2006/07 Influenza and Respiratory Infection Outbreak Surveillance Report

January 2009

Ministry of Health and Long-Term Care

Public Health Division

Ontario

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Acknowledgements:

The authors would like to acknowledge the assistance of the following: Peter Zabchuk (retired) and Brian Winchester of Centre for Immunization and Respiratory Infectious Diseases (CIRID), Public Health Agency of Canada (PHAC); and all of Ontario's public health units for their participation in the provincial influenza and respiratory infection outbreak surveillance program.

Ministry of Health and Long-Term Care

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2006/07 Influenza and Respiratory Infection Outbreak Surveillance Report

Report on the 2006/07 Influenza and Respiratory Infection Outbreak Surveillance Season in Ontario

Introduction

Background

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

"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.

Objectives

The objectives of Ontario influenza and respiratory institutional infection outbreak surveillance program during the 2006/07 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 onset, duration, end 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.

2006/07 was the seventh 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 selected chronic health conditions if significant enough to require regular medical follow-up or hospital care. These high-risk conditions include the following:

    - cardiac or pulmonary disorders (including bronchopulmonary dysplasia, cystic fibrosis, and asthma)
    - diabetes mellitus and other metabolic diseases
    - cancer, immunodeficiency, immunosuppression (due to underlying disease and/or therapy)
    - renal disease
    - anemia or hemoglobinopathy
    - conditions that compromises the management of respiratory secretions and are associated with an increased risk of aspiration
    - children and adolescents with conditions treated for long periods with acetylsalicylic acid

- People of any age who are residents of nursing homes and other chronic care facilities.
- People ≥ 65 years of age
- Healthy children aged 6 to 23 months

Methods

The PHD of the MOHLTC used various data sources to track influenza activity in Ontario. The five components of influenza surveillance for the 2006/07 season included the following:

- Laboratory surveillance, conducted by PHAC's Centre for Immunization and Respiratory Infectious Diseases (CIRID) in conjunction with the National Microbiology Laboratory;
- iPHIS reports of confirmed influenza cases from health units across Ontario;
- iPHIS 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 components, data regarding influenza immunization rates for residents and staff of Long-Term Care Homes (LTCHs) and hospital staff are included in this report.

Data Summary

There were a total of 908 confirmed institutional respiratory infection outbreaks reported during the 2006/07 surveillance season (September 1, 2006 – August 31, 2007), of which 185 (20.4 %)

were attributed to influenza. Influenza A was determined to be the causative organism in 181 (19.9%) of these respiratory infection outbreaks, influenza B in 4 (0.4%). Causative organisms other than influenza were detected in 226 (24.8%) outbreaks. The causative organism was unknown for 498 (54.9%) of the institutional respiratory infection outbreaks.

During the 2006/07 influenza and respiratory infection outbreak surveillance season, the Centre for Immunization and Respiratory Infectious Diseases (CIRID) of the Public Health Agency of Canada (PHAC) reported that 2,720 (8.7%) isolates from Ontario's participating laboratories tested positive for influenza, of which 2,658 (97.7%) were influenza A and 62 (2.3%) were influenza B. These figures represented a 17.4% increase and 0.1% decrease in the percentage[1] of positive influenza isolates as compared to 2005/06 season, when a total of 2,317 (8.6%) positive specimens were reported: 1,258 (54.3%) influenza A and 1,059 (45.7%) influenza B.

Between September 1, 2006 and August 31, 2007, a total of 2,920 confirmed influenza cases were reported to the Ministry of Health and Long-Term Care (MOHLTC) by Health Units through the integrated Public Health Information System (iPHIS). This was a 22.1% increase in influenza cases reported as compared to the 2,391 cases of confirmed influenza reported during the previous season2. Of the 2,920 cases reported in iPHIS, 2,870 (98.3%) were influenza A and 50 (1.7%) were influenza B3. Peak influenza activity in Ontario with respect to influenza case reports occurred in February, 2007, with a total of 1,105 confirmed cases for which a type (ie. A vs B) was reported. Of these, 1,103 (99.8%) were influenza A.

