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

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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 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.

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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

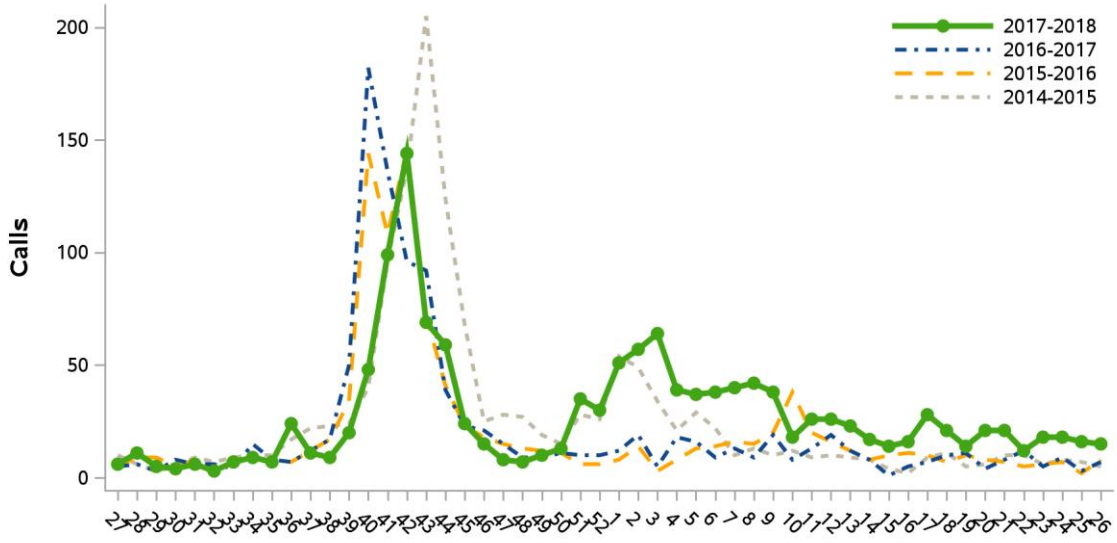
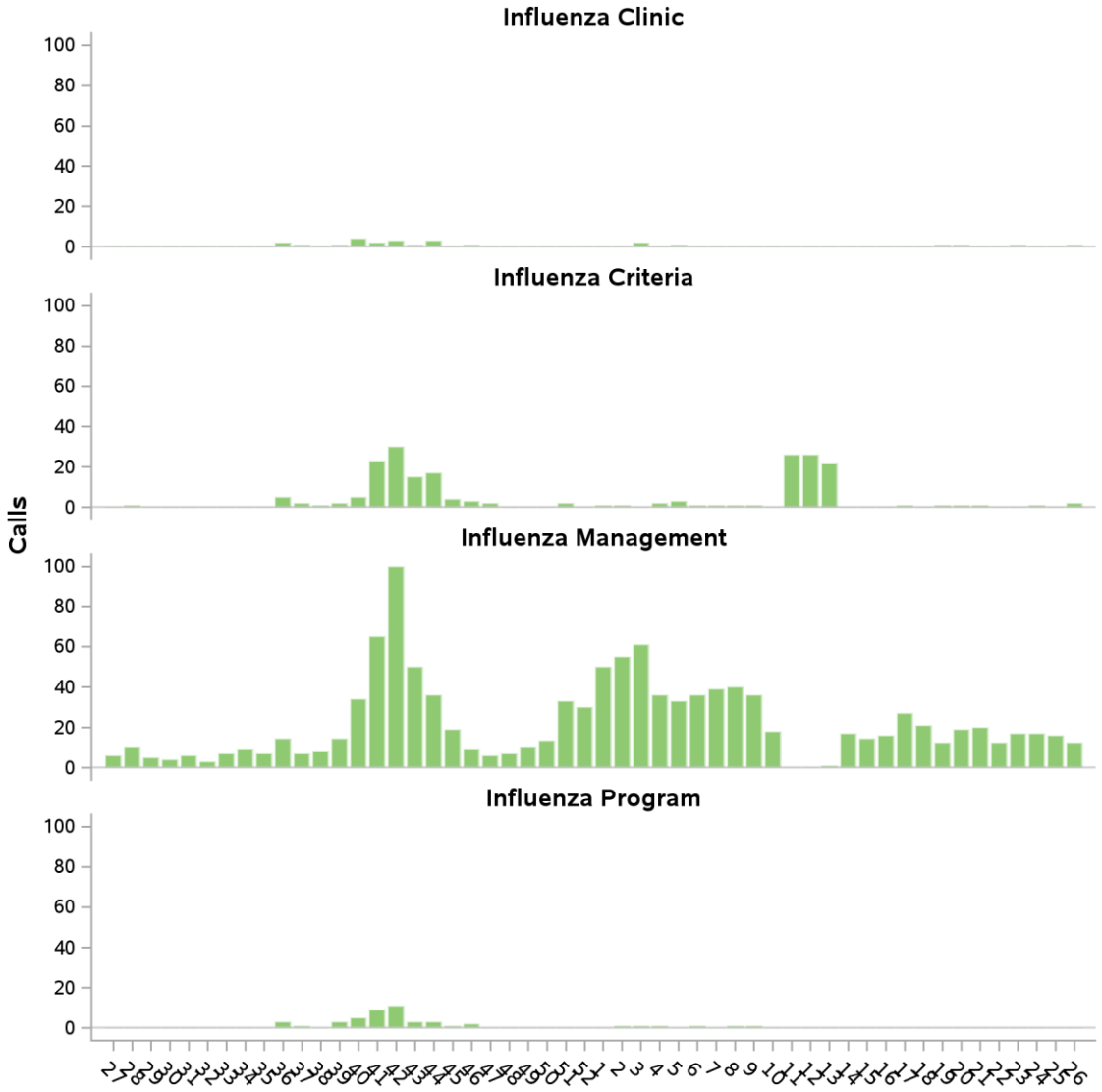


