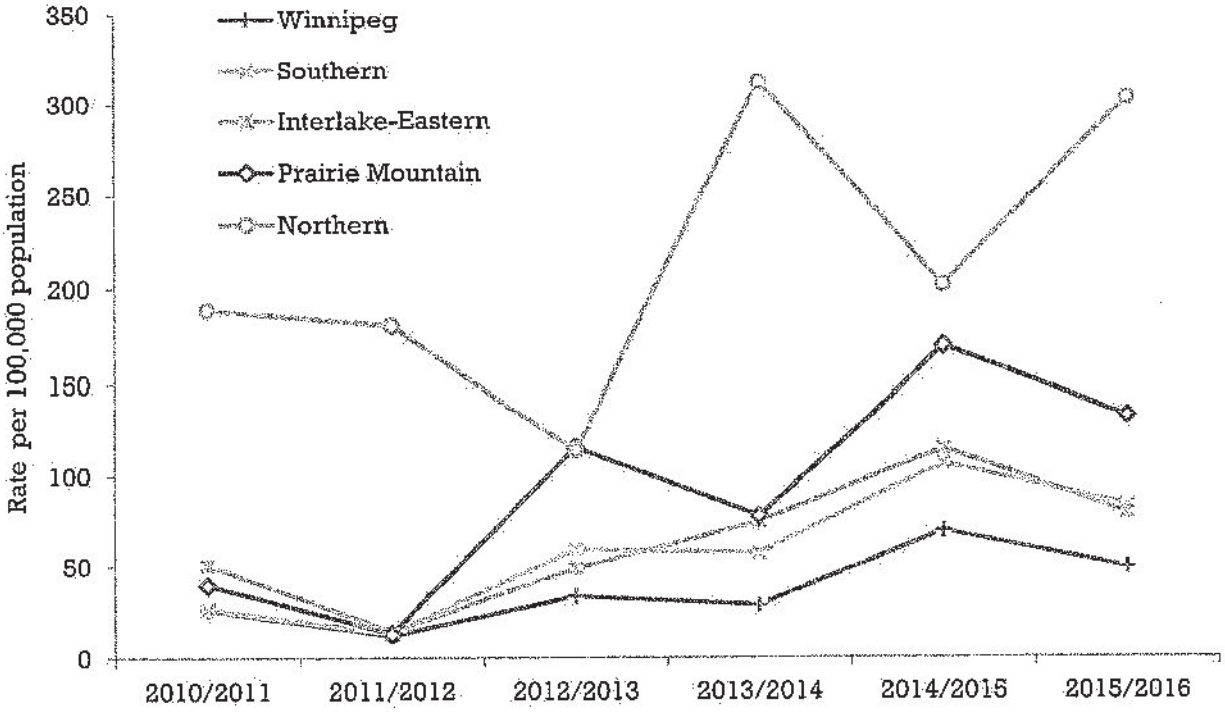

Figure 10 Incidence rate (per 100,000 population) of influenza by RHA, Manitoba, 2010–2011 to 2015–2016

Hospitalizations, ICU Admissions and Deaths

E&S also routinely monitors and reports the burden of severe illness associated with influenza. Each influenza season on a weekly basis, the central public health office in each RHA is requested to submit a line listing of hospitalizations, ICU admissions and deaths for laboratory-confirmed influenza patients that were admitted to hospitals in the reporting RHA, or deceased as the registered residents of the reporting RHA.

Influenza associated deaths may also be reported from other sources, including:

- Chief Medical Examiner;
- Medical Officers of Health (MOHs) in RHAs; and
- Infection Control Practitioners in LTC facilities.

The reason for hospitalization and ICU admission or, the cause of death, does not have to be attributable to influenza. Instead, a temporal association with a positive influenza laboratory result is sufficient for reporting. Submissions are validated by E&S to remove duplicate submissions for the same patient within the same illness episode. The aggregate numbers of patients admitted to hospitals and ICUs, respectively, and deceased in a reporting week and cumulative for the season are submitted to PHAC for national surveillance on a weekly basis. In this report, only Manitoba residents were included.

There were 291 influenza associated hospitalizations in 2015–2016 (Table 2), fewer than in 2014–2015 (N=346) but more than in 2013–2014 (N=127). Among those hospitalized patients, 78 were admitted to ICUs, more than in both 2014–2015 (N=62) and 2013–2014 (N=44). In 2015–2016, 26.6% of all influenza patients were reported to have been admitted to hospital, (27.1% in 2014–2015), and 7.1% to ICUs (4.8% in 2014–2015). A total of 25 influenza associated deaths were reported and most occurred in hospital. The majority of the hospitalizations (N=256, 88.0%), ICU admissions (N=73, 93.6%) and deaths (N=22, 88.0%) were associated with influenza A.

Table 2 Hospitalizations, ICU admissions and deaths by influenza type, Manitoba, 2015–2016

Type/subtype	Hospitalizations		ICU admissions		Deaths	
	N	%	N	%	N	%
Influenza A (unsubtyped)	164	56.4%	28	35.9%	5	20.0%
Influenza A H1N1 Pandemic 2009	79	27.1%	39	50.0%	16	64.0%
Influenza A(H1N1)	2	0.7%	1	1.3%	0	0.0%
Influenza A(H3)	11	3.8%	5	6.4%	1	4.0%
Influenza B	35	12.0%	5	6.4%	3	12.0%
Total	**291**		**78**		**25**	

Unlike other indicators, a high incidence of influenza associated severe outcomes sustained for three weeks (Figure 11) from Week 9 (February 28–March 5) to Week 11 (March 13–19). Of the 25 influenza associated deaths, 15 occurred in these three weeks.