[1] 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 incidence of the virus.
[2] This 22.1% increase in the number of confirmed influenza cases reported through iPHIS is comparable to the 17.4% increase in the number of positive influenza isolates in the province reported by CIRID.
[3] This is also comparable to the 97.7% influenza A and 2.3% influenza B positive tests reported by CIRID for Ontario

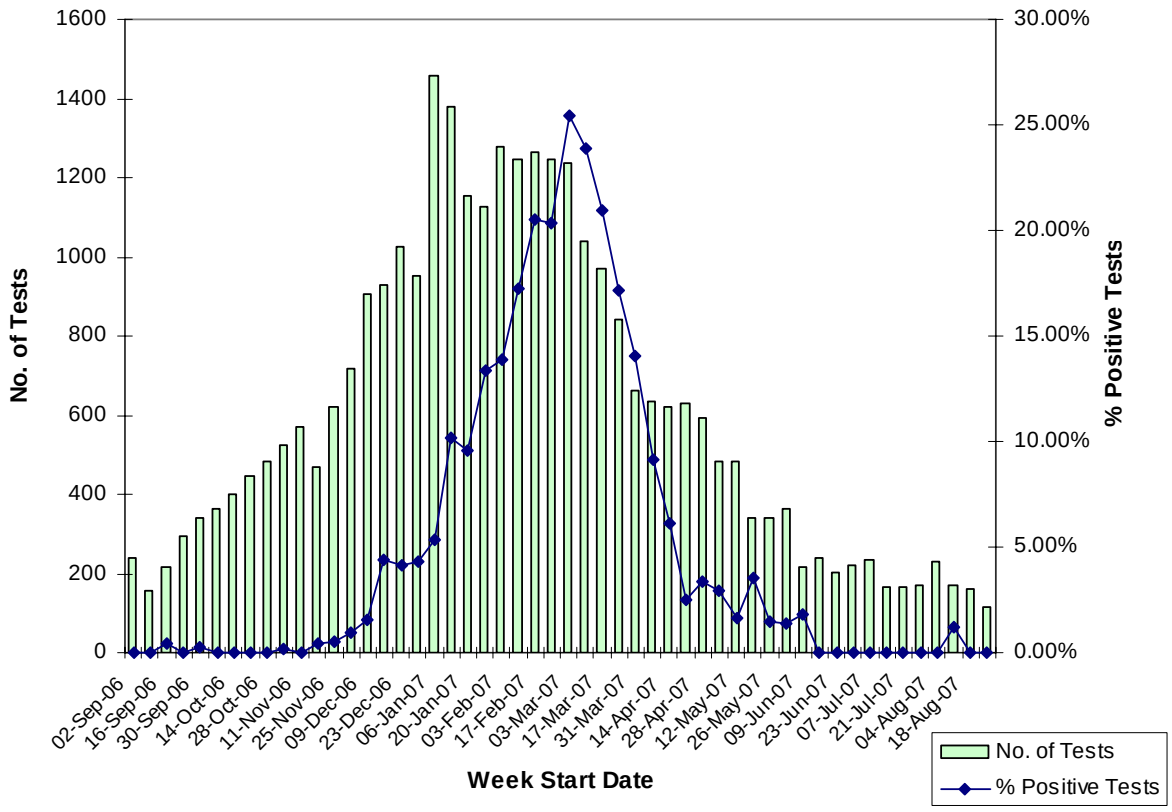
Laboratory Surveillance of Influenza and Other Respiratory Viruses

The laboratory surveillance component involved the reporting of positive influenza and other respiratory virus isolates from select Ontario laboratories to CIRID. Reports included results from outbreak-associated and sporadic cases of respiratory infection. These data are then reported weekly to the PHD. During the 2006/07 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 November to the end of April and biweekly during the rest of the year.