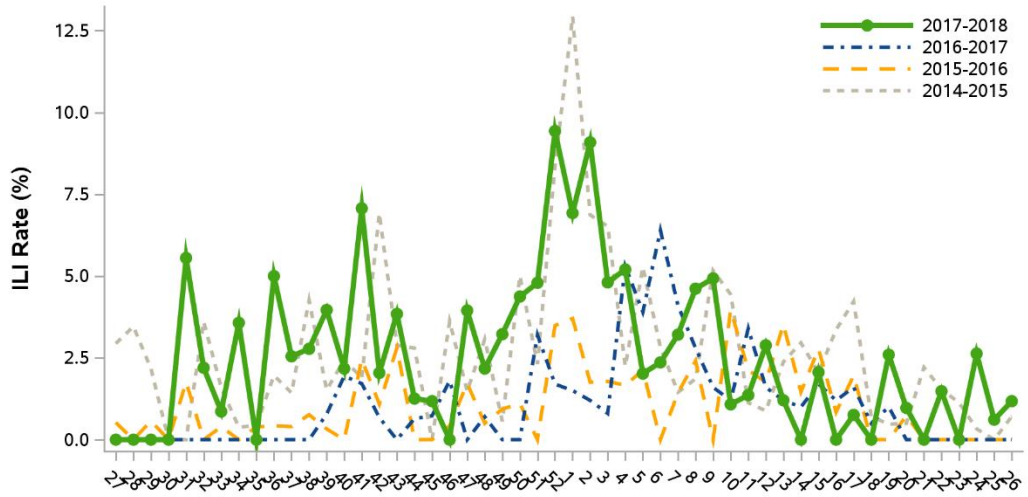
Figure 2: Types of influenza related calls to Health Links–Info Santé, Manitoba, 2017–2018



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).

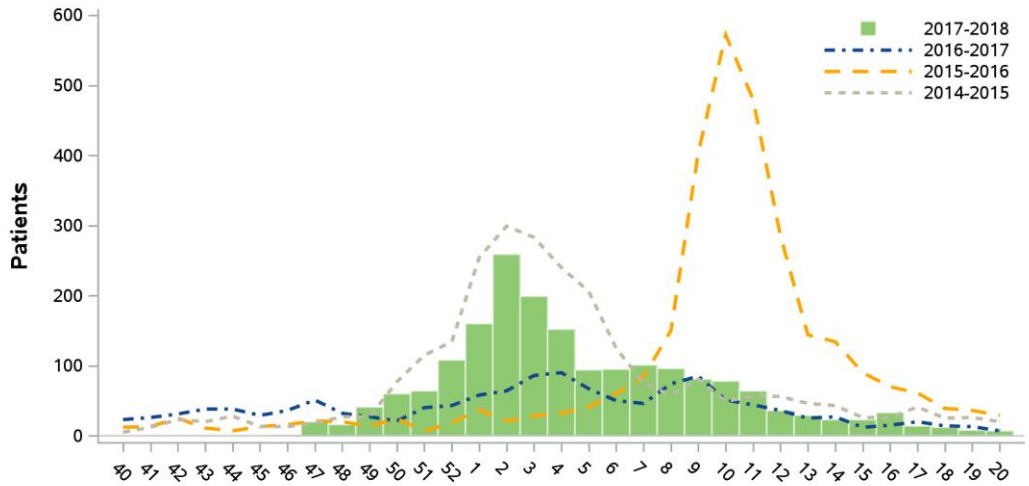
Figure 3: Weekly percentage of visits to sentinel physicians due to ILI, Manitoba, 2014–2015 to 2017–2018



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).