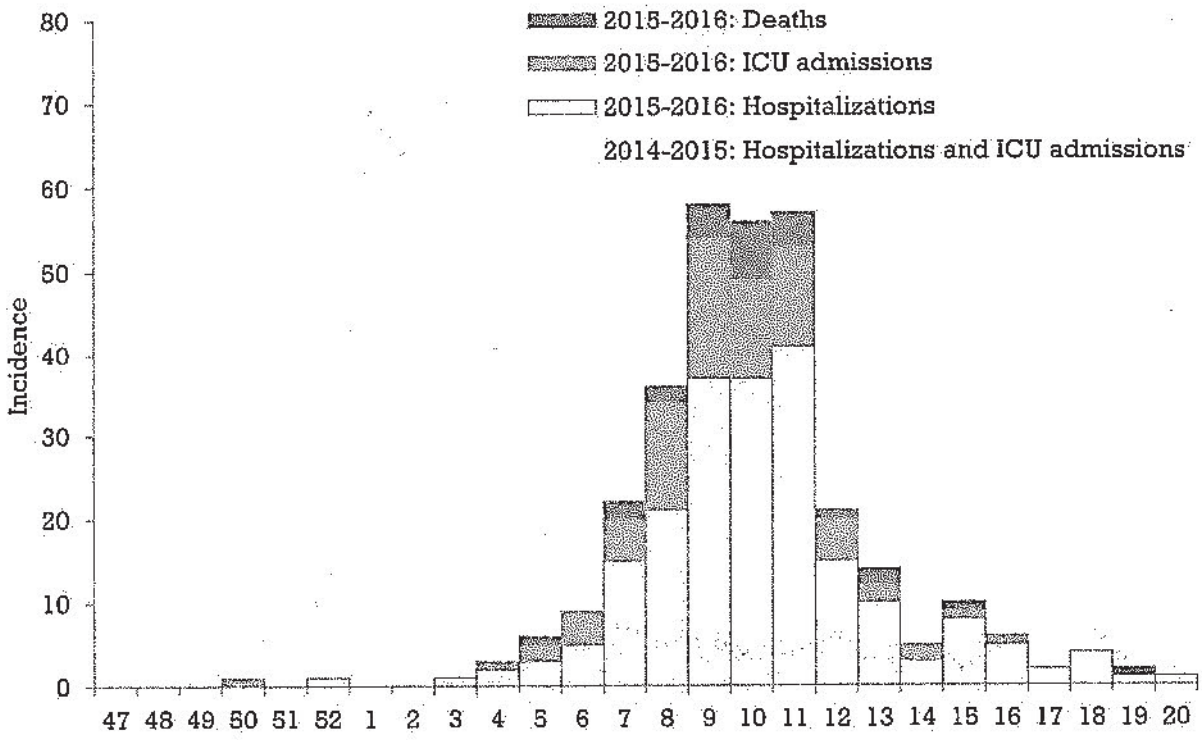

Figure 11 Weekly incidence of influenza associated hospitalizations, ICU admissions, and deaths, Manitoba, 2015–2016

Note. ICU admissions are not included in the hospitalizations

In 2015–2016, younger populations were more vulnerable to the influenza associated severe illness due to the predominating A(H1N1)pdm09 strain (Figure 12). Most hospitalized and deceased influenza patients were aged younger than 65 years of age. The highest rate for influenza associated hospitalizations was observed among patients below one year of age (126 hospitalizations per 100,000 population).

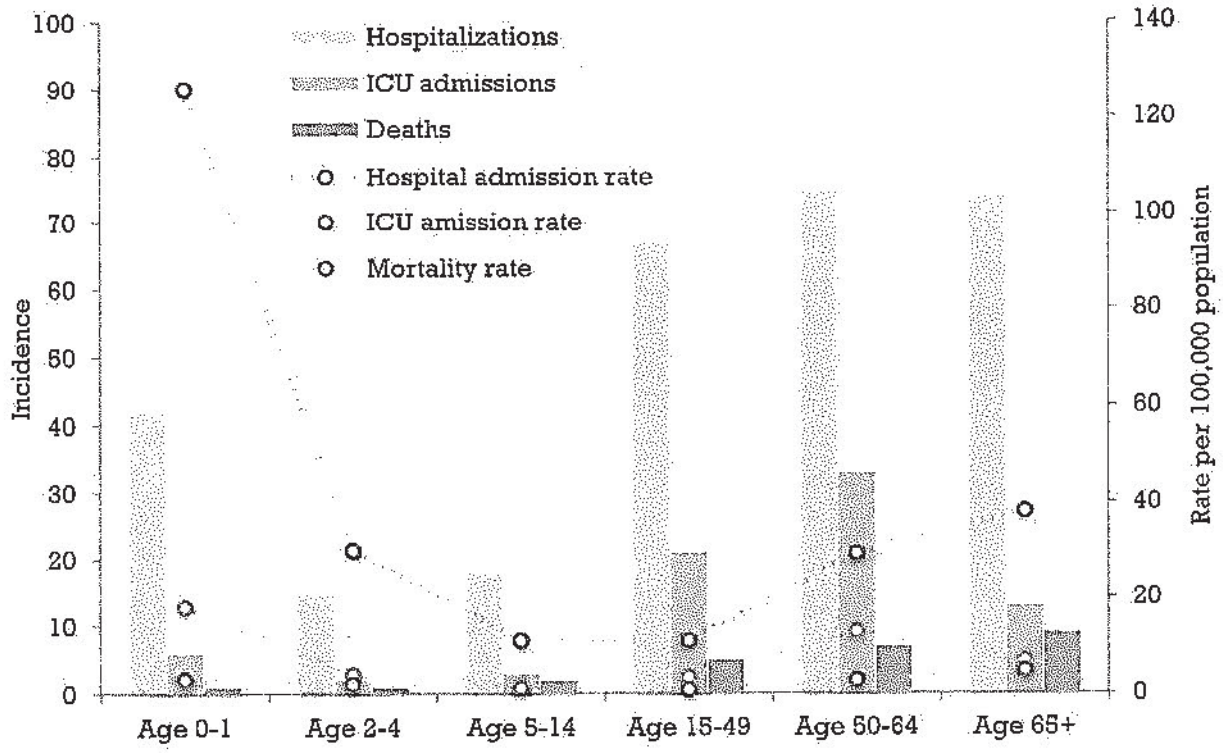

Figure 12 Incidence and incidence rate (per 100,000 population) of influenza associated hospitalizations, ICU admissions, and deaths by age group, Manitoba, 2015–2016

