

Surveillance Report of the 2005/06 Ontario Influenza and Respiratory Infection Outbreak Surveillance Season

Background

Influenza has been a reportable disease in Ontario since 1923 and a provincial surveillance program is conducted year-around since 2004. Respiratory infection outbreaks in institutions have been reportable since 2001.

Data Summary

There were a total of 792 confirmed institutional respiratory infection outbreaks reported during the 2005/06 surveillance season (September 1, 2005 – August 31, 2006), of which 151 (19.1 %) were attributed to influenza. Influenza A was determined to be the causative organism in 122 (80.8%) of these outbreaks, influenza B in 19 (12.6%), and combined influenza A and B in four (2.6%). The remaining six influenza outbreaks were caused by combinations of influenza viruses with other microorganisms (respiratory syncytial virus (RSV), enterovirus, etc). Respiratory viruses other than influenza were detected in 175 (22.1%) outbreaks. The causative organism was unknown for 466 (58.8%) institutional respiratory infection outbreaks.

During the 2005/06 influenza and respiratory infection outbreak surveillance season, the Centre for Infectious Disease Prevention and Control (CIDPC) of the Public Health Agency of Canada (PHAC) reported that 2,317 (8.6%) isolates from Ontario's participating laboratories tested positive for influenza, of which 1,258 (54.3%) were influenza A and 1,059 (45.7%) were influenza B. These figures represented a 55% decrease in the total number and 5.2% decrease in the percentage[†] of positive influenza isolates as compared to 2004/05 season, when a total of 5,145 (13.8%) positive specimens were reported: 3,836 (74.6%) influenza A and 1,309 (25.4%) influenza B.

Between September 1, 2005 and August 31, 2006, a total of 2,391 confirmed influenza cases were reported to the Ministry of Health by Health Units through the integrated Public Health Information System (iPHIS). This was a 58% decrease in influenza cases reported as compared to the 5,688 cases of confirmed influenza reported during the previous season[‡]. Influenza type (i.e., A vs. B) was not specified in iPHIS for 139 of these cases. Of the 2,252 cases with specified types in iPHIS, 1,204 (53.5%) were influenza A and 1,048 (46.5%) were influenza B[§]. Peak activity of influenza cases in Ontario occurred in March, 2006, with a total of 1,104 confirmed cases for which a type was reported. Of these, 489 (44%) were influenza A.

[†] The change in percentage of positive isolates is reported together with the change in number of positive isolates, because the latter can be caused by changes in the number of tests done and not necessarily the changes in the activity of the virus.

[‡] This 58% decrease in the number of confirmed influenza cases reported through iPHIS is comparable to the 55% decrease in the number of positive influenza isolates in the province reported by CIDPC.

[§] This is also comparable to the 54.3% influenza A and 45.7% influenza B positive tests reported by CIDPC

Introduction

“Respiratory Infection Outbreaks in Institutions” were included among the specified Reportable Diseases under the Ontario Regulation 559/91 and amendments to the *Health Protection and Promotion Act (HPPA)* in 2001. As a result, since the 2001/02 influenza and respiratory infection outbreak surveillance season all respiratory infection outbreaks in institutions, irrespective of the causative organism (including those of unknown cause), are reported to the Public Health Division (PHD) of the Ministry of Health and Long Term Care (MOHLTC). Reporting of non-influenza respiratory infection outbreaks in institutions is necessary to assess the complete epidemiology of respiratory infection outbreaks in Ontario, which is essential for adequate and timely control measures.

The objectives of Ontario influenza and respiratory institutional infection outbreak surveillance program during the 2005/06 surveillance season were:

- To facilitate the timely detection of influenza in Ontario.
- To identify the strains of influenza circulating in Ontario, for comparison to national and international viral activity, and to monitor antigenic drift and shift.
- To determine the epidemiology (e.g. incidence and prevalence) of influenza and other respiratory illnesses (endemic, emerging and re-emerging), including the identification of high-risk groups for the implementation of appropriate control measures.
- To determine the duration and severity of the influenza season.
- To assess the effectiveness of outbreak control measures.
- To provide accurate and timely information on influenza and other respiratory infection activity to our stakeholders at the provincial, national and international levels.

2005/06 was the sixth season for the *Universal Influenza Immunization Program (UIIP)*, in which all Ontarians over the age of 6 months who live, work, or go to school in Ontario were eligible to receive free influenza vaccine. A continued emphasis of this program was the immunization of people at high-risk for complications associated with influenza including:

- Adults and children with chronic cardiac or pulmonary disorders or chronic conditions such as diabetes mellitus, cancer, immunodeficiency, or immunosuppression
- People of any age who are residents of nursing homes and other chronic care facilities
- People ≥ 65 years of age
- Adults and children who have any condition that can compromise respiratory function or the handling of respiratory secretions or that can increase the risk of aspiration
- Healthy children aged 6 to 23 months
- Children and adolescents (aged 6 months to 18 years) receiving long term acetylsalicylic acid therapy
- People at high risk of influenza complications (as outlined above) embarking on travel to destinations where influenza is likely to be circulating.

Methods

The PHD of the MOHLTC used various data sources to track influenza activity in Ontario. The five components of influenza surveillance for the 2005/06 season included the following:

- Laboratory surveillance, conducted by PHAC's CIDPC in conjunction with the National Microbiology Laboratory;
- iPHIS reports of confirmed influenza cases across Ontario;
- Reports of institutional respiratory infection outbreaks from health units across Ontario;
- Influenza activity level reports from health units across Ontario;
- Sentinel Physician influenza-like illness (ILI) consultation rates coordinated by PHAC/College of Family Physicians of Canada (CFPC) as part of the *FluWatch* Program.

In addition to the above, data regarding influenza vaccination rates for residents and staff of Long-Term Care Homes (LTCHs) and hospital staff are included in this report.

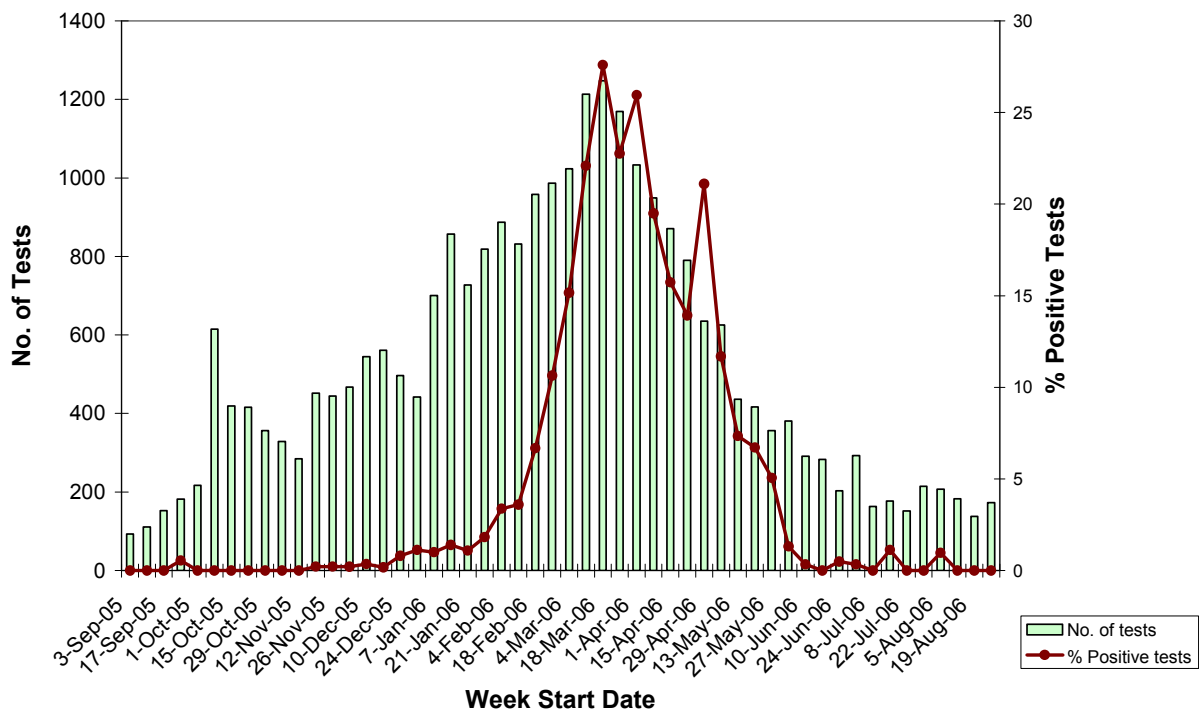
1. Laboratory Surveillance of Influenza and Other Respiratory Viruses

The laboratory surveillance component involved the reporting of positive influenza and other respiratory virus isolates from select Ontario laboratories to CIDPC. Reports included results from outbreak-associated and sporadic cases of respiratory infection. These data are then reported weekly to the PHD. During the 2005/06 influenza surveillance season, 17 laboratories in Ontario participated in laboratory surveillance. The participating laboratories were: the Central Public Health Laboratory (Toronto), the Toronto Medical Laboratory, Kingston, Timmins, Windsor, Thunder Bay, Sault Saint Marie, Orillia, Sudbury, Ottawa Public Health Laboratory, Peterborough, London Public Health Laboratory and Hamilton. The hospital-based laboratories are the Children's Hospital of Eastern Ontario (Ottawa), the Hospital for Sick Children (Toronto), St. Joseph's Hospital (London), and Sunnybrook & Women's College Health Sciences Centre (Toronto). All laboratory data were published in the *Ontario Influenza Bulletin* throughout the season, weekly from early October to the end of April and biweekly during the rest of the season.

Influenza, Ontario

During the 2005/06 Ontario influenza season, influenza activity began in late November, 2005, and peaked in early March, 2006. Ontario's participating laboratories reported that a total of 26,974 specimens were tested between August 28, 2005 and August 26, 2006 (the period most closely corresponding to the respiratory infection outbreak surveillance season in Ontario). Of these, 2,317 (8.6%) tested positive for influenza (1,258 influenza A, and 1,059 influenza B) (Figure 1). This represented a 67.4% decrease in positive influenza A isolates and a 19.1% decrease in positive influenza B isolates, compared to the previous season's 3,863 and 1,309 positive influenza A and B isolates respectively. However, the proportions of positive influenza isolates in Ontario were comparable to the rest of Canada both this and previous seasons (Table 1) and represented a 5.2% decrease in positive tests compared to 2004/05 season, when 13.8% of all specimens tested positive.