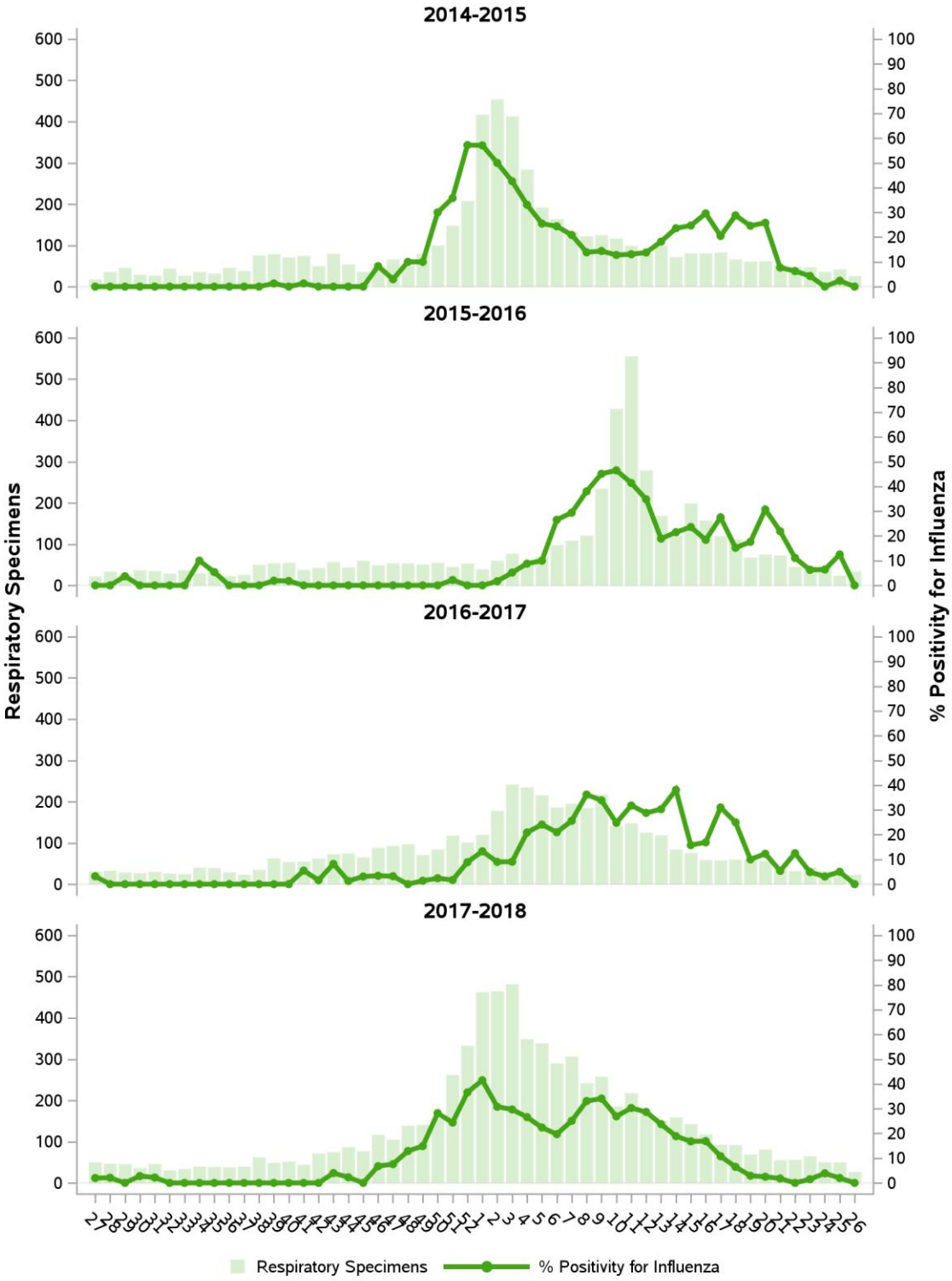
Table 1: Viral respiratory specimens and testing at Cadham Provincial Laboratory, Manitoba, 2014–2015 to 2017–2018

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

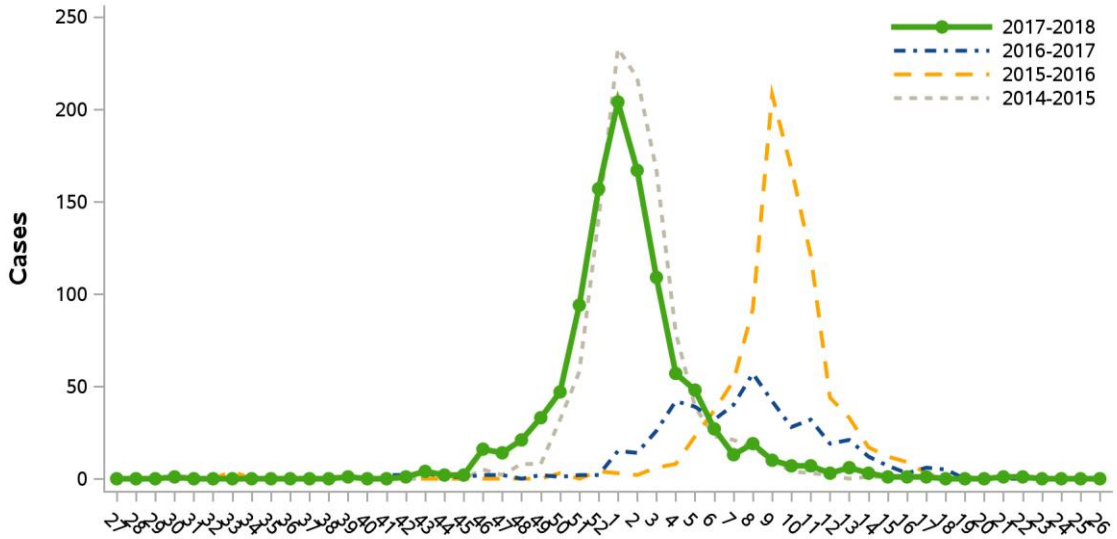
In 2017–2018, there was a total of 1,078 laboratory–confirmed influenza A and 603 influenza B cases in Manitoba residents[1] from CPL and other laboratories. The 2017–2018 season was an influenza A(H3N2)-predominant season:

- 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

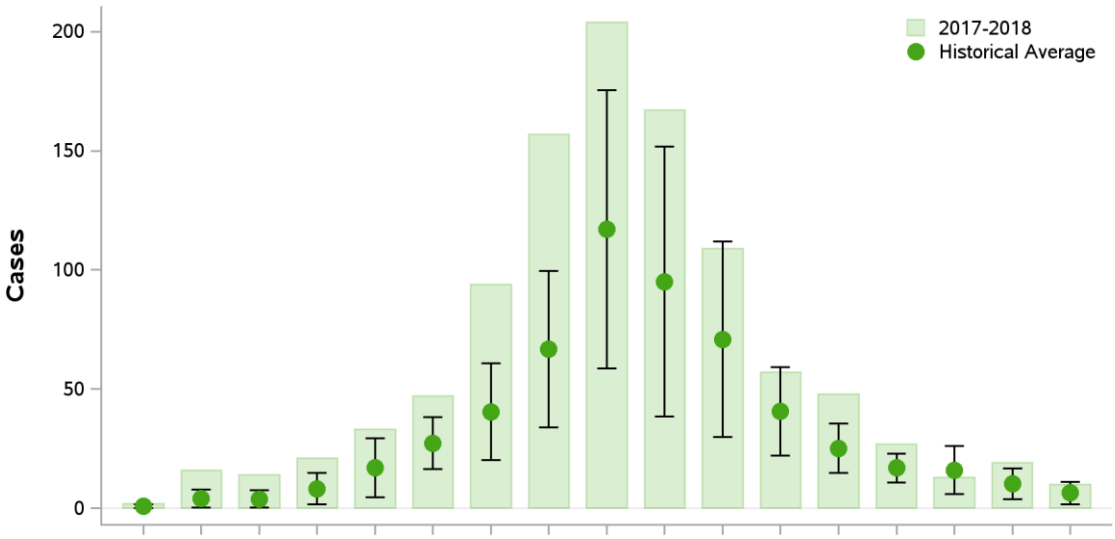


To compare the 2017–2018 season to past seasons, the incidence curves in seasons from 2010–2011 to 2016–2017 were aligned with the peak of 2017–2018. Subsequently, the average weekly incidence of influenza A and 95% confidence intervals (CIs) were calculated (Figure 7). In 2017–2018, the incidence

[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.

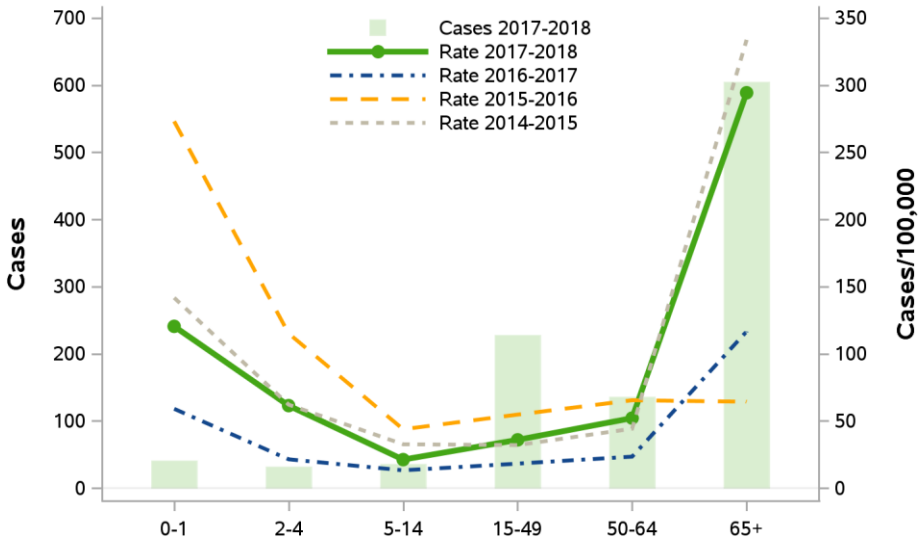
Figure 7: Weekly incidence of influenza A, Manitoba, 2017–2018 and historical average



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.

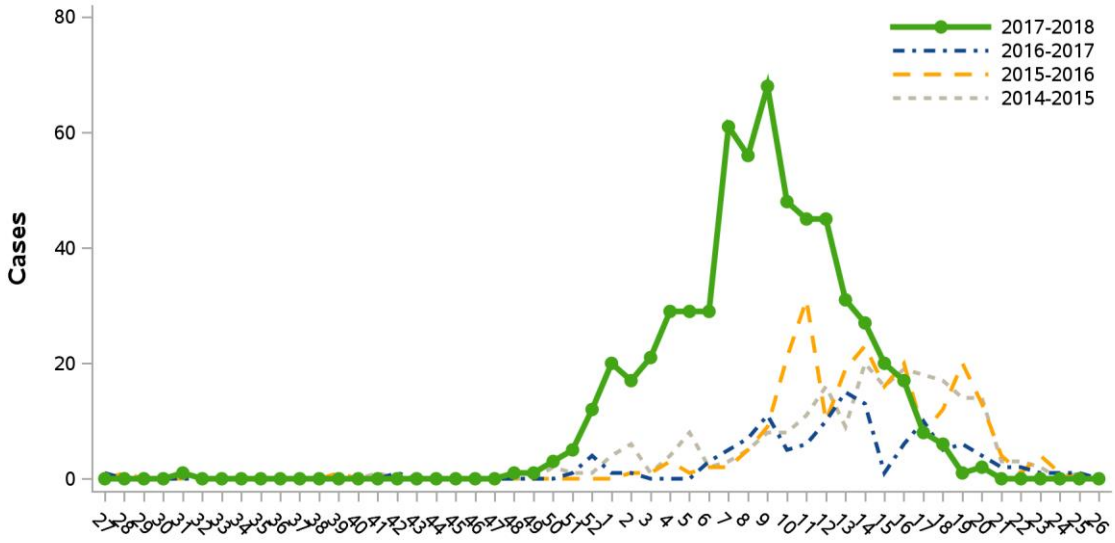
Figure 8: Incidence and incidence rate (/100,000) of influenza A by age group, Manitoba, 2017–2018