Outbreaks

As outlined in Manitoba's Communicable Disease Management Protocol–Seasonal Influenza[4], the common definition of an institutional outbreak is:

> *Two or more cases of ILI (including at least one laboratory–confirmed case) occurring within a seven-day period in an institution. An institution includes but is not limited to hospitals, long-term care facilities for both adults and children (e.g., personal care homes, nursing homes, chronic care facilities) and correctional facilities.*

Each influenza season, suspected and confirmed outbreaks are reported to E&S from public health staff within RHAs. CPL also notifies E&S of outbreaks, for which specimens have been collected and shipped to CPL for laboratory confirmation. In this report, an outbreak was considered an influenza outbreak if an ILI outbreak had at least one laboratory confirmed influenza case.

Between July 1, 2015 and June 30, 2016, there were 21 influenza outbreaks reported in Manitoba: 18 outbreaks of influenza A, 2 outbreaks of influenza B, and 1 mixed outbreak of influenza A and B. The majority of those outbreaks were reported from LTC facilities.

Four RHAs reported influenza outbreaks:

- Winnipeg RHA: 11
- Southern Health-Santé Sud: 5
- Interlake-Eastern RHA: 2
- Prairie Mountain Health: 3

The weekly outbreak reports increased in alignment with influenza activity (Figure 13) in other indicators and peaked in Week 9 (February 28–March 5, 2016). Note that ILI outbreaks were reported year-round and when influenza activity increased, there were more ILI outbreaks.

[4] http://www.gov.mb.ca/health/publichealth/cdc/protocol/influenza1.pdf

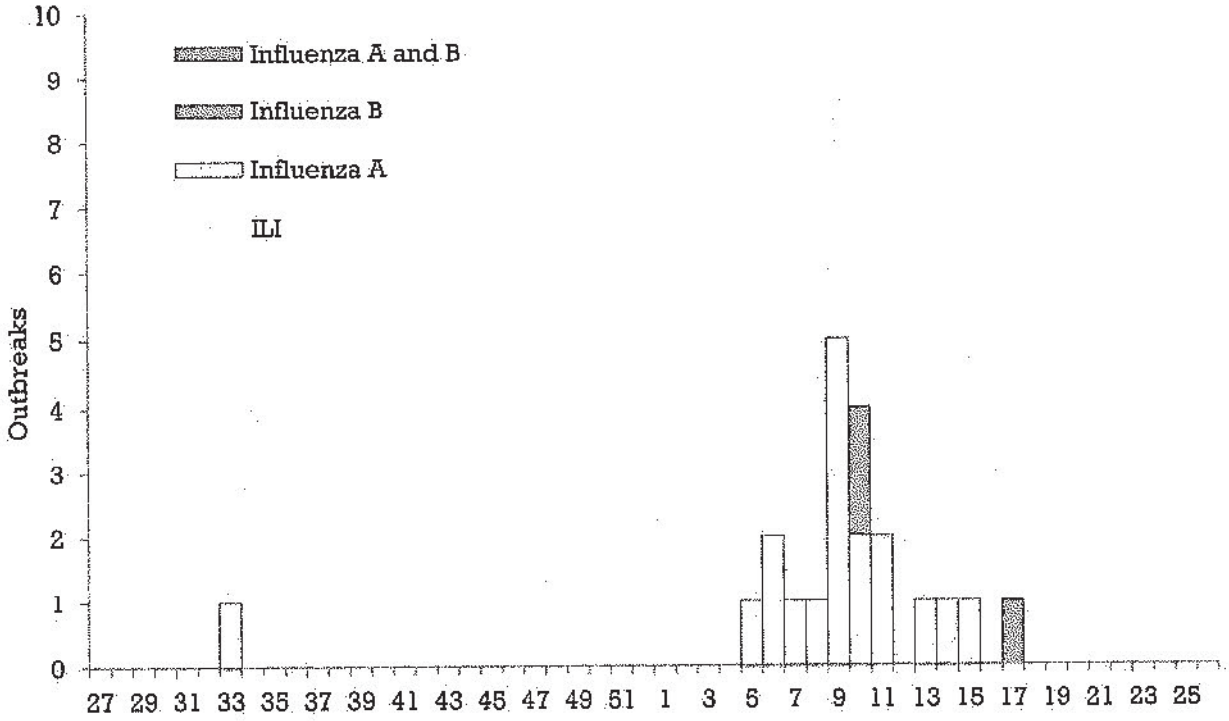

Figure 13 Weekly outbreaks of influenza A and B, Manitoba, 2015–2016

Antiviral Dispensing

The daily units of antiviral drug, Oseltamivir (Tamiflu®), dispensed since October 1 to Manitoba residents are obtained from the Drug Programs Information Network (DPIN) on a weekly basis during each influenza season. Only drugs dispensed from community retail pharmacies were included in this report. Those dispensed in hospitals or nursing stations could not be included due to a lack of data.

Between October 1, 2015 and May 21, 2016, a total of 3,002 units of Oseltamivir were dispensed from community retail pharmacies. The units of Osteltamivir dispensed each week almost paralleled the laboratory detections of influenza (Figure 14), though the peak in Week 10 (March 6–12, 2016) was one week behind. Compared with 2014–2015, considerably more units of Oseltamivir were dispensed, probably due to more symptomatic patients.