Influenza, Ontario

During the 2006/07 Ontario influenza season, influenza activity began in early November, 2006, and peaked in early February, 2007. Ontario's participating laboratories reported to PHAC that a total of 31,321 specimens were tested between August 27, 2006 and August 25, 2007 (the period most closely corresponding to the respiratory infection outbreak surveillance season in Ontario). Of these, 2,720(8.7%) tested positive for influenza (2,658 influenza A, and 62 influenza B) (Figure 1). This represented a 111.3% increase in positive influenza A isolates and a 94.2% decrease in positive influenza B isolates, compared to the previous season's 1,258 and 1,059 positive influenza A and B isolates respectively. However, the proportions of positive influenza isolates in Ontario were comparable to the rest of Canada both in this and previous seasons (Table 1) and represented a 0.1% increase in positive tests compared to 2005/06 season, when 8.6% of all specimens tested positive for influenza.

Figure 1. Proportion of isolates testing positive for influenza, by week, Ontario, 2006-07



Source: Centre for Immunization and Respiratory Infectious diseases

Table 1. Laboratory testing and confirmation of influenza in Ontario and Canada, 2004-05, 2005-06 and 2006-07

	Ontario			Canada (excluding Ontario)		
Season	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)	8.6 (4.7/3.9)	60,329	5,105 (3,269/1,836)	8.5 (5.4/3.1)
2006/07	31,321	2,720 (2,658/62)	8.7 (8.5/0.2)	69,543	5,413 (4,458/955)	7.8 (6.4/1.4)

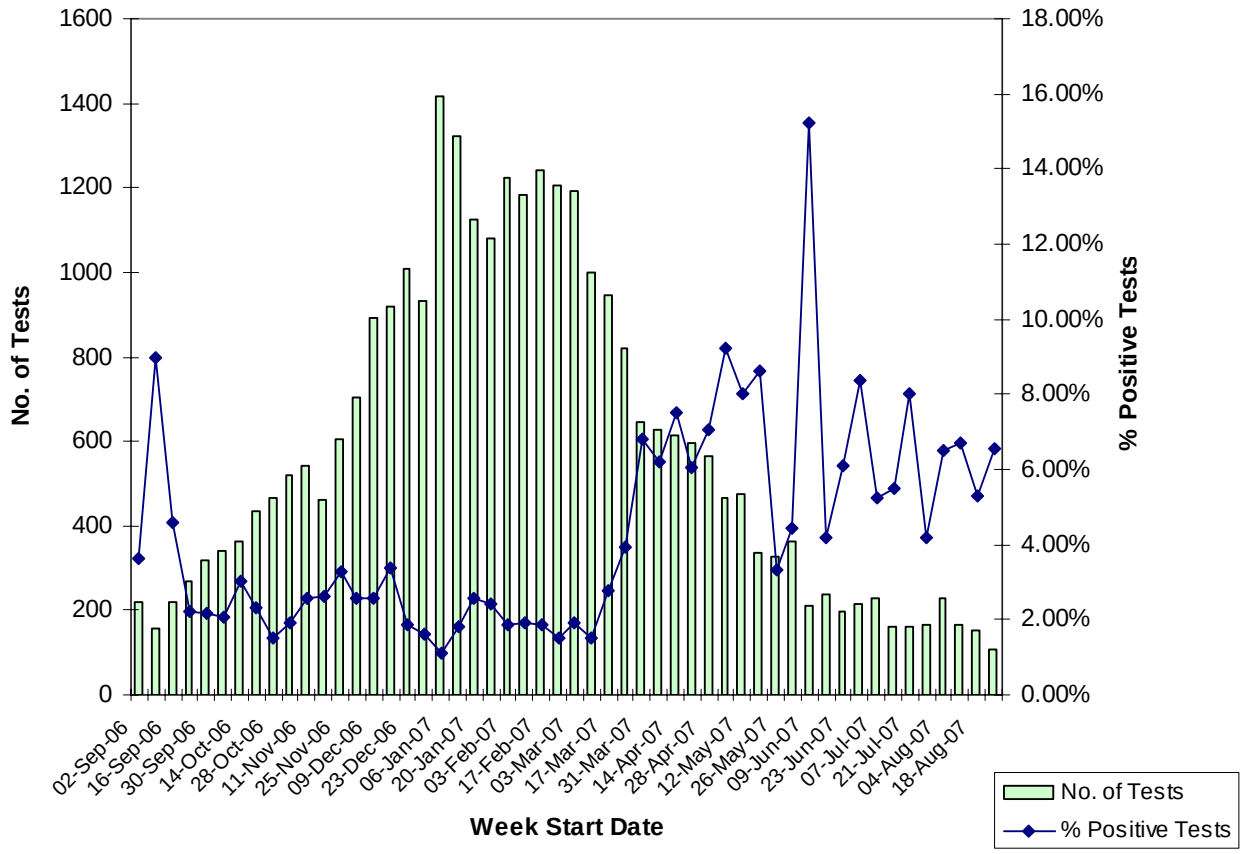
* The numbers in brackets show breakdown between influenza A and influenza B respectively