Figure 1. Proportion of isolates testing positive for influenza, by week, Ontario, 2005-06



Source: Centre for Infectious Disease Prevention and Control

Table 1. Laboratory testing and confirmation of influenza in Ontario, compared to the rest of Canada, 2004-05 and 2005-06

Season	Ontario			Canada (excluding Ontario)		
	No. of specimens tested	No. of positive Tests (A/B)*	% positive (A/B)*	No. of specimens tested	No. of positive Tests (A/B)*	% positive (A/B)*
2004/05	37,356	5,145 (3,836/1,309)	13.8 (10.3/3.5)	63,913	7,734 (6,930/804)	12.1 (10.8/1.3)
2005/06	26,974	2,317 (1,258/1,059)	(4.7/3.9)	60,329	5,105 (3,269/1,836)	8.5 (5.4/3.1)

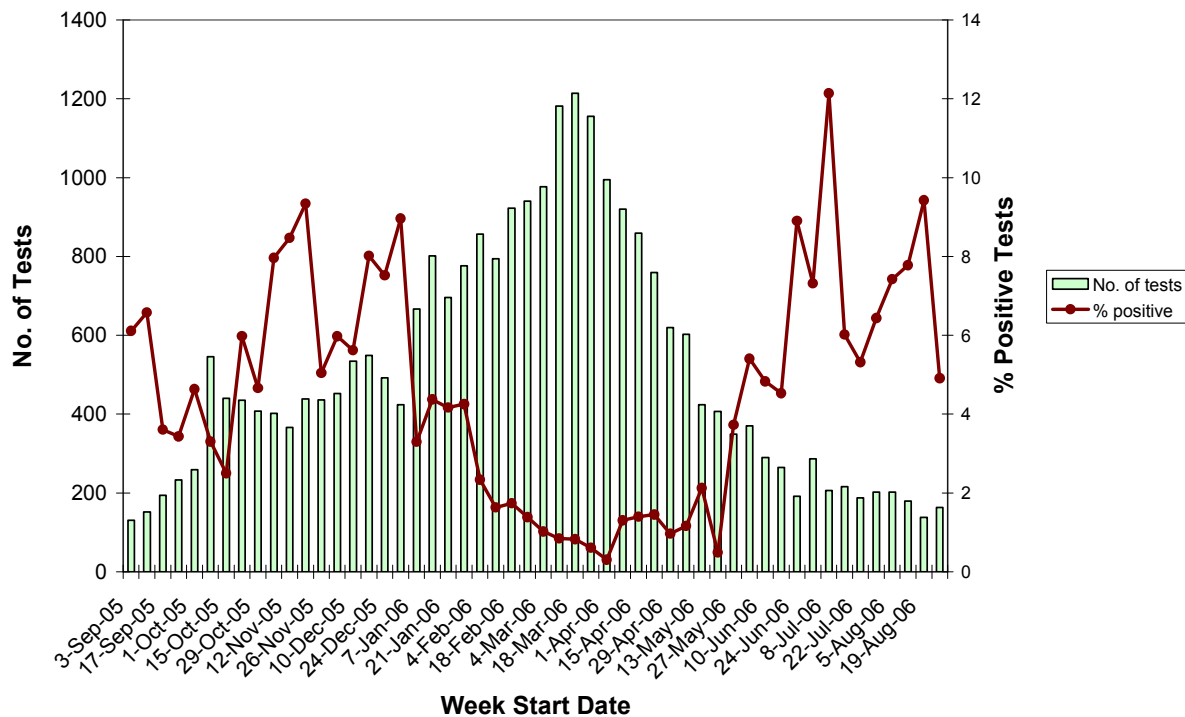
* The numbers in brackets show breakdown between influenza A and influenza B respectively

Respiratory viruses other than influenza, Ontario

Routine testing was conducted for three other respiratory viruses during the season: parainfluenza virus (PIV), adenovirus, and respiratory syncytial virus (RSV).

A total of 26,703 tests for PIV were performed between August 28, 2005 and August 26, 2006, of which 909 (3.4%) were positive (Figure 2).

Figure 2. Proportion of isolates testing positive for parainfluenza, by week, Ontario, 2005-06



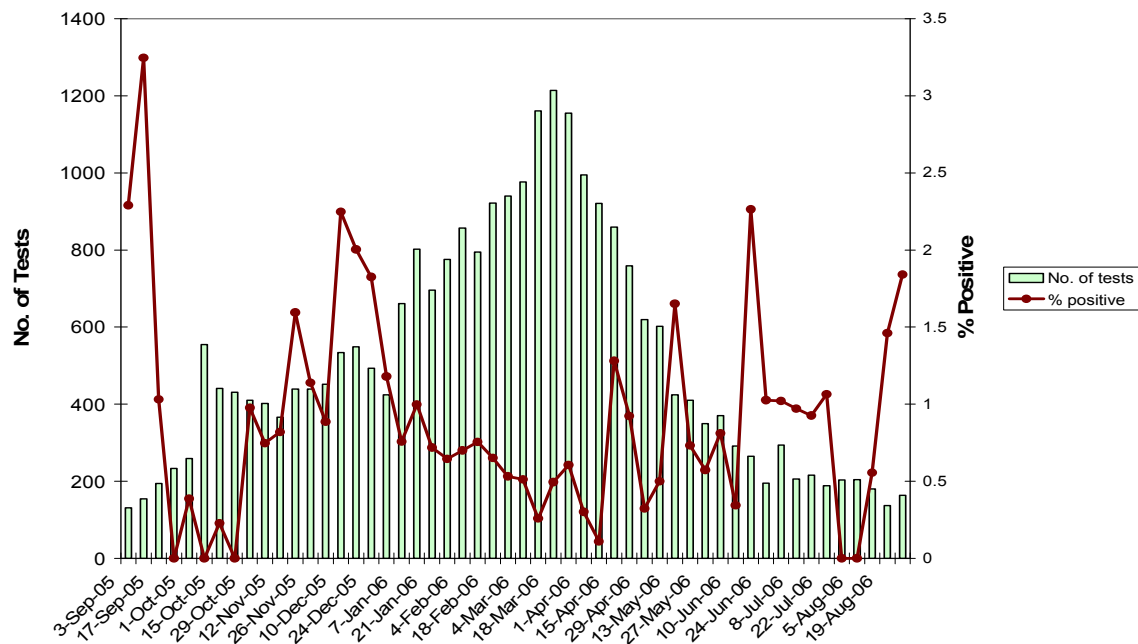
Source: Centre for Infectious Disease Prevention and Control

A total of 27,712 tests for adenovirus were performed between August 28, 2005 and August 26, 2006, of which 208 (0.8%) were positive (Figure 3).

A total of 27,786 tests for RSV were performed during the same time period, of which 1,830 (6.6%) were positive (Figure 4).

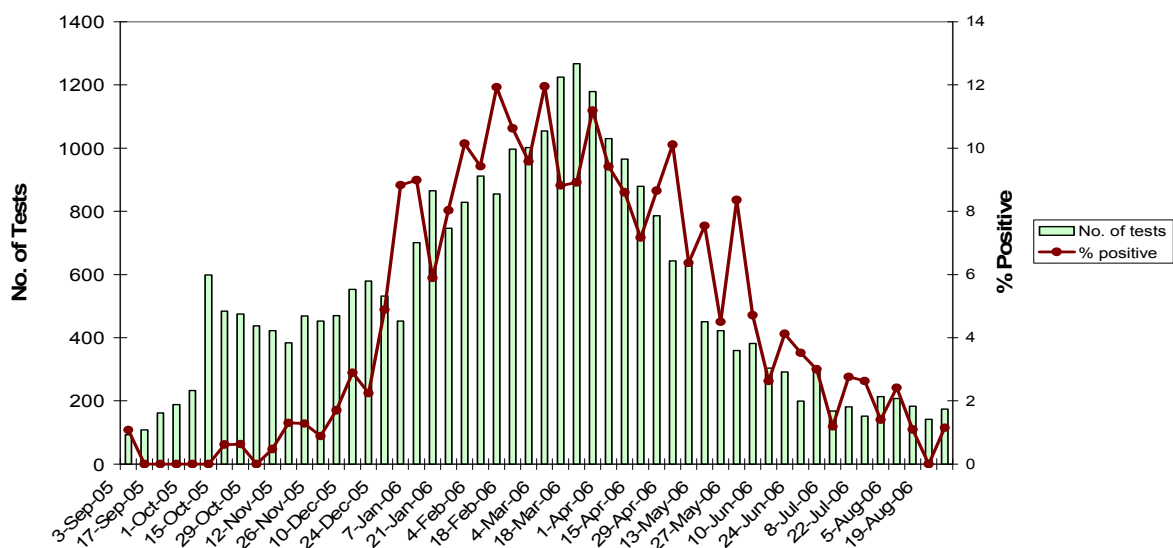
Compared to the 2004-05 season, there was a 67.2% decrease in the number and a 5.6% decrease in the percentage of positive influenza A isolates; a 19.1% decrease in the number and 0.4% increase in the percentage of positive influenza B isolates; a 35.7% decrease in the number and 1.0% decrease in the percentage of positive RSV isolates; a 2.3% decrease in the number and 0.8% increase in the percentage of positive PIV isolates; a 51.6% decrease in the number and 0.4% decrease in the percentage of positive adenovirus isolates (figures 5 and 6).