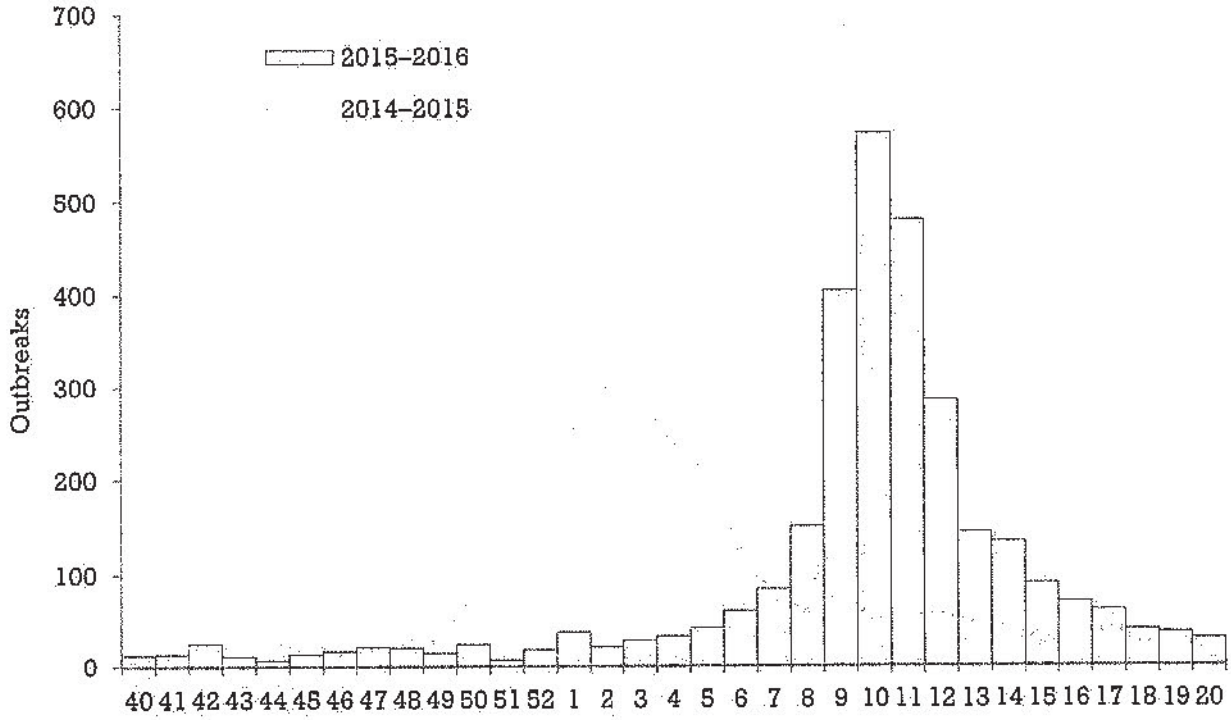

Figure 14 Weekly dispensing of Oseltamivir, Manitoba, 2015–2016

Immunizations

Uptake

In 2015–2016, the quadrivalent seasonal influenza vaccine was available free-of-charge to all Manitoba residents over 6 months of age. As in previous seasons, MHSAL conducted an influenza immunization program for all Manitobans that focused on those at increased risk of serious illness from influenza, their caregivers and close contacts, including[5]:

- Seniors aged 65 or older
- Residents of a LTC facility
- Health care workers and first responders
- Children 6 to 59 months of age
- Individuals of Aboriginal ancestry
- Those with chronic illness, such as:
  - Cardiac or pulmonary disorders (including bronchopulmonary dysplasia, cystic fibrosis and asthma);
  - Diabetes mellitus and other metabolic disorders;
  - Cancer, immune compromising conditions (due to underlying disease and/or therapy);
  - Renal disease;
  - Anemia or hemoglobinopathy;
  - Conditions that compromise the management of respiratory secretions and are associated with an increased risk of aspiration; and,
  - Children 6 months to adolescents 18 years of age on long-term acetylsalicylic acid (i.e. Aspirin) therapy
- People who are severely overweight or obese
- Healthy pregnant women

In addition, international students, visitors and newcomers were eligible to receive the seasonal influenza vaccine free-of-charge regardless of the third party insurance or MHSAL coverage.

[5] http://www.gov.mb.ca/health/flu/index.html

As per the World Health Organization (WHO), all seasonal quadrivalent influenza vaccines for the 2015–2016 season in the northern hemisphere contained:

- A/Switzerland/9715293/2013(H3N2)-like virus;
- A/California/7/2009(H1N1)pdm09-like virus;
- B/Phuket/3073/2013-like virus;
- B/Brisbane/60/2008-like virus (not included in the trivalent influenza vaccine).

In 2015–2016, two vaccines were included in the province's Publicly-Funded Seasonal Influenza Immunization Program:

- Quadrivalent inactivated vaccine (QIV)—Fluzone® Quadrivalent (Sanofi Pasteur)
- Quadrivalent live attenuated influenza vaccine (QLAIV)—FluMist® Quadrivalent (AstraZeneca)

Immunization data for previous annual influenza reports were extracted from the Manitoba Immunization Monitoring System (MIMS). MIMS is a mainframe registry application with a listing of all immunizations administered to Manitoba residents. MIMS was initiated in 1988 for childhood immunizations provided to children born in 1980 or later. Adult immunizations were entered since 2000. For the 2015–2016 annual report, all immunization data were extracted from the new provincial immunization registry, Panorama. Panorama is a Public Health application for disease surveillance and management. It was developed by IBM Canada on behalf of the provinces and territories for implementation across Canada. Panorama contains five modules and two modules have been implemented in Manitoba as of spring 2016:

- Immunization Management – records immunization events. This module became fully functional in February 2015. All the immunization data in MIMS were incrementally imported into Panorama:
    - creates and manages immunization schedules and eligibility;
    - applies logic to forecast immunizations due in future;
    - maintains client records including consent and special considerations;
    - records adverse events following immunization;
    - manages mass immunization clinic events for large groups;
    - built-in reports, e.g., reports on coverage rates.
- Vaccine Inventory Management – manages and monitors vaccine inventories:
    - supports cold-chain monitoring during storage and transport;

- facilitates distribution and sharing in case of an outbreak;
- supports vaccine recall.