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 30,384 tests for PIV were performed between August 27, 2006 and August 25, 2007, of which 1,019 (3.4%) were positive (Figure 2).

Figure 2. Proportion of isolates testing positive for parainfluenza, by week, Ontario, 2006-07



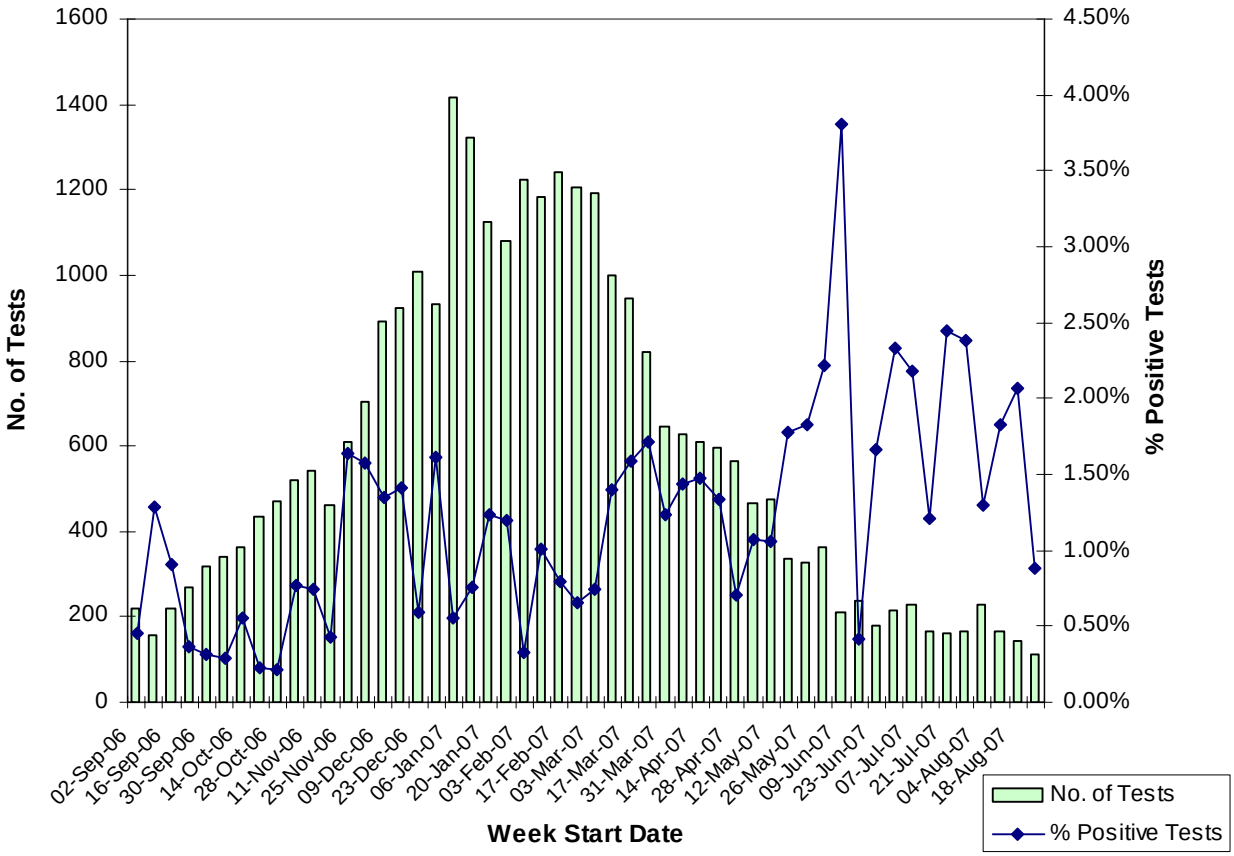
Source: Centre for Immunization and Respiratory Infectious diseases