Figure 3. Proportion of isolates testing positive for adenovirus, by week, Ontario, 2005-06



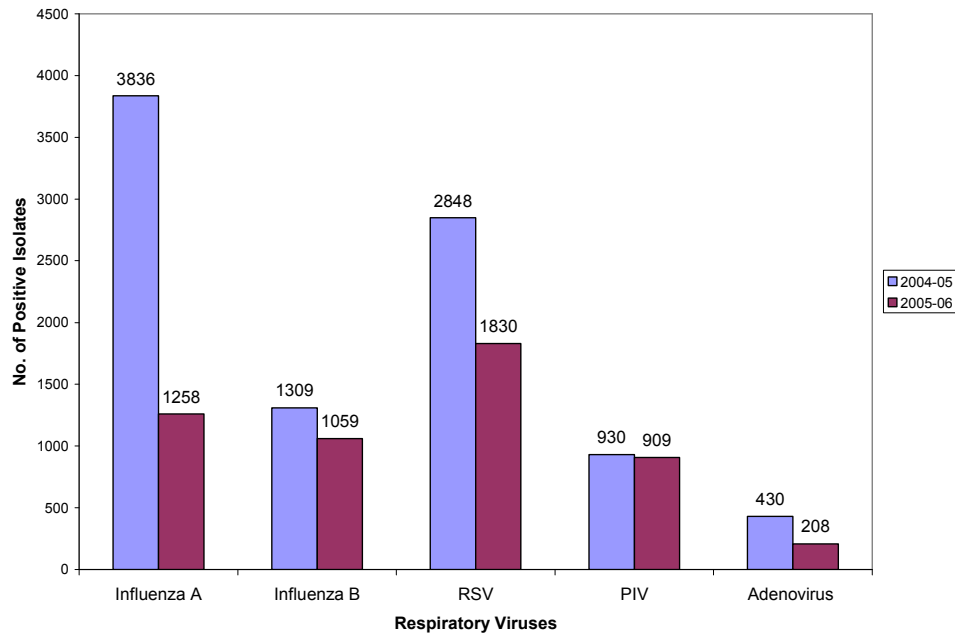
Source: Centre for Infectious Disease Prevention and Control

Figure 4. Proportion of isolates testing positive for respiratory syncytial virus, by week, Ontario, 2005-06



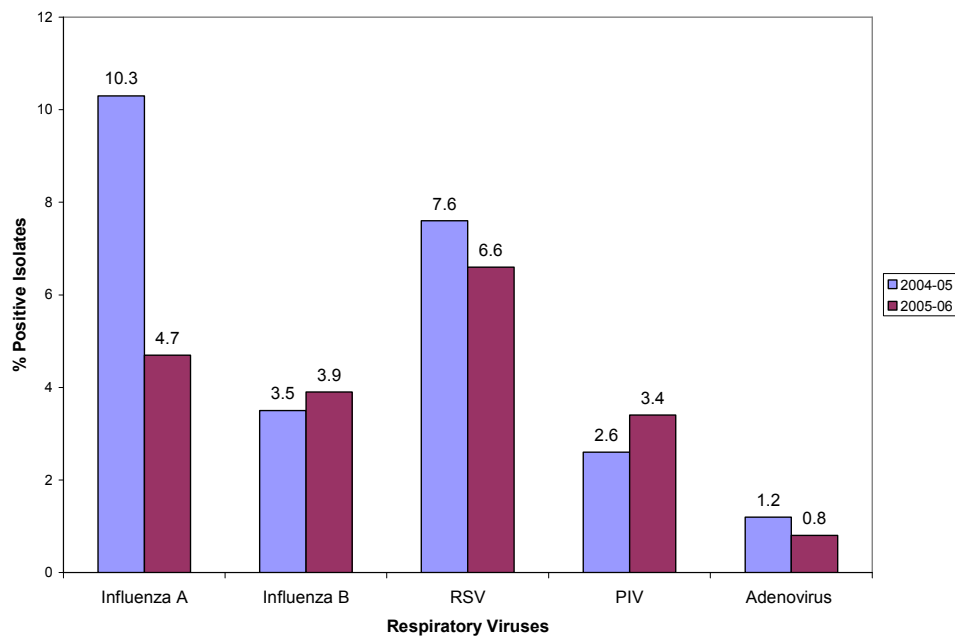
Source: Centre for Infectious Disease Prevention and Control

**Figure 5. Laboratory Confirmation of Select Respiratory Viruses
Ontario, 2004-05 and 2005-06**



Source: Centre for Infectious Disease Prevention and Control

**Figure 6. Proportion of Isolates Testing Positive for Select Respiratory Viruses
Ontario, 2004-05 and 2005-06**



Source: Centre for Infectious Disease Prevention and Control

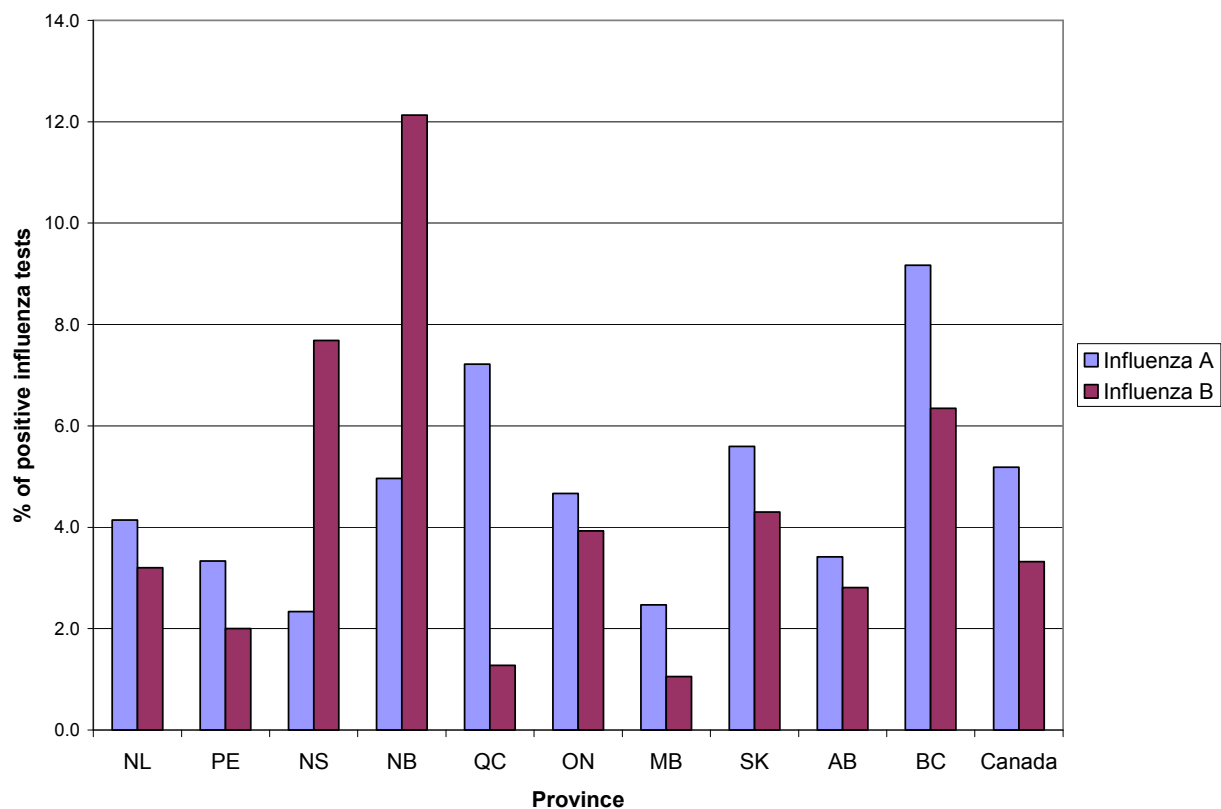
Influenza, Canada

During the 2005/06 surveillance season, the CIDPC reported that 7,422 (8.5%) isolates in Canada tested positive for influenza: 4,527 (61%) tested positive for influenza A and 2,895 (39%) for influenza B. These figures represented a 57.6% decrease in the total number and 3.6% decrease in the percentage of positive influenza isolates as compared to Canada's 2004/05 season, when a total of 12,879 positive specimens were reported. These figures also represented a 58.0% decrease in the number and a 5.4% decrease in the percentage of positive influenza A isolates. However, the number and percentage of positive influenza B isolates increased 35.7% and 1.2% respectively.

The highest percentage of positive influenza A isolates was in British Columbia (9.2%) and the highest percentage of positive influenza B isolates was in New Brunswick (12.1%) (Figure 7).

The highest rate of positive influenza tests per 100,000 population was in Saskatchewan (37.3/100,000 population for influenza A and 28.7/100,000 for influenza B), while the lowest rate was in Prince Edward Island (3.6/100,000 for influenza A and 2.2/100,000 for influenza B) (Table 2).

**Figure 7. Proportion of Isolates Testing Positive for Influenza
Canada, 2005-06**



Source: Centre for Infectious Disease Prevention and Control

Table 2. Laboratory Surveillance of Influenza, by Province, Canada, 2005/06

	NL	PE	NS	NB	QC	ON	MB	SK	AB	BC
Population 2006	509,700	138,500	934,400	749,200	7,651,500	12,687,000	1,177,800	985,400	3,375,800	4,310,500
# of isolates tested	1,062	150	1,158	1,632	20,198	26,974	2,556	6,583	21,722	5,268
# pos. tests influenza A	44	5	27	81	1457	1258	63	368	741	483
Rate / 100,000	8.6	3.6	2.9	10.8	19.0	9.9	5.3	37.3	22.0	11.2
% positive influenza A	4.1	3.3	2.3	5.0	7.2	4.7	2.5	5.6	3.4	9.2
# pos. tests influenza B	34	3	89	198	258	1059	27	283	610	334
Rate / 100,000	6.7	2.2	9.5	26.4	3.4	8.3	2.3	28.7	18.1	7.7
% positive influenza B	3.2	2.0	7.7	12.1	1.3	3.9	1.1	4.3	2.8	6.3

Source: Centre for Infectious Disease Prevention and Control

Source for population: Statistics Canada. Population estimates and projections. Population by year, by province and territory. (<http://www40.statcan.ca/l01/cst01/demo02a.htm>)

Respiratory viruses other than influenza, Canada

During the 2005/06 surveillance season, the CIDPC reported 2,944 (4% of isolates tested) laboratory-confirmed PIV isolates in Canada, 1,614 (2.4% of isolates tested) laboratory-confirmed adenovirus isolates, and 5,854 (7.1% of isolates tested) laboratory-confirmed RSV isolates. Compared to 2004/05 surveillance season, this represented a 38.4% increase in the number and 1.3% increase in the percentage of positive PIV, a 19.2% decrease in the number and 0.2% decrease in the percentage of positive adenovirus, and 29.1% decrease in the number and 1.9% decrease in the percentage of positive RSV isolates.

Composition of the 2005/06 Influenza Vaccine in Canada

The influenza vaccine for the 2005/06 season was developed based on antigenic characteristics of current and emerging influenza virus strains. The trivalent influenza vaccine developed for the 2005/06 season included the following: an A/New Caledonia/20/99 (H1N1)-like strain, an A/California/ 7/2004 (H3N2)-like strain, and a B/Shanghai/361/2002-like strain.