Influenza B

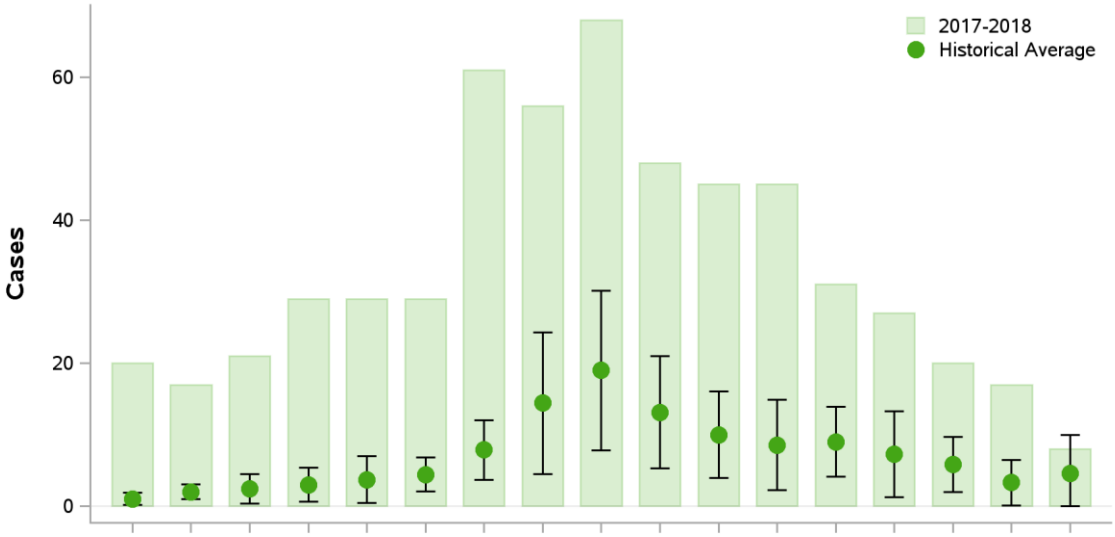
The influenza B detection in 2017–2018 increased from Week 50 (December 10–16, 2017) and peaked in Week 9 (February 25–March 03, 2018).

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.

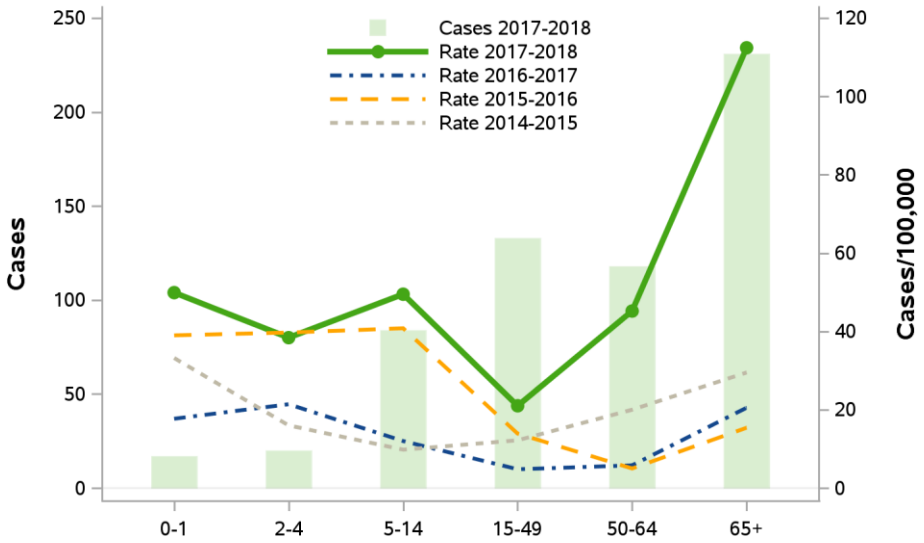
Figure 10: Weekly incidence of influenza B, Manitoba, 2017–2018 and historical average



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

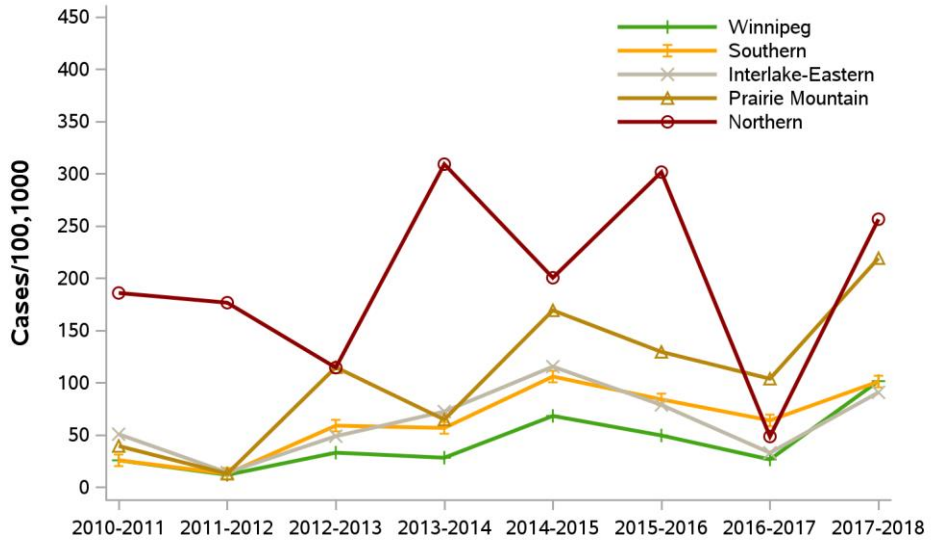
Analyses were conducted by geographic regions. Similar to previous seasons. There were regional differences in 2017–2018 (Table 2). Northern Health (NH) had the highest incidence rates of both influenza A and influenza B. Prairie Mountain Health (PMH) had the second highest incidence rate of both influenza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