Seasonal influenza immunizations were captured in Panorama in one of three ways:

- immunizations administered by physicians were imported into Panorama from the Physician Billing System.
- immunizations administered by pharmacists were imported into Panorama from the Drug Processing Information System (DPIN).
- immunizations provided by all other health care providers including public health nurses were entered by data entry staff in the RHAs.

In facilities that Panorama has not been implemented, immunizations were entered into MIMS and loaded from MIMS to Panorama weekly. Therefore, immunization data in Panorama are considered comprehensive. However, it has been identified that some immunizations were not captured in either Panorama or MIMS, typically in facilities without access to either system. The impact of those missing records on the immunization assessment is unknown.

Between September 1, 2015 and March 31, 2016, a total of 292,066 influenza vaccine doses were administered to 286,160 patients. A small number of patients received more than one dose due to medical reasons or reasons unknown. For example, patients nine years of age and younger should receive two doses of influenza vaccine if the first time to be immunized with the influenza vaccine.

The overall influenza vaccine coverage in Manitoba was 21.7% as of March 31, 2016 in the registered Manitoba residents (Table 3). The age group over 65 had the highest coverage (54.4%) followed by the age groups of 50–64 (25.4%) and 0–4 (22.0%). In comparison, the age group 15–49 had the lowest coverage (12.0%).

Table 3 Influenza immunization coverage (%) by RHA and age group, Manitoba, 2015–2016

Age	Winnipeg	Southern	Interlake Eastern	Prairie Mountain	Northern	Manitoba
0 – 4	30.7	11.6	19.2	11.9	10.8	22.0
5 – 14	16.5	7.3	11.3	9.3	12.1	13.1
15 – 49	13.7	7.5	10.0	9.8	12.2	12.0
50 – 64	27.6	19.3	24.0	23.6	23.7	25.4
65+	57.2	47.9	52.5	52.9	43.4	54.4
Total	**24.3**	**15.2**	**21.4**	**20.4**	**15.9**	**21.7**

Note. Immunizations up to March 31, 2016.

Regional variance continued to be present in immunization uptake. The highest coverage, 24%, was observed in Winnipeg RHA and the lowest, 15%, in Southern Health-Santé Sud. This regional variance was not even across all age groups. In some age groups, the variance was more prominent (Figure 15). In young children below five years of age, coverage in Winnipeg RHA (30.7%) was almost three times the coverage in Northern Health Region (10.8%), Southern Health-Santé Sud (11.6%), and Prairie-Mountain Health (11.9%).

Coverage in Northern Health Region among the 5–64 age group was similar to the provincial average. However, coverage in the very young group aged below five and in the older group aged above 65 was the lowest among all health regions.

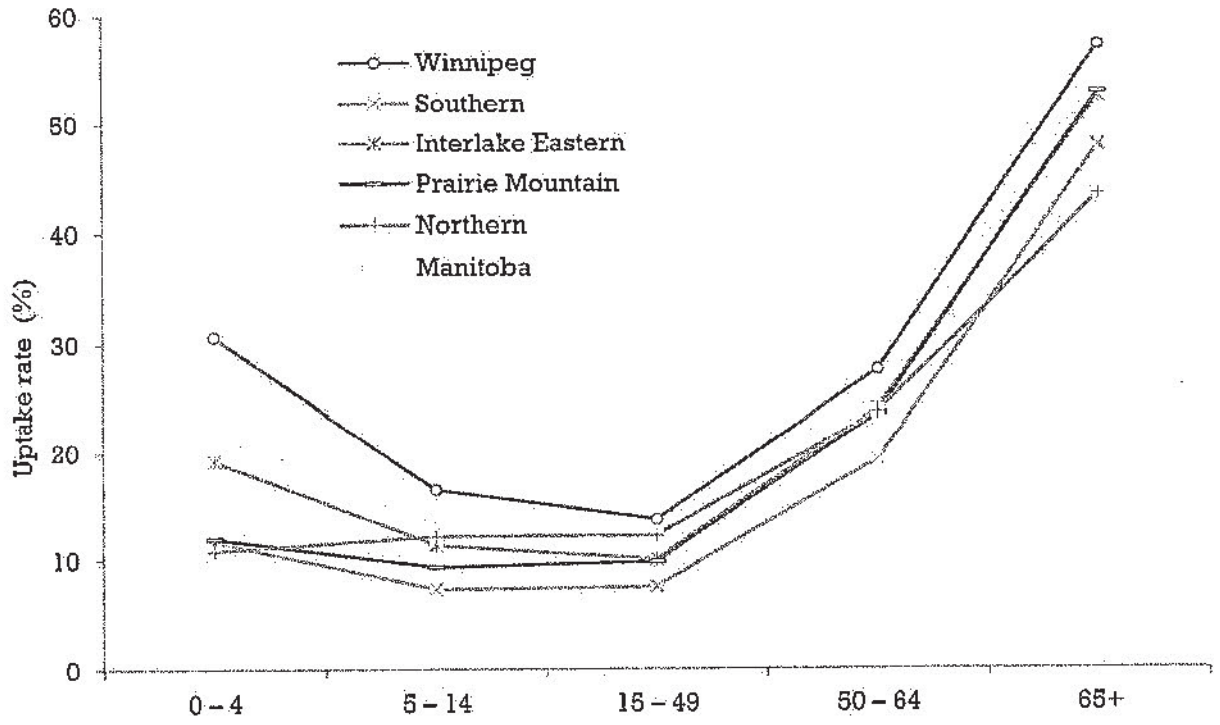

Figure 15 Influenza immunization coverage rate (%) by RHAs and age group, Manitoba, 2015–2016

Service Providers

Immunization providers in this report were categorized by the organizations or programs that the providers belonged to when delivering immunizations. More information pertaining to the provider and the regional program the provider worked for was captured if an immunization record was entered directly into Panorama by staff in RHAs. For this report, providers were categorized as:

- physician,
- pharmacist,
- RHA–Public health,
- RHA–Occupational,
- RHA–Long term care (LTC),
- RHA–Other programs,
- other providers including private physicians, pharmacists and correction facilities,
- unknown providers due to missing values.