A total of 30,384 tests for adenovirus were performed between August 27, 2006 and August 25, 2007, of which 330 (1.1%) were positive (Figure 3).

A total of 32,010 tests for RSV were performed during the same time period, of which 3,171 (9.9%) were positive (Figure 4).

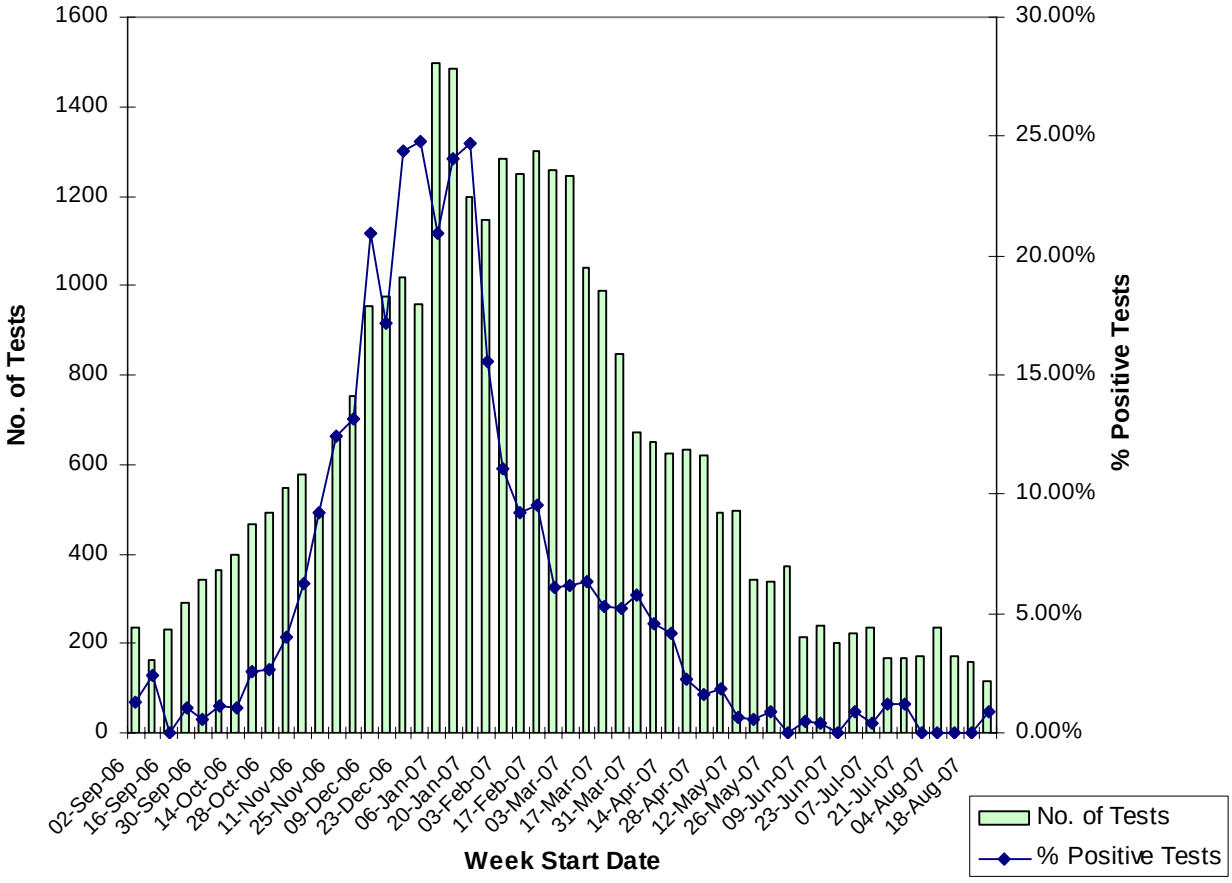
Compared to the 2005-06 season, there was a 73.3% increase in the number and 3.3% increase in the percentage of positive RSV isolates; a 12.1% increase in the number and no increase in the percentage of positive PIV isolates; a 58.7% increase in the number and 0.3% increase in the percentage of positive adenovirus isolates (figures 5 and 6).