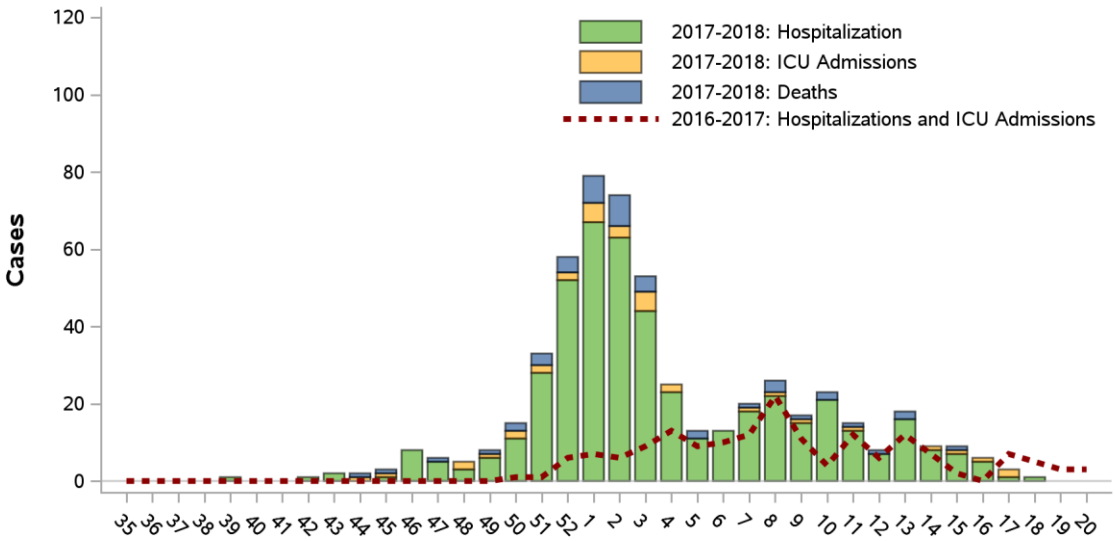
A total of 46 influenza–associated deaths were reported during the season and most occurred in hospitals. The majority of influenza–associated hospitalizations (n=344, 67.7%), ICU admissions (n=25, 71.4%), and deaths (n=34, 73.9%) were associated with influenza A.

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).

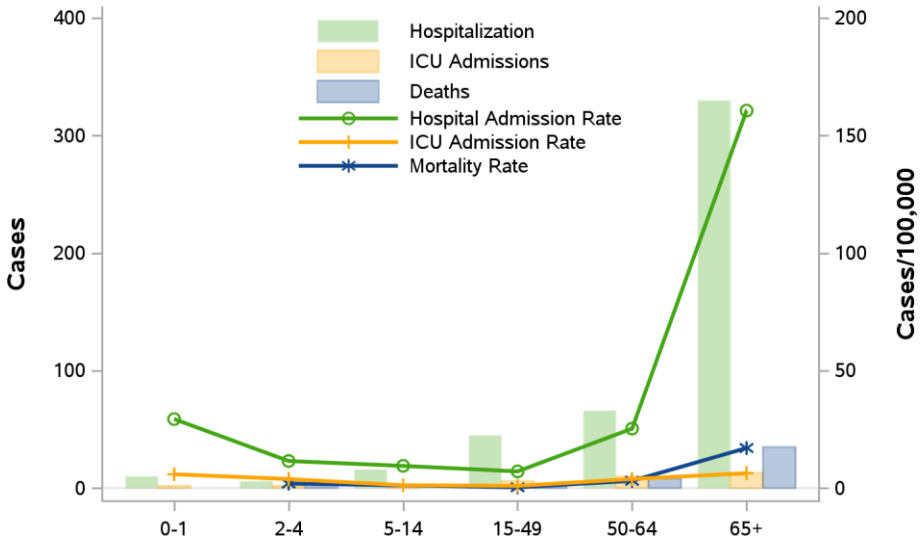
Figure 13: Weekly incidence of influenza–associated hospitalizations, ICU admissions, and deaths, Manitoba, 2017–2018



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.

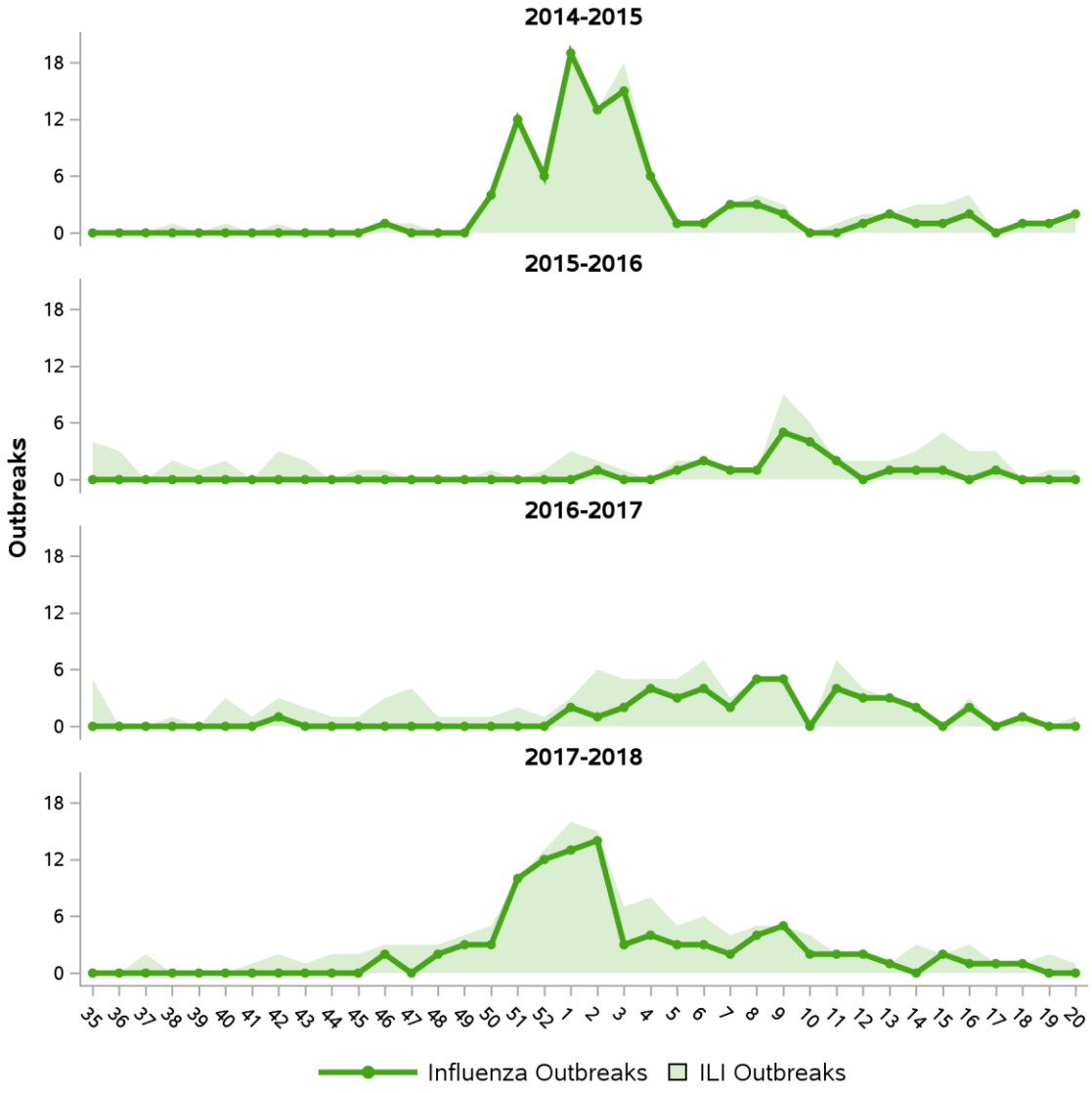
Table 4: Laboratory-confirmed influenza outbreaks in institutions, Manitoba, 2014–2015 to 2017–2018