In 2015–2016, physicians, pharmacists and various RHA programs delivered 98% of the total influenza immunizations. Similar to previous seasons, public health nurses and physicians were the two major service providers in 2015–2016. Each group delivered 25.6% and 40.7% of the total immunizations respectively. Compared with last season, physicians administered over 7,000 more immunizations in 2015–2016. In their second year eligible to administer the seasonal influenza vaccine, pharmacists delivered 58,915 immunizations, or 20.2% of the total, in Manitoba in 2015–2016 (Table 4), an increase from 49,642 (17%) in 2014–2015.

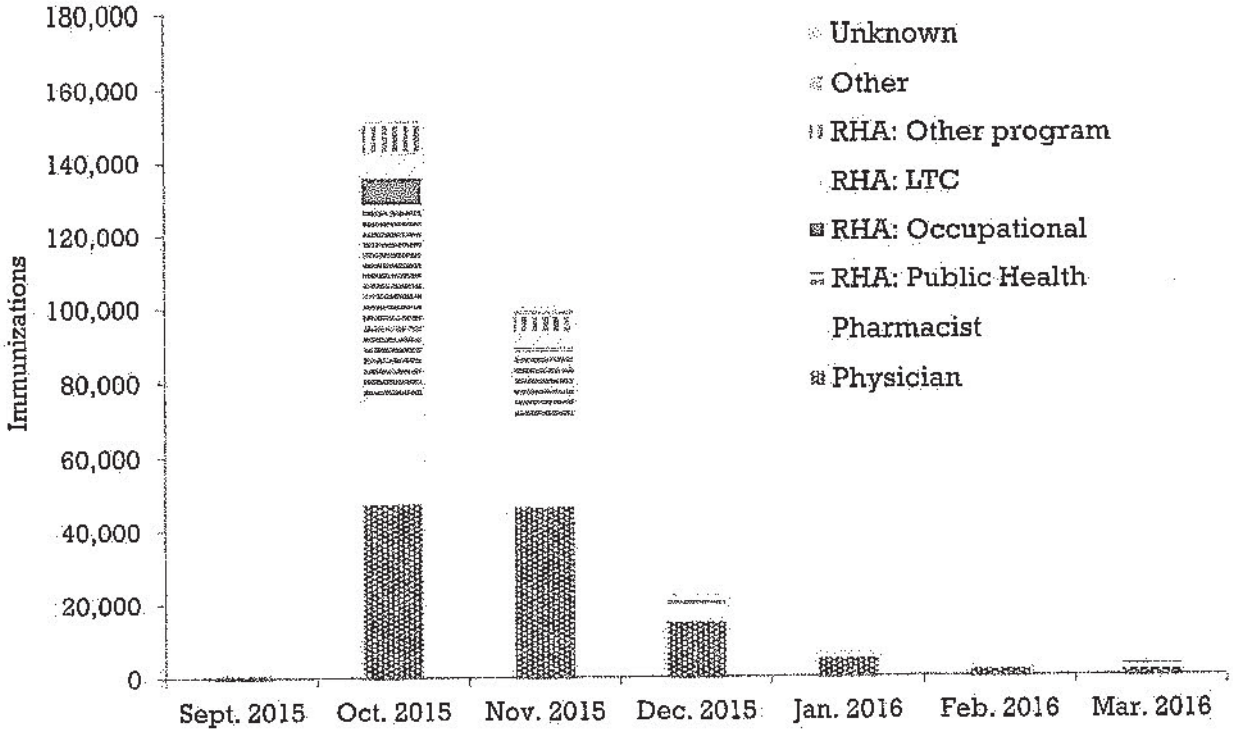

Figure 16 Influenza immunizations by provider type and month, Manitoba, 2015–2016

The majority of immunizations (86%) were delivered in October and November of 2015, before seasonal activity increased. Additionally, immunization providers distributed their service with a different schedule. Public health nurses delivered immunizations most rigorously in October. Physicians and pharmacists delivered a similar amount of immunizations in October and November (Figure 16).

Table 4 Influenza immunizations by provider type, Manitoba, 2015–2016

Age	Public Health	Physician	Pharmacist	Occupational	LTC	Other Programs	Unknown	Total
0-4	20.4%	70.2%	0.2%	0.0%	0.0%	7.9%	1.3%	19,932
5-14	33.2%	45.3%	14.0%	0.0%	0.2%	5.8%	1.4%	21,415
15-49	22.9%	37.6%	22.6%	6.5%	2.5%	4.7%	3.4%	75,454
50-64	24.3%	37.9%	24.0%	4.6%	2.7%	4.5%	2.2%	67,163
65+	28.3%	38.3%	21.0%	0.6%	6.9%	4.0%	1.0%	108,102
Total	**75,349** (25.8%)	**118,818** (40.7%)	**58,915** (20.2%)	**8,524** (2.9%)	**11,144** (3.8%)	**13,708** (4.7%)	**5,608** (1.9%)	**292,066**

Note. As per The Manitoba Pharmaceutical Act and Regulations, pharmacists are authorized to administer seasonal influenza immunizations to people 7 years of age and older.

Each type of immunization provider served different age groups (Table 4). As expected, physicians were the major service provider for all age groups, especially in young children below five years of age. In this age group, 70% of the total immunizations were delivered by physicians. Public health nurses were also a major service provider for all age groups, delivering 22.9%–33.2% of the total. Pharmacists have become important in immunizing patients older than seven years of age (consistent with provincial regulations) (Figure 17).