Influenza Strains Circulating in Canada

The predominant circulating influenza A strain in Canada during the 2005/06 surveillance season was A/California/7/2004 (H3N2)-like (40% of all strain-characterized isolates), which is similar to the influenza A(H3N2) component of the 2005/06 influenza vaccine. Additional circulating strains included B/Malaysia/2506/04-like (32%), B/Hong Kong/330/01-like (13%), A/New Caledonia/20/1999 (H1N1)-like (9%), A/Wisconsin/67/2005 (H3N2)-like (5%), and B/Shanghai/361/2002-like (1%).

During the 2005/06 season, the National Microbiology Laboratory (NML) at Public Health Agency of Canada sub-typed and strain-characterized 546 influenza A isolates and 472 influenza B isolates.

Of the 546 influenza A isolates: 399 (73%) were A/California/7/2004 (H3N2)-like, 96 (18%) were A/New Caledonia/20/1999 (H1N1)-like, and 51 (9%) were A/Wisconsin/67/2005 (H3N2)-like. Of the 472 influenza B isolates, 329 (69.7%) were B/Malaysia/2506/04-like, 136 (28.8%) were B/Hong Kong/330/01-like, and 7 (1.5%) were B/Shanghai/361/2002-like (Table 3).

Table 3. Influenza A & B Strains Circulating in Canada 2003/04 to 2005/06 Seasons

<u>Season</u>	<u>Main Circulating Strains</u>	<u>Season's Vaccine Strains</u>
2005/06	A/California/7/2004 (H3N2)-like A/New Caledonia/20/1999 (H1N1)-like A/Wisconsin/67/2005 (H3N2)-like B/Malaysia/2506/04-like B/Hong Kong/330/01-like B/Shanghai/361/2002-like	A/California/ 7/2004 (H3N2)-like A/New Caledonia/20/1999 (H1N1)-like B/Shanghai/361/2002-like
2004/05	A/Fujian/411/2002 (H3N2)-like A/California/07/2004 A(H1N1) B/Hong Kong/330/2001 B/Shanghai/361/2002	A/New Caledonia/20/99- like (H1N1) A/Wyoming/3/2003 (H3N2) B/Jiangsu/10/2003
2003/04	A/Fujian/411/2002 (H3N2)-like A/Panama/2007/99-like (H3N2) A/New Caledonia/20/9/9-like (H1N1) A(H1N2)* B/Hong Kong/330/2001 B/Sichuan/379/99	A/Panama/2007/99- like (H3N2) A/New Caledonia/20/99- like (H1N1) B/Hong Kong/330/2001 like

Source: National Microbiology Lab (NML), Population & Public Health Branch, Public Health Agency of Canada

* Note: The influenza A (H1N2) virus strain is a reassortment virus derived from the influenza A (H1N1) and A (H3N2) virus strains.

2. Integrated Public Health Information System (iPHIS): Confirmed Cases of Influenza

Beginning in April of 2005, Ontario health units were required to transmit data on confirmed cases of influenza to the PHD through iPHIS. Cases of influenza would not be reported by health units if cases did not seek medical care or if lab testing was not done. Since only confirmed cases of influenza are reported through iPHIS, this number represents only a portion of the true number of influenza cases in Ontario.

The case definition for a confirmed case of influenza in iPHIS was:

Clinically compatible signs and symptoms of influenza with one of the following:

- laboratory confirmation by detection or isolation of influenza virus in pharyngeal or nasal secretions or lung tissue;
- OR
- demonstration of a four-fold or greater increase in hemagglutination antibody titres to influenza between acute and convalescent sera;
- OR
- epidemiologic link to laboratory-confirmed case

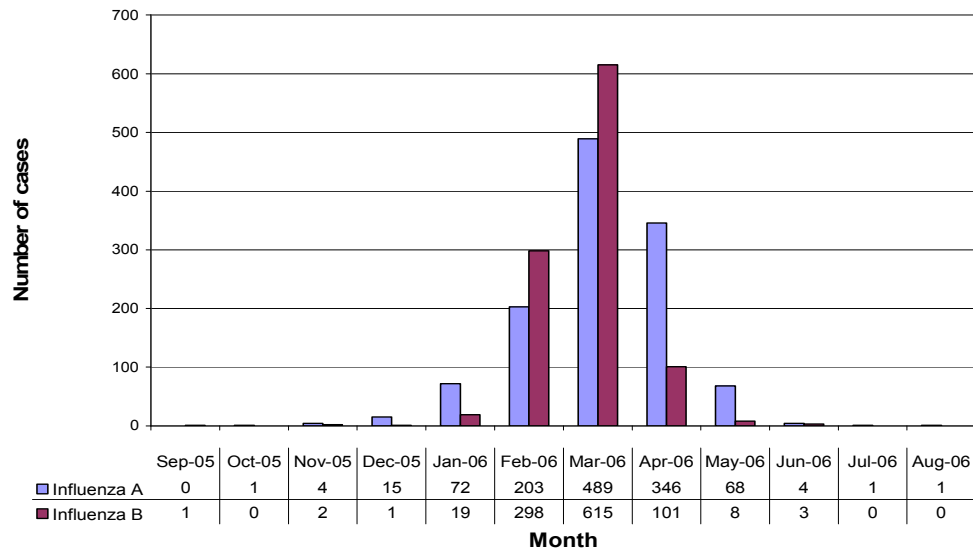
iPHIS Results

Between September 1, 2005 and August 31, 2006, a total of 2,391 confirmed influenza cases were reported through iPHIS. This was a 58% decrease in reported influenza cases as compared to the 5,688 cases of influenza reported through RDIS* and iPHIS during the previous season. Of these 2,391 cases, 1,204 (50.4%) were influenza A, 1,048 (43.8%) were influenza B, and 139 (5.8%), for which the type (i.e. A vs B) was not specified. Peak activity occurred in March, with a total of 1,104 confirmed cases reported. Of these, 489 (44%) were influenza A and 615 (56%) were influenza B (Figure 8).

The number of influenza cases per 100,000 population was highest in the Central West region of the province; the regional rate of influenza cases was 21.63/100,000 population. The North West region demonstrated the lowest regional rate at 9.14/100,000 population (Figure 9).

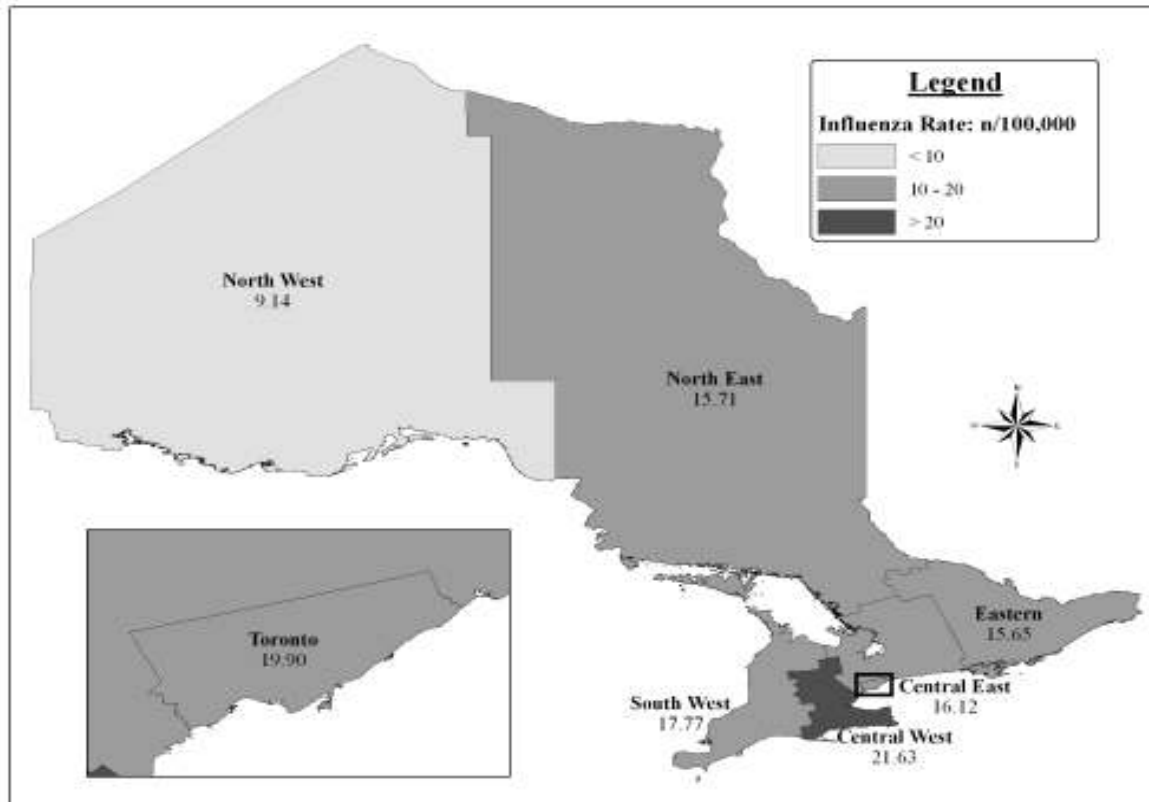
* Until April 1, 2005, confirmed influenza cases were reported to PHD through RDIS – Reportable Disease Information System. Starting April 1, 2005, some health units began to use iPHIS. The data that were collected in 2005 through RDIS were converted to iPHIS.