	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).

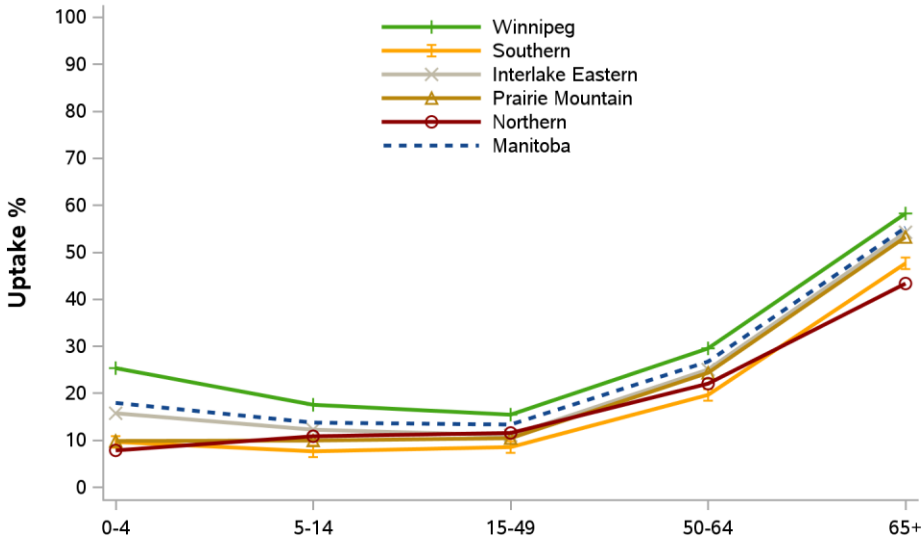
Table 5: Influenza immunization uptake (%) by region and age group, Manitoba, 2017–2018