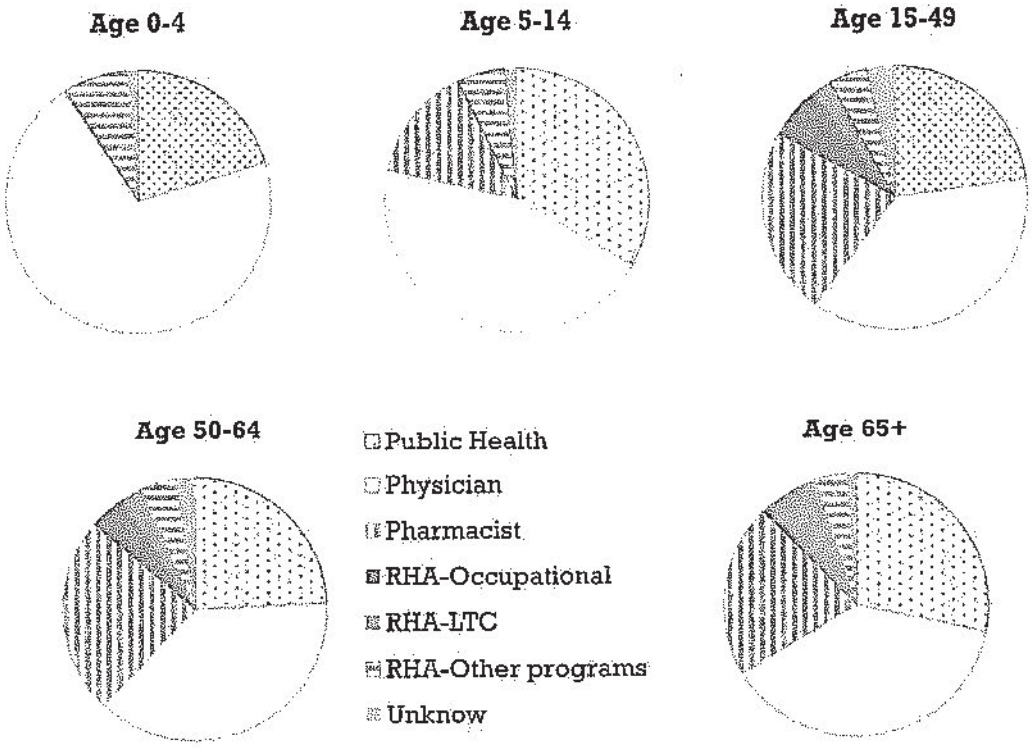

Figure 17 Influenza immunizations by provider type and patient age, Manitoba, 2015–2016

Adverse Events Following Immunization (AEFIs)

AEFIs are reported from different sources. Per *The Food and Drugs Act* and Regulations, vaccine manufacturers are required to report to PHAC all serious AEFI reports with vaccines for which they are the Market Authorization Holder within 15 days of knowledge of their occurrence. No other legal requirement for reporting AEFI exists nationally.

In Manitoba, an AEFI is reportable under *The Public Health Act* as prescribed in the Immunization Regulation (C.C.S.M. c.P210) if it is temporally associated with an immunizing agent, cannot be attributed to a co-existing condition, and if it meets at least one of the following criteria:

a. The event is serious in nature:
   - life-threatening;
   - could result in permanent disability;
   - requires hospitalization or urgent medical attention;
   - or for any other reason considered to be of a serious nature.

b. The event is unusual or unexpected, including but without limitation:
   - an event not previously identified;

- an event previously identified but with an increased frequency.

c. At the time of the report, the event cannot be explained by anything in the patient's medical history, such as a recent disease or illness, or the taking of medication.

Health care professionals who become aware of reportable AEFIs are to report them within seven days by creating an AEFI report in Panorama or completing the AEFI form[6] and submitting to their regional MOHs. Data for this report were extracted from a provincial AEFI database. AEFI data for 2015–2016 in the provincial AEFI database and Panorama were synchronized during the transition of systems. It is expected that AEFI data for 2016–2017 will be extracted from Panorama.

A total of 57 reports of influenza vaccine related AEFIs were received by MHSAL during the 2015–2016 influenza season, dated between October 9, 2015 and January 28, 2016. The incidence rate of AEFI was 19.5 reports per 100,000 doses administered. The majority of those AEFI reports (93%) were related to Fluzone® Quadrivalent.

The mean age of patients with AEFIs at the time of reporting was 38 years. Patients at the highest risk for AEFIs were children under 15 years of age (Table 5). Particularly, the only two patients (4%) admitted to hospital due to severity were four and five years of age respectively. There were more female patients (68%).

Table 5 Adverse events following influenza immunization by age group, Manitoba, 2015–2016

Age group	Reports	Rate per 100,000 doses
0–4	7	35.1
5–14	9	42.0
15–49	18	23.9
50–64	15	22.3
65+	8	7.4
Total	57	19.5

[6] http://www.gov.mb.ca/health/publichealth/cdc/docs/aefi_form.pdf

Each AEFI report may contain multiple adverse events. Overall, allergic and allergic-like events were the most commonly reported AEFIs (52.6%) in all ages (Table 6). Three types of allergic reactions were captured in AEFI reports: anaphylaxis, oculo-repiratory syndrome (ORS), and the other allergic events. ORS occurred with at least one of the following symptoms: red eyes, cough, wheeze, chest tightness, difficulty breathing, sore throat, or facial swelling, that started within 2 to 24 hours of influenza vaccination and resolved within 48 hours of symptom onset[7]. First observed during the 2000–2001 season, ORS was linked to all influenza vaccines used in Canada. In 2015–2016, one third of the allergic and allergic-like reactions were reported to be ORS. Local reactions at or near the vaccination site were the second most commonly reported adverse events (49.1%).

Table 6 Adverse events following influenza immunization by event type, Manitoba, 2015–2016

	Adverse events	% of reports
Allergic or allergic-like event	30	52.6%
Local reaction	28	49.1%
Neurologic events	4	7.0%
Other defined event of interest	12	22.2%

Most AEFIs this season were mild. However, two patients were hospitalized and 11 patients were treated in Emergency Rooms (Table 7).