Figure 8. Total Number of Confirmed Influenza A and Influenza B Cases, by Month of Onset, Ontario, 2005-06



Source: Integrated Public Health Information System (iPHIS), analysis as of February 9, 2007

Figure 9. Rate of Influenza per 100,000 population, by Region of Ontario, 2005-06



Source: Integrated Public Health Information System (iPHIS), analysis as of February 9, 2007

Source for population: Provincial Health Planning Data Base (PHPDB) Version 16.16, December 20, 2006

Among Health Units, Huron had the highest rate of influenza (68.26/100,000 population), and Timiskaming the lowest (0) (Table 4)

**Table 4. Confirmed Influenza Cases by Health Unit and Region
Ontario, 2005-06**

	Health Unit	Number of influenza cases (A&B)	Population 2005	Rate/100,000**
North West	Northwestern	18	81,837	22.0
	Thunder Bay	4	158,992	2.5
	TOTAL NORTH WEST	22	240,829	9.14
North East	Algoma	19	119,925	15.8
	North Bay Parry Sound	10	125,163	8.0
	Porcupine	38	89,081	42.7
	Sudbury	22	196,938	11.2
	Timiskaming	0	35,493	0
	TOTAL NORTH EAST	89	566,600	15.71
Eastern	City Of Ottawa	111	832,550	13.37
	Eastern Ontario	38	199,954	19.07
	Hastings-Prince Edward	43	162,163	26.6
	KFLA	53	189,306	28.0
	Leeds, Grenville and Lanark	3	169,630	1.8
	Renfrew	11	100,878	11.0
	TOTAL EASTERN	259	1,654,481	15.65
Central East	Durham Region	12	575,201	2.09
	HKPR	106	174,555	60.8
	Peel Region	188	1,215,261	15.5
	Peterborough	8	133,667	6.0
	Simcoe-Muskoka	134	484,371	27.7
	York Region	117	922,857	12.7
	TOTAL CENTRAL EAST	565	3,505,912	16.12
Toronto	Toronto	519	2,607,637	19.9
	TOTAL TORONTO	519	2,607,637	19.90
South West	Chatham-Kent	8	109,237	7.3
	Elgin-St. Thomas	2	88,502	2.3
	Grey Bruce	66	162,102	40.7
	Huron	42	61,527	68.3

** Age standardized rates were calculated for some health units. However, because the differences between crude and age-standardized rates were very small, crude rates are reported here.

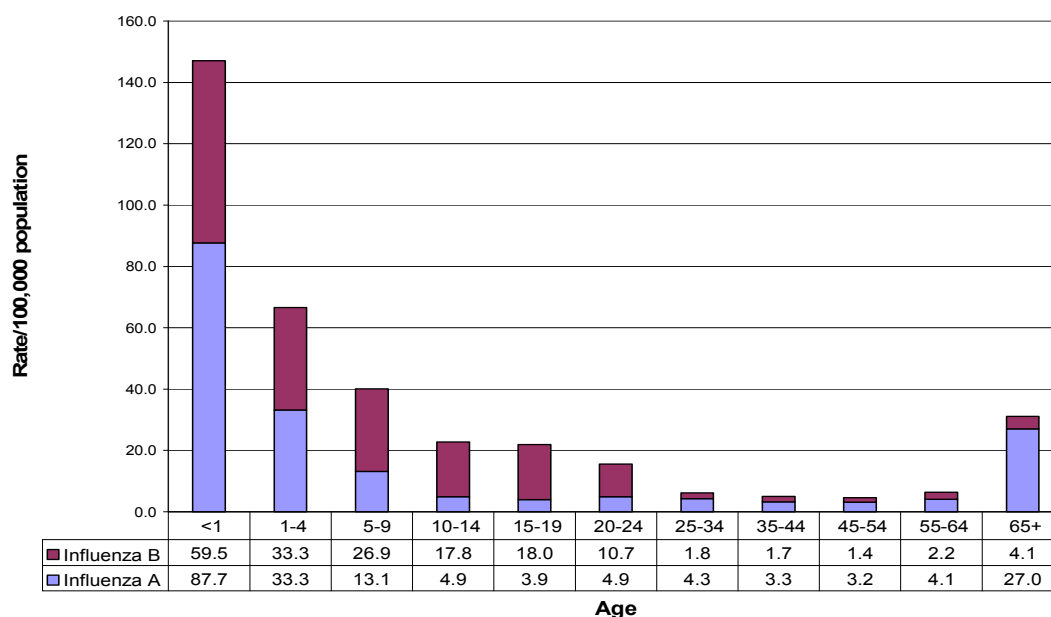
	Lambton	32	132,283	24.2
	Middlesex-London	47	434,222	10.8
	Oxford	22	105,183	20.9
	Perth	29	77,624	37.4
	Windsor-Essex	32	404,839	7.9
	TOTAL SOUTH WEST	280	1,575,519	17.77
Central West	Brant	9	134,952	6.7
	City Of Hamilton	203	519,878	39.0
	Haldimand-Norfolk	25	111,043	22.6
	Halton	86	443,402	19.4
	Niagara	46	434,347	10.6
	Waterloo	95	485,248	19.6
	Wellington-Dufferin-Guelph	53	261,562	20.3
	TOTAL CENTRAL WEST	517	2,390,432	21.63
TOTAL		2,251	12,541,410	17.9

Source: Integrated Public Health Information System

Source for population: Provincial Health Planning Data Base (PHPDB) Version 16.16

Age distribution of influenza cases showed that the highest rates of cases were among children less than one and 1-4 years of age. Among adults, those ≥ 65 years of age had the highest influenza rate (Figure 10).

Figure 10. Confirmed Influenza Rates per 100,000 population, by Age Groups Ontario, 2005-06



Source: Integrated Public Health Information System (iPHIS), analysis as of February 9, 2007

Source for population: Provincial Health Planning Data Base (PHPDB) Version 16.16, December 20, 2006

3. Respiratory Infection Outbreaks in Institutions Ontario, 2005/06 Season

Since 2001 health units have been required to report to PHD all respiratory infection outbreaks caused by known (e.g. influenza, RSV, PIV, etc) or unknown respiratory organisms that occurred in Long-Term Care Homes (LTCHs) and other health care institutions in their jurisdictions.

Data were collected and analyzed for outbreaks that occurred in LTCHs, retirement homes (RH) with more than 10 residents, acute care hospitals (ACH), chronic care facilities (CCF), psychiatric hospitals, and schedule I and II facilities (the latter two facility types were designated as “other”).

The criteria for an institutional respiratory outbreak were:

Long-term care homes

- Two cases of acute respiratory tract illness, one of which is laboratory confirmed.

OR

- Three cases of acute respiratory tract illness occurring within 48 hours in a geographic area (e.g., unit, floor).

OR

- More than two units having a case of acute respiratory illness within 48 hours

Note that cases can include residents/patients and/or staff.

Hospitals (influenza outbreak)

- Two or more cases of nosocomially-acquired influenza-like illness occurring within 48 hours on a specific hospital unit, with at least one laboratory confirmed as influenza.

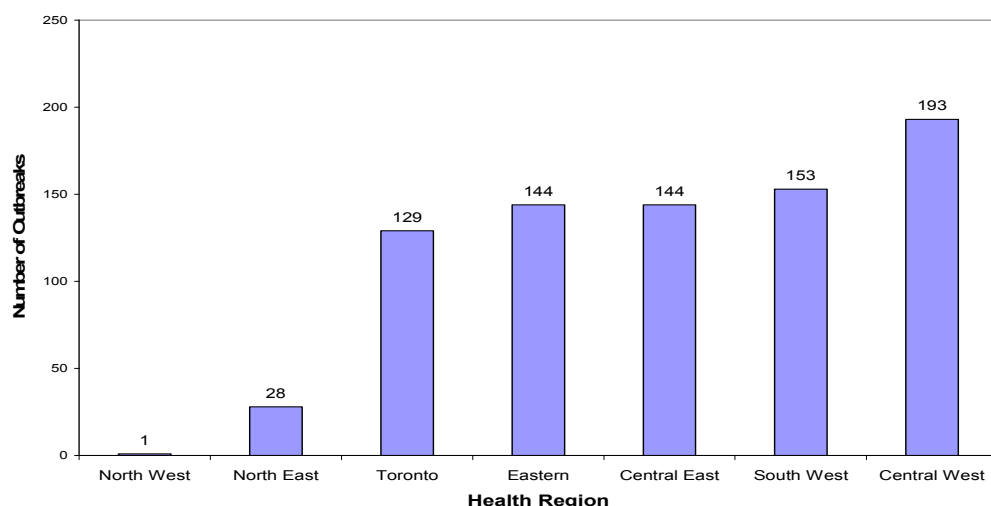
Preliminary reports of respiratory infection outbreaks in institutions were faxed to the PHD Call Centre by health units within 24 hours of outbreak notification. Final reports were to be submitted within three weeks of the outbreaks being declared over and included summarized epidemiologic information on residents/patients and staff, such as influenza immunization coverage rates, morbidity and mortality attributes, outbreak duration, causative organism if known, and antiviral usage for prophylaxis or therapy to control an influenza outbreak.

Results

There were 792 confirmed institutional respiratory infection outbreaks reported to the PHD during the 2005/06 surveillance season (September 1, 2005 – August 31, 2006), of which 151 (19 %) were attributed to influenza. This represented a 30% decrease in the total number of institutional respiratory infection outbreaks when compared to 1,125 confirmed institutional respiratory infection outbreaks during the 2004/05 surveillance season. In addition, this represented a 74% decrease in the number of influenza outbreaks and an 18% increase in the number of non-influenza outbreaks, when compared to the previous season's 584 influenza and 541 non-influenza outbreaks.

The number of institutional respiratory outbreaks reported by health regions ranged from one reported by the North West region to 193 reported by the Central West region (Figure 11)

Figure 11. Number of Institutional Respiratory Infection Outbreaks by Health Region, Ontario, 2005-06



Source: Provincial Appendix D and E Database, 2005-06

The number of outbreaks reported by health units ranged from none reported by Algoma and Northwestern health units to 129 reported by Toronto.

Causative Organisms

Of the 792 reported respiratory infection outbreaks, 151 (19.1%) were laboratory-confirmed influenza. Influenza A was determined to be the causative organism in 122 (15.4%) outbreaks, influenza B in 19 (2.4%), and influenza A and B were combined in two outbreaks (0.5%). Influenza A was combined with other organisms (RSV, streptococcus or human metapneumovirus) in three (0.4%) outbreaks, influenza B was combined with enterovirus or RSV in two (0.3%) outbreaks and influenza A & B was combined with RSV in one (0.1%) outbreak. A number of non-influenza organisms were identified in 175 outbreaks. The causative organism was unknown for 466 (58.8%) institutional respiratory infection outbreaks (Table 5).