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

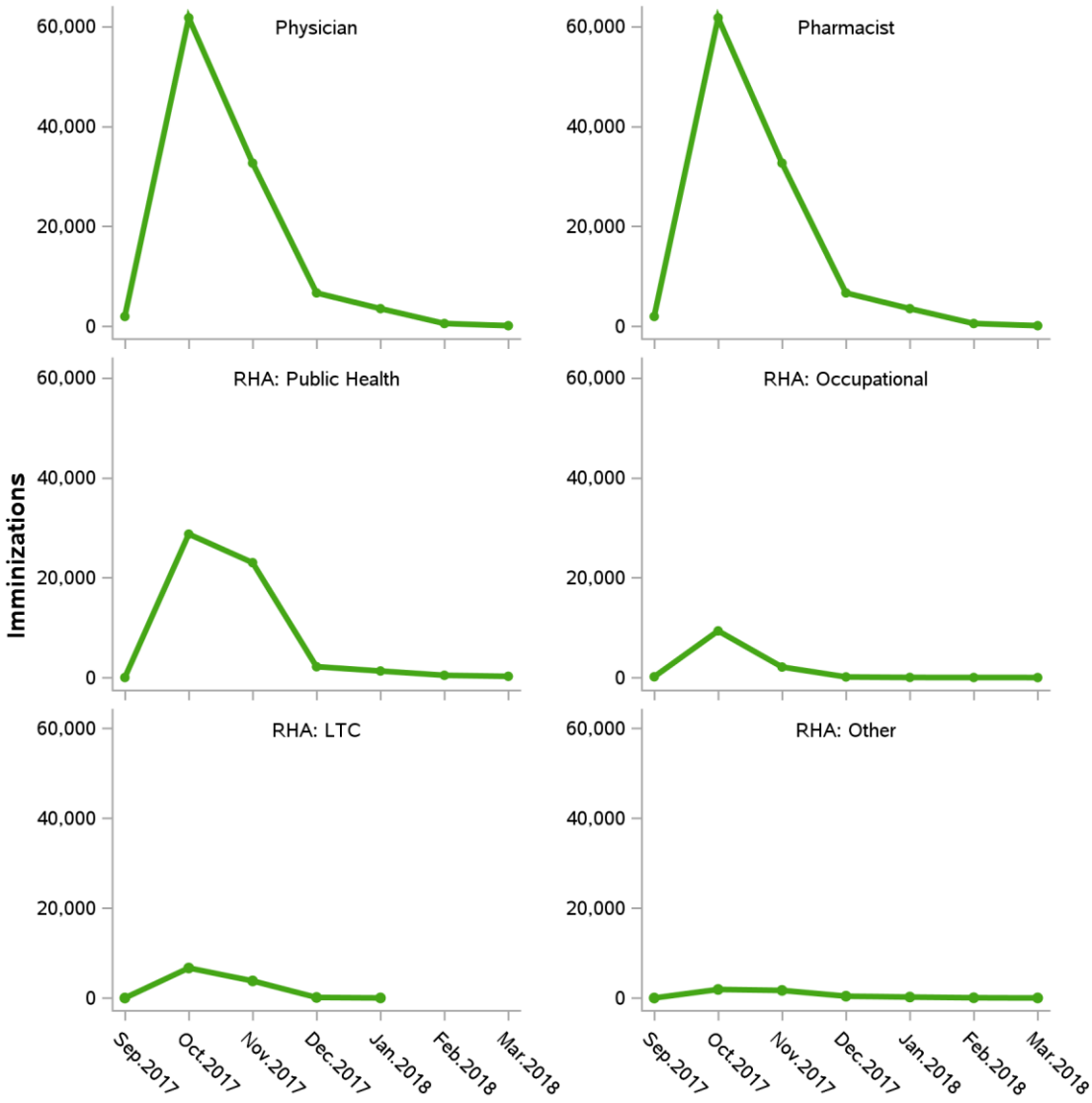
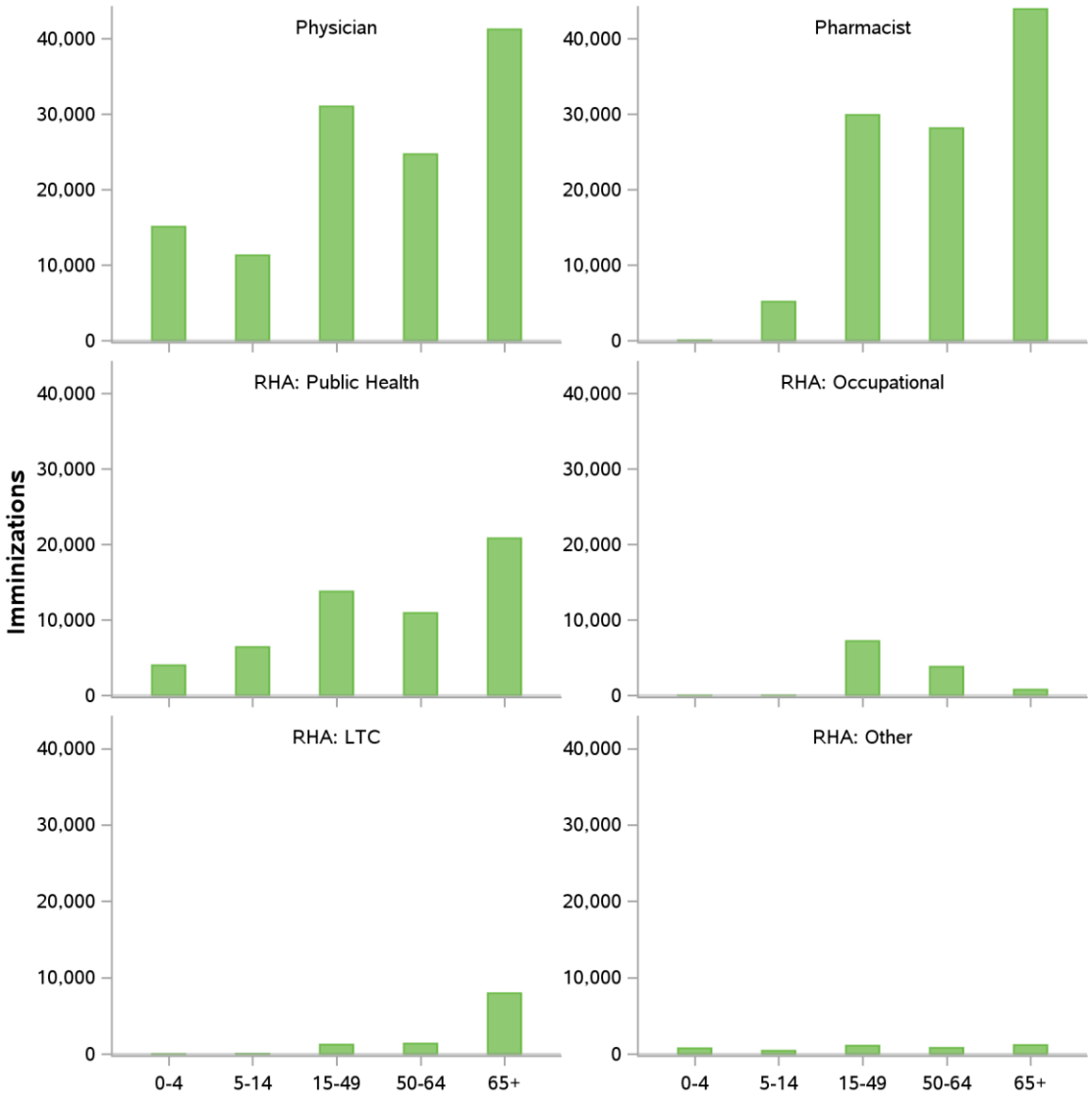


Figure 18: Influenza immunizations by provider type and client age group, Manitoba, 2017–2018



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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