[7] http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/05vol31/dr3121a-eng.php

Table 7 Severity of adverse events following influenza immunization, Manitoba, 2015–2016

Care required	Reports	%
None	15	26.3%
Non-urgent visit	17	29.8%
Telephone advice from health professional	10	17.5%
Emergency visit	11	19.3%
Hospitalization	2	3.5%
Prolongation of existing hospitalization	0	0.0%
Unknown	2	3.5%
Total	57	

The majority of the patients with AEFIs required only low-level care or no care. At the time of reporting, there were no deaths as a result of AEFI, and over half patients had fully recovered (Table 8).

Table 8 Outcomes of adverse events following influenza immunization, Manitoba, 2015–2016

Patient outcome	Reports	%
Fully recovered	30	52.6%
Not yet recovered	20	35.1%
Permanent disability	0	0.0%
Death	0	0.0%
Unknown	7	12.3%
Total	57	

Strain Characterization and Antiviral Resistance

Influenza and Respiratory Viruses Section (IRVS) at the National Microbiology Laboratory (NML) undertakes enhanced surveillance, investigations and research on influenza and other respiratory pathogens. IRVS develops, evaluates and improves molecular techniques and reagents to early detect and identify potential epidemic and pandemic influenza strains and other new emerging respiratory viruses. As a routine practice, NML also antigenically characterizes influenza viruses received from Canadian laboratories. In Manitoba, a random sample of positive influenza specimens isolated by culture is referred from CPL to NML for strain characterization. Routine testing for antiviral resistance is also performed by NML. The aggregate results of strain characterization and antiviral resistance are shared with Canadian provinces and territories on a weekly basis.

The same as in Canada overall, the 2015–2016 season in Manitoba was predominated by the A/California/7/2009(H1N1)-like strain. Influenza viruses of the B/Victoria lineage predominating the influenza B detections were characterized as B/Brisbane/60/2008-like, the vaccine virus included only in the quadrivalent vaccines.

Table 9 Strain characterization of influenza isolates, Manitoba and Canada, 2015–2016

Influenza Strain	Canada	Manitoba
A/Switzerland/9715293/2013(H3N2)-like	76	3
A/California/7/2009(H1N1)-like	1,458	46
B/Phuket/3073/2013-like	251	6
B/Brisbane/60/2008-like	942	27

Note. Reports between September 1, 2015 and June 30, 2016

Between September 1, 2015 and June 30, 2016, NML reported that all influenza isolates submitted from Manitoba were susceptible to the antivirals, Oseltamivir and Zanamivir. However, nationally, ten influenza A(H1N1) isolates demonstrated resistance to Oseltamivir (Table 10). In comparison, all Manitoba viruses tested were resistant to Amantadine.

Table 10 Antiviral resistance of influenza isolates, Manitoba and Canada, 2015–2016

Virus	Zanamivir		Oseltamivir		Amantadine	
	Resistant	Sensitive	Resistant	Sensitive	Resistant	Sensitive
Manitoba						
A(H3N2)	0	3	0	3	8	0
A(H1N1)	0	33	0	33	46	0
B	0	20	0	20	N/A	N/A
Canada						
A(H3N2)	0	186	0	186	245	1
A(H1N1)	0	1,098	10	1,088	1,471	0
B	0	721	0	721	N/A	N/A

Note. Reports between September 1, 2015 and June 30, 2016

Conclusion

This annual report aims to summarize the season in its broad trends while being cautious about possible causes of a change in data. However, there are a number of challenges in influenza surveillance. First, influenza surveillance is inherently biased towards more severe outcomes. The real burden of influenza is likely underestimated because not all individuals experiencing symptoms will seek medical attention and not all ILI cases will be tested for influenza. As such, a set of indicators monitoring different severity levels of illness were selected for surveillance. Second, surveillance data can be affected by multiple factors, such as public awareness, laboratory technique, test ordering pattern, circulating strains, vaccine formulation, staff change, and people's behaviour, etc. The change in data caused by those factors may or may not represent a real change in seasonal activity.

The 2015–2016 influenza season started in late January 2016 and peaked at the end of February 2016, much later than the three previous seasons. Influenza A(H1N1)pdm09 viruses has been predominating. Unlike influenza A(H3N2), the A(H1N1)pdm09 strain has been associated with severe illness in younger populations after the virus emerged in the 2009 pandemic and again in 2013–2014. This season, as expected, there were higher rates of illness in younger populations, especially those below five years of age. A higher number of ICU admissions were also observed as a result. Overall, the 2015–2016 season was less severe compared with 2014–2015, the influenza A(H3N2)-predominant season, and was similar to 2013–2014, the last influenza A(H1N1)-predominant season.

The majority of viruses characterized this season were antigenically similar to the reference viruses representing the recommended components for the 2015–2016 Northern Hemisphere quadrivalent influenza vaccine. As a result, vaccine effectiveness was higher in 2015–2016 compared with 2014–2015, when there was a mismatch between circulating strains and components in the vaccine. The mid-season estimate of vaccine effectiveness in Canada was 64% (95%ICs: 44–77%) against medically attended and laboratory-confirmed

A(H1N1)pdm09 illness[8]. In the United States, the seasonal vaccine effectiveness estimate was 47% against influenza infections (95%CIs: 39%–53%)[9].

The population coverage of influenza immunizations has been relatively stable over the past several seasons, between 20% and 22%. Regional variance continued to be present in 2015–2016, especially in certain age groups. In young children 0–4 years of age, the coverage rate in Winnipeg RHA was almost three times the coverage in Northern Health Region, Prairie-Mountain Health, and Southern Health-Santé Sud.

Please email comments and questions to:
flusurveillance@gov.mb.ca

[8] *Skowronski, D.M. et al. (2016). Interim estimates of 2015/16 vaccine effectiveness against influenza A(H1N1)pdm09, Canada, February 2016. Euro Surveillance, 20(4).*

[9] *Centers for Disease Control and Prevention (2016). Seasonal Influenza Vaccine Effectiveness, 2005-2016. Retrieved from https://www.cdc.gov/flu/professionals/vaccination/effectiveness-studies.htm*