Table 5. Number of Outbreaks, by Causative Organism, Ontario, 2005-06

Causative Organisms	# of Outbreaks	% of Total Outbreaks
Influenza A	122	15.4
Influenza B	19	2.4
Influenza A & B	4	0.5
Influenza A & others	3	0.4
Influenza B & others	2	0.3
Influenza A & B and others (RSV)	1	0.1
Influenza (A&B) Outbreaks	151	19.1

PIV	58	7.3
RSV	32	4.0
Enterovirus or Rhinovirus	79	10.0
Legionella	1	0.1
Others/multiple others	5	0.6
Unknown	466	58.8
Non-influenza Outbreaks	641	80.9
ALL OUTBREAKS	792	100.0

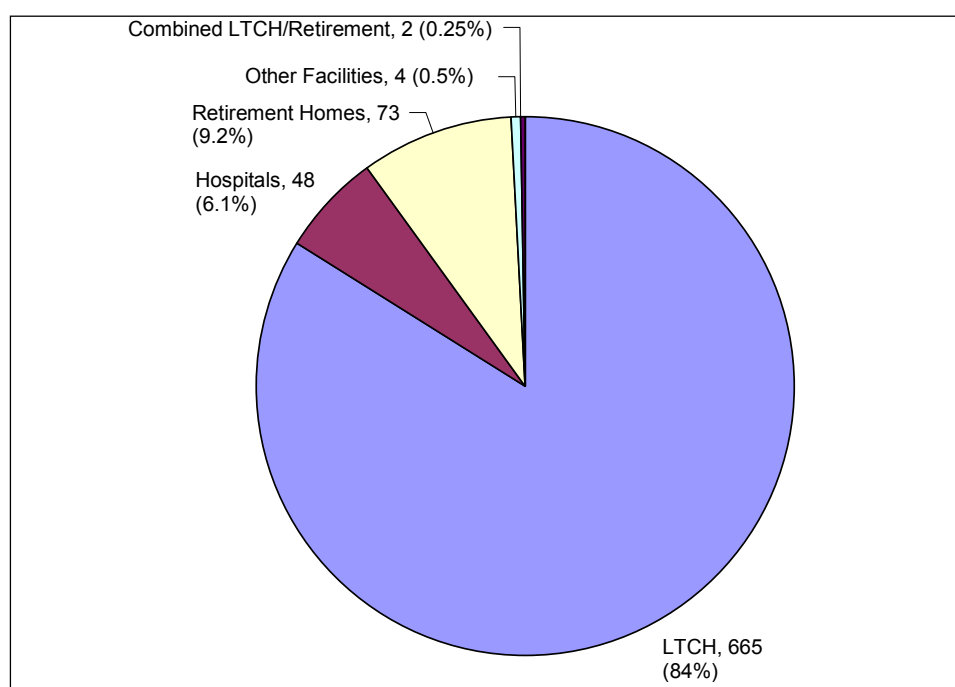
Source: Provincial Appendix D and E Database, 2005-06

Institution Type

Of the total number of respiratory infection outbreaks in institutions, 665 (84%) occurred in LTCHs, 48 (6.1%) in hospitals, 73 (9.2%) in retirement homes, two (0.25%) in combined LTCH/Retirement homes and four (0.5%) in “other” facilities (Figure 12).

Of the 48 respiratory infection outbreaks that occurred in hospitals, 11 (23%) occurred in acute care hospitals, 25 (52%) were in chronic care hospitals, and 12 (25%) in psychiatric hospitals (Table 6).

Figure 12. Respiratory Infection Outbreaks by Institution Type, Ontario, 2005-06



Source: Provincial Appendix D and E Database, 2005-06

**Table 6. Number of Respiratory Infection Outbreaks, by Type of Hospital
Ontario, 2005-06**

Type of Hospital	# of Outbreaks	% of Hospital Outbreaks (n=48)
Acute Care	11	23
Chronic Care	25	52
Psychiatric	12	25
TOTAL	48	100

Source: Provincial Appendix D and E Database, 2005-06

Of the 665 outbreaks that occurred in LTCHs 565 (85%) were in nursing homes, and 100 (15%) in homes for the aged (both public and charitable) (Table 7).

Table 7. Number of Respiratory Infection Outbreaks, by Type of LTCH, Ontario, 2005-06

Type of LTCH	# of Outbreaks	% of LTCH Outbreaks (n=665)
Nursing Home	565	85.0
Home for the Aged	100	15.0
TOTAL	665	100

Source: Provincial Appendix D and E Database, 2005-06

Influenza Outbreaks

A total of 151 institutional influenza infection outbreaks were reported. Of all the influenza outbreaks, 15 (9.9%) occurred in hospitals, 114 (75.5%) in LTCHs, 20 (13.2%) in retirement homes and 2 (1.3%) in other facilities (Table 8).

Table 8. Number of Influenza Outbreaks, by Type of Institution, Ontario, 2005-06

Type of Institution	# of Outbreaks	% of Total # of Influenza Outbreaks (n=151)
Acute Care	9	6.0
Chronic Care	4	2.7
Psychiatric	2	1.3
TOTAL HOSPITALS	15	10.0
Nursing Home	98	64.9
Home for the Aged	16	10.6
TOTAL LTCHs	114	75.5
Retirement Homes	20	13.2
Others	2	1.3
TOTAL RETIREMENT HOMES AND OTHERS	22	14.5
TOTAL INFLUENZA OUTBREAKS	151	100

Source: Provincial Appendix D and E Database, 2005-06

Respiratory Infection Outbreaks Other Than Influenza

A total of 641 institutional outbreaks were attributed to non-influenza organisms. 33 (5.1%) occurred in hospitals, 551 (86%) in LTCHs, 53 in retirement homes, two in combined (LTCH/retirement home) facilities, and two in "other" facilities (Table 9).

Table 9. Number of Outbreaks Caused by Non-influenza Organisms, by Type of Institution, Ontario, 2005-06

Type of Hospital	# of Outbreaks	% of Total # of Non-influenza Outbreaks (n=641)
Acute Care	2	0.3
Chronic Care	21	3.3
Psychiatric	10	1.5
TOTAL HOSPITALS	33	5.1
Home for the Aged	84	13.1
Nursing Home	467	72.9
TOTAL LTCHs	551	86.0
Retirement Homes	53	8.3
Combined (LTCHs/Retirement home)	2	0.3
Others	2	0.3
TOTAL RETIREMENT HOMES AND OTHERS	57	8.9
TOTAL NON-INFLUENZA OUTBREAKS	641	100

Source: Provincial Appendix D and E Database, 2005-06

Outbreak Duration

Outbreak duration was defined as the number of days from the onset of illness in the first case until the outbreak was declared over. Due to the wide range of data, median results are reported.

The median duration for all respiratory infection outbreaks for which data were available (n=722; 91.2% of all outbreaks) was 17 days (range 5-70 days). The median duration of outbreaks caused by influenza A and B was 16 days (range 8-47 days) and 18 days (range 9-48 days) respectively (Table 10). There were only 4 outbreaks caused by both influenza A and B, and complete information was available for only 3 of them (16, 24 and 26 days). This is comparable to results from 2004/05 when the median duration for all respiratory infection outbreaks was 17 days; for influenza A and B the median durations were 16 and 17 days respectively.

The median duration of respiratory infection outbreaks caused by non-influenza organisms was 23 days for PIV and RSV, and 19 days for rhinovirus and enterovirus. The median duration for outbreaks in which the causative organisms was unknown was 16 days (range 5-65 days) (Table 10).

Table 10. Median Duration of Outbreaks by Causative Organism, Ontario, 2005-06

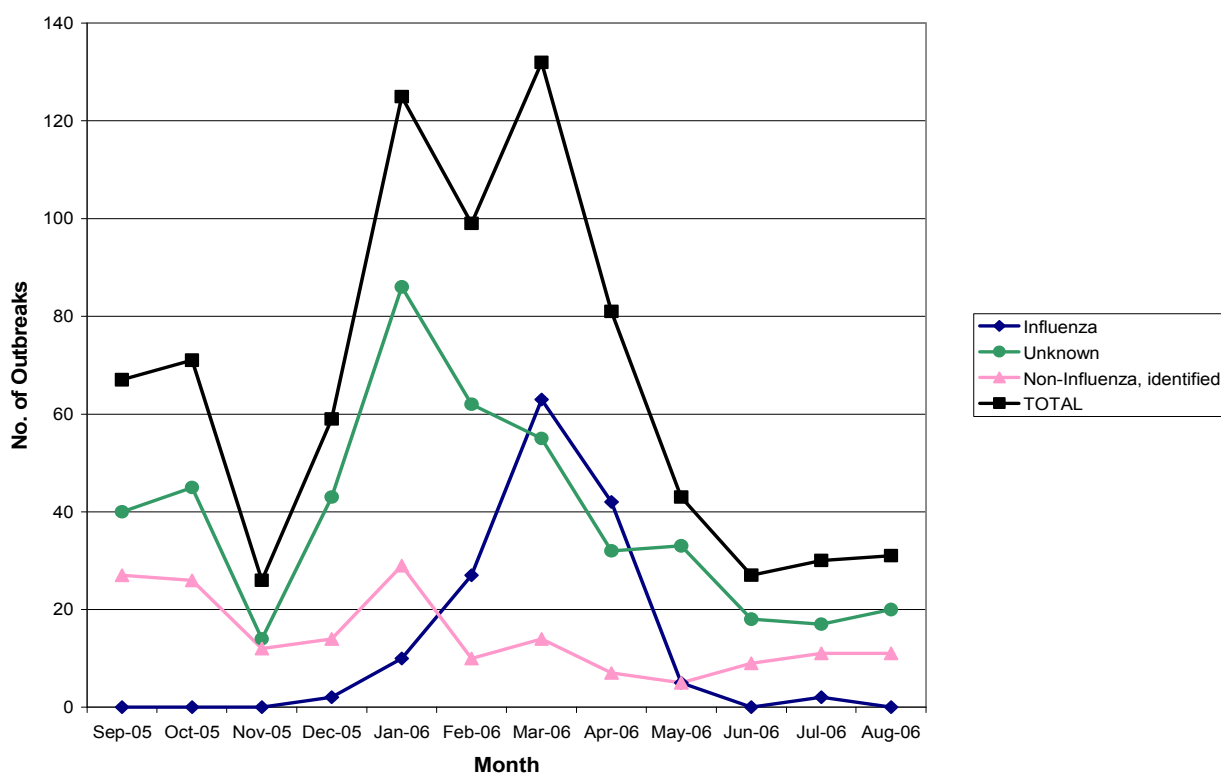
Causative Organism	Median duration (days)	Range (days)
All types of organisms	17	5-70
Influenza A	16	8-47
Influenza B	18	9-48
PIV	23	10-70
Enterovirus or Rhinovirus	19	10-49
RSV	23	11-49
Causative organism unknown	16	5-65

Source: Provincial Appendix D and E Database, 2005-06

Occurrence of Respiratory Infection Outbreaks, including influenza

Peak activity for all institutional respiratory infection outbreaks was in January to March, with a total of 125 outbreaks in January, 99 in February, and 132 in March. Only 10 (8%) out of 125 outbreaks occurring in January were due to influenza. In March, influenza outbreaks comprised almost half of all reported outbreaks (63 out of 132 (47.7%)) (Figure 13), i.e., peak activity for influenza outbreaks in institutions was in March.

Figure 13. Number of Institutional Respiratory Infection Outbreaks by Causative Agent and Month, Ontario, 2005-06



Source: Provincial Appendix D and E Database, 2005-06

Attack Rates for Institutional Respiratory Infection Outbreaks, Residents/Patients

During the 2005/06 surveillance season, the median institutional attack rate for residents in all respiratory infection outbreaks in LTCHs was 9.3% (range 0.6% - 71.4%). This rate represents outbreaks for which sufficient data were available for analysis (n=620, 93.2%)

The median attack rate among residents for influenza infection outbreaks in LTCHs for which sufficient information was available (n=105, 92.1%) was 8.1% (range 0.6% - 56.7%)

For non-influenza outbreaks in LTCHs for which sufficient information was available (n=515, 93.5%) the median attack rate was 10.1% (range 0.7% - 71.4%)

There were insufficient data to determine attack rates among patients in hospitals, or for attack rates among staff in all types of facilities.

Complications and Mortality for Respiratory Infection Outbreaks

During the 2005/06 surveillance season, a total of 305 deaths among residents and patients were attributed to respiratory infection outbreaks in institutions. The majority of deaths occurred in LTCHs, with a total of 292 (95.7%) deaths. 23 (7.5%) of the deaths were in a single legionella outbreak*. The remainder occurred in hospitals, with 9 (3%) deaths, and "other" facilities, with 4 (1.3%) deaths. The mean case fatality rate for all institutions that reported outbreaks was 2.8% (excluding the legionella outbreak). The case fatality rate for hospitals, LTCHs, and "other" facilities were 2.3%, 3.0%, and 0.5% respectively.

There were no deaths attributed to respiratory infection outbreaks among staff.

For all institutional respiratory infection outbreaks in LTCHs, the number of resident cases hospitalized as a consequence of the outbreak was 449 out of total 8,939 cases, a case hospitalization rate of 5.0%.

A total of 6 out of 3,035 staff cases were hospitalized in as a consequence of respiratory infection outbreaks resulting in a case hospitalization rate of 0.2%.

There were 536 radiologically-confirmed cases of pneumonia as a result of respiratory infection outbreaks. 522 of them were among residents/patients, resulting in a case-pneumonia rate of 5.2% and 14 among the staff, with a case-pneumonia rate of 0.5%. A total of 448 (85.8%) out of 522 pneumonia cases in residents occurred in LTCHs, a case pneumonia rate of 5.0%.

During the 2004/05 surveillance season, there were a total of 608 deaths and 868 radiologically-confirmed cases of pneumonia. As well, 802 hospitalizations occurred among LTCH residents as a result of respiratory infection outbreaks. This year's data

* Due to the specific nature of legionella outbreaks, including much higher case-fatality and hospitalization rates than other respiratory outbreaks, the analysis in this section does not include the legionella outbreak. The summary data for the legionella outbreak are provided in Table 12 at the end of the section

represented a 49.8% decrease in the number of deaths attributed to institutional respiratory infection outbreaks, a 38.2% decrease in the number of radiologically-confirmed cases of pneumonia, and a 44% decrease in the number of cases hospitalized among LTCH residents. The decrease in the number of complications can to a large extent be explained by a 30% decrease in the number of respiratory infection outbreaks compared to the previous year. This resulted in a lower number of cases attributable to respiratory infection outbreaks (Table 11). Case-fatality, case-pneumonia and case-hospitalization rates were comparable between the two years (Table 11).

Table 11. Complication rates for institutional respiratory infection outbreaks in residents/patients, 2004/05 and 2005/06*

Surveillance Season	Total No. of cases	No. of deaths	Case-fatality rate	No. of pneumonia cases	Case-pneumonia rate	Total No. of cases among LTCH residents	No. of hospitalizations among LTCH residents	Case-hospitalization rate among LTCH residents
2004-05	16,611	608	3.7%	868	5.2%	13,811	798	5.8%
2005-06*	10,105	282	2.8%	522	5.2%	8,939	449	5.0%

Source: Provincial Appendix D and E Database, 2005-06

Complications and Mortality among Patients/Residents, Influenza Outbreaks

There were a total of 70 deaths in 1,914 influenza cases in patients/residents, comprising 23% of the total number of deaths attributed to respiratory infection outbreaks. The case-fatality rate was 3.7% in influenza outbreaks. There were 119 radiologically-confirmed cases of pneumonia due to influenza outbreaks (22.8% of the total pneumonia cases). The case-pneumonia rate was 6.2%.

LTCHs represented the majority of institutions reporting complications as a result of influenza outbreaks. Of the 70 deaths that occurred as a result of influenza outbreaks, 63 (90%) occurred in LTCHs, with a case-fatality rate of 4.0%, four (5.7%) in hospitals, and three (4.3%) in "other" facilities. Of the 119 radiologically-confirmed cases of pneumonia, 93 (78.2%) occurred in LTCHs, with a case-pneumonia rate of 5.8%.

Complications and Mortality among Patients/Residents, Non-influenza Outbreaks

Institutions reporting non-influenza outbreaks noted 212 patient/resident deaths (75.2% of the total number of deaths in all respiratory infection outbreaks), and 403 radiologically-confirmed cases of pneumonia (77.2% of the total number of pneumonia cases in all respiratory infection outbreaks).

Of the 212 deaths attributed to non-influenza outbreaks, 206 (97.2%) occurred in LTCHs.

Table 12 . Summary of Complications and Mortality in LTCH residents, related to Respiratory Infection Outbreaks, Ontario, 2005/06

Type of outbreak	No. of cases	No. of deaths	Case-fatality rate (%)	No. of residents hospitalized	Case-hospitalization rate (%)	No. of residents with pneumonia	Case-pneumonia rate (%)
Influenza	1594	63	4.0	109	6.8	93	5.8
Non-influenza	7345	206	2.8	340	4.6	355	4.8
Total Influenza and Non-influenza	8939	269	3.0	449	5.0	448	5.0
Legionella Outbreak*	69	23	33.3	53	76.8	23	33.3

Source: Provincial Appendix D and E Database, 2005-06

Antiviral Use

In Ontario, antivirals have been used for the prophylaxis and treatment of influenza A since 1988. In January 2006 the Public Health Agency of Canada recommended that health care providers in Canada not prescribe amantadine to treat and prevent influenza during 2005/06 season. This recommendation followed testing showing that 91% of 47 influenza A/H3N2 isolates tested by National Microbiology Laboratory in Winnipeg were resistant to amantadine. Oseltamivir (Tamiflu®) was recommended for use as treatment and prophylaxis and zanamivir (Relenza®) as treatment for both influenza A and B outbreaks. Studies indicate that when used for treatment oseltamivir should be given within 48 hours of onset of symptoms for maximum benefit.

Patients/Residents

Of the 151 institutional influenza outbreaks, antiviral use in patients/residents was reported for 96 (93 used antivirals, 3 did not). Data on antiviral usage for the remaining 55 outbreaks were not available.

A total of 8,732 patients/residents were given antiviral medication as prophylaxis.

For treatment of influenza, 692 patients/residents were given antivirals within 48 hours of onset of symptoms; 154 patients/residents were given antivirals after 48 hours of onset of symptoms.

Oseltamivir was used as prophylaxis in all 93 outbreaks in which use of antivirals was reported. The average maximum length* of prophylaxis was 12.3 days (range 5-33). Oseltamivir was used as treatment in 91 influenza outbreaks; the average maximum

* For details of the legionella outbreak, please see the Toronto Public Health report "Legionellosis Outbreak – Descriptive Epidemiology", November 10, 2005.

* Since more than one case was on antivirals in each outbreak, the duration of antiviral use varied by case within each outbreak. Only the maximum of the range was entered into the database.

length* of treatment was 5.7 days (range 5-16). The recommended treatment duration for oseltamivir is five days.

Staff

Of the 151 influenza outbreaks, antiviral use in staff was reported for 93 (76 used antivirals, 17 did not). For the remaining 58 outbreaks data on antiviral usage for staff were not reported.

A total of 1,731 staff were prescribed antiviral medication for prophylaxis.

99 staff were prescribed antivirals for treatment, of these, 93 staff took antivirals within 48 hours of onset of symptoms; 6 staff took antivirals after 48 hours of onset of symptoms.

72 of 76 institutions that reported using antivirals for staff, used oseltamivir for prophylaxis. The average maximum length* of prophylaxis was 12.7 days (range 5-30). Oseltamivir was used for treatment for staff in 24 influenza outbreaks; the average maximum length* of treatment was 6.6 days (range 5-19).

Due to insufficient data it was not possible to assess the effectiveness of antiviral usage during the outbreaks.

Vaccination Rates in LTCHs and Hospitals (All facilities)

Under the "Influenza Prevention and Surveillance Protocol for Ontario Long-Term Care Facilities" released by the MOHLTC in November 1999 and the "Influenza Surveillance Protocol for Public Hospitals" issued by the Ontario Hospital Association in July 2000, influenza vaccine coverage rates as of November 15 of each year for residents and staff of LTCHs and staff of public hospitals are to be reported to the local medical officer of health by December 1st of each year. The rates are then reported to the province by the health unit.

Residents

Resident immunization data were available for 491 (81.7%) of 601 LTCHs in Ontario. The median vaccination coverage rate among residents was 95.1% (range 43.7% - 100%). In 2004/05, the median rate was 95.0% with a range of 56.5-100%.

Staff

Staff immunization data were available for 492 (81.9%) of 601 LTCHs in Ontario. The median vaccination coverage rate among staff was 55.6% (range 19.2% – 97.9%). In 2004/05, median coverage was 82.8% (range 23.3% - 100%).

Immunization data were also available for 155 (68.6%) of 226 hospital sites in Ontario. The median vaccination coverage rate among staff was 55.6% (range 19.2% - 97.9%). In 2004/05, median staff coverage was 52.9% (range 19.9% - 96.3%)

LTCH Influenza Outbreak Policies

Of the 151 influenza outbreaks, there was sufficient data from 96 outbreaks to determine facility immunization policy. Ninety-three of the 96 facilities indicated that they had a policy requiring staff influenza immunization. Ninety-four facilities offered influenza vaccine to staff on-site during the 2004/05 season, of which 49 (52.1%) facilities offered the vaccine on-site after onset of the outbreak.

A total of 57 facilities reported they excluded staff from work during an influenza outbreak because staff were not immunized and not receiving antiviral medication. In 52 of 57 (91.2%) influenza outbreaks, staff were excluded in accordance with institutional policy. In two influenza outbreaks, an order issued by the local medical officer of health under section 22 of the HPPA was used to exclude staff from work.

4. Influenza Activity Level Reporting

Every week, influenza activity was assessed and reported by the medical officer of health of each health unit to the PHD. The data were then mapped and published in the *Ontario Influenza Bulletin*. Suggested indicators for determining local influenza activity included the following: community (e.g. day care facility) outbreaks, institutional (e.g. long-term care homes) outbreaks and results from local virology laboratories.

For reporting purposes, influenza activity is defined as the level of influenza-like illness (ILI) prevalent in the local community. ILI is defined by acute onset of respiratory illness with fever and cough and with one or more of the following - sore throat, arthralgia, myalgia, or prostration which could be due to influenza virus. In children under five, gastrointestinal symptoms may also be present. In patients under five or 65 and older, fever may not be prominent.

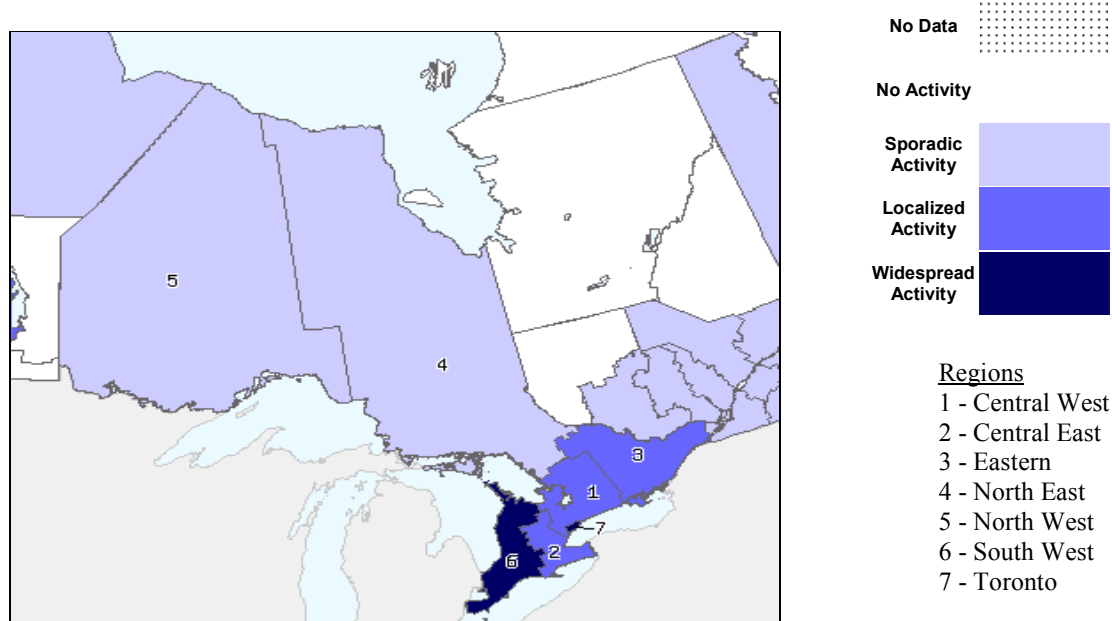
Influenza activity was categorized into one of the following four levels:

- “*No Activity*”, i.e. no laboratory-confirmed influenza detections during the past four weeks, however, sporadically occurring ILI may be reported
- “*Sporadic Activity*”, i.e. sporadically occurring ILI and lab confirmed influenza with NO outbreaks detected within the influenza surveillance region
- “*Localized Activity*”, i.e. sporadically occurring ILI and lab confirmed influenza together with outbreaks of ILI in schools and worksites or laboratory confirmed influenza in residential institutions occurring in less than 50% of the influenza surveillance region(s)
- “*Widespread Activity*”, i.e. sporadically occurring ILI and lab confirmed influenza together with outbreaks of ILI in schools and worksites or laboratory confirmed influenza in residential institutions occurring in greater than or equal to 50% of the influenza surveillance region(s).

Influenza activity in Ontario was sporadic through the months of November and December 2005, but started to increase in early January 2006. It was mostly localized throughout the

province in the months of January through March, and widespread only in South-West region during weeks 5 (January 29-February 4), and 9-10 (February 26-March 11), and in Toronto during weeks 10-20 (March 5-May 20) (Figure 14). In May influenza activity returned to sporadic and no activity levels.

Figure 14. Highest Influenza Activity Level in Ontario, Week 10, March 5-11, 2006



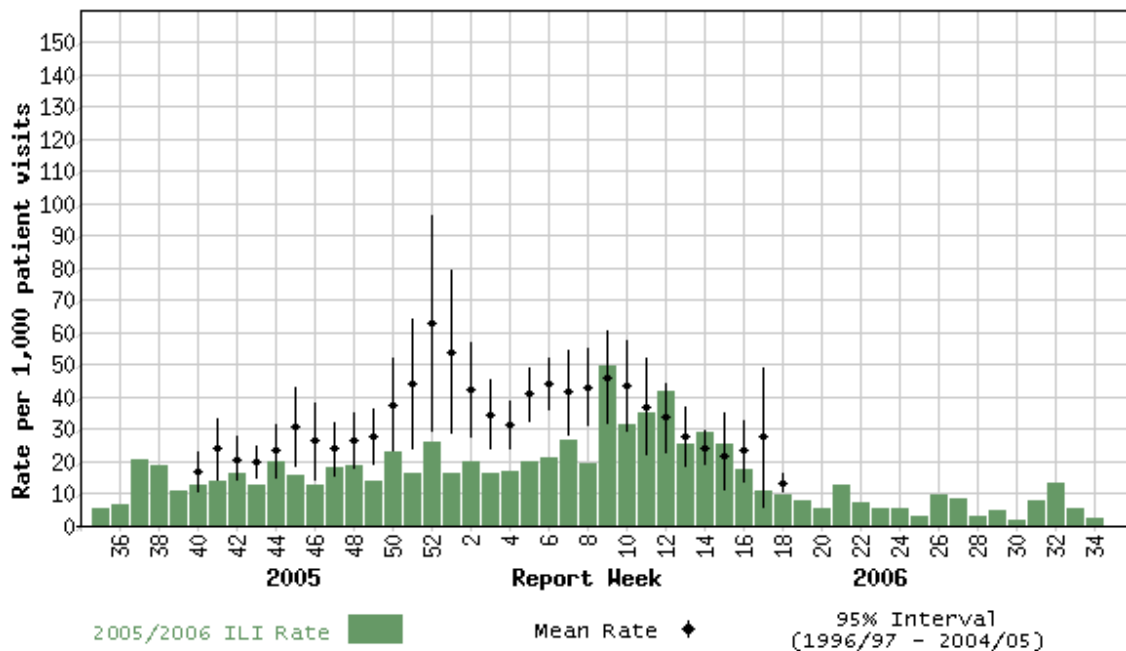
Source: FluWatch Canada

5. Public Health Agency of Canada / College of Family Physicians of Canada (CFPC) *FluWatch* Program

Sentinel physician data were collected, collated and disseminated through the national *FluWatch* program. The College of Family Physicians of Canada (CFPC) recruited 252 physicians by census divisions across Canada (72 in Ontario) for the *FluWatch* program. Sentinel physicians were asked to report the number of consultations for influenza-like-illness (ILI) per age group for one day each week, and the total number of patient visits per age group for the same day.

Over the surveillance period (September 1, 2005 to August 31, 2006), the rates of consultations to sentinel physicians for ILI ranged from 5 to 50 visits of ILI per 1000 patients seen (Figure 15). Higher levels of ILI consultation corresponded with increases in the number of influenza cases and respiratory infection outbreaks reported by health units.

Figure 15. Influenza-like illness (ILI) reporting rates, Canada, by report week, 2005-2006 compared to 1996/97 through 2004/2005 seasons



Source: FluWatch Canada

Summary

Based on the results from all of the data sources used for influenza surveillance in Ontario, influenza activity in the 2005/06 season was much lower than in the 2004/05 season. This decrease was attributable mostly to influenza A, while influenza B activity was similar to that of the previous season.

The proportions of positive influenza isolates in Ontario in the 2005/06 season, as well as the ratio of influenza A to influenza B, were comparable to the rest of Canada.

The proportions of positive isolates of non-influenza respiratory viruses (RSV, PIV, and adenovirus) in Ontario were similar to those in the previous surveillance season and to the rest of Canada.

The peak activity of influenza in Ontario occurred in March 2006, when the maximum number of confirmed influenza cases and the maximum number of institutional influenza outbreaks were reported by health units. The peak of non-influenza respiratory infection outbreaks in institutions was in January 2006.

All five components of influenza surveillance were used to assess respiratory infection activity in the province. Information on the number of positive influenza isolates received from CIDPC was comparable to the information on the number of confirmed influenza cases reported through iPHIS. Similarly, levels of ILI consultations at sentinel physicians

corresponded with the number of influenza cases and respiratory infection outbreaks reported by health units.

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Prepared by:

Yelena Katsaga, MHSc candidate
Community Health and Epidemiology Program
University of Toronto

Anne-Luise Winter, RN, BScN, MHSc, CIC
Nurse Epidemiologist
Infectious Disease Branch, Public Health Division
Ministry of Health and Long-Term Care

Michael Whelan, MSc
Epidemiologist
Infectious Diseases Surveillance Section, Infectious Diseases Branch
Public Health Division
Ministry of Health and Long-Term Care

Karen Hay, MSc
Surveillance Lead
Infectious Diseases Surveillance Section, Infectious Diseases Branch
Public Health Division
Ministry of Health and Long-Term Care

Contact

Anne-Luise Winter, RN, BScN, MHSc, CIC
Nurse Epidemiologist and Infection Control Consultant
Infectious Disease Branch, Public Health Division
Ministry of Health and Long-Term Care
Email: Anne-Luise.Winter@moh.gov.on.ca