Figure 3. Proportion of isolates testing positive for adenovirus, by week, Ontario, 2006-07



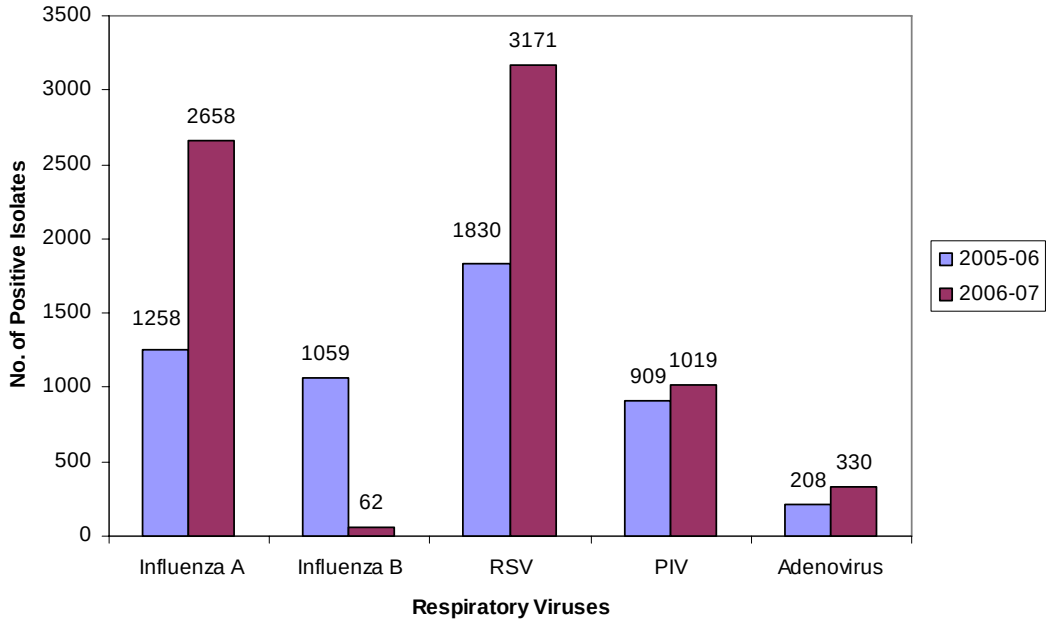
Source: Centre for Immunization and Respiratory Infectious diseases

Figure 4. Proportion of isolates testing positive for respiratory syncytial virus, by week, Ontario, 2006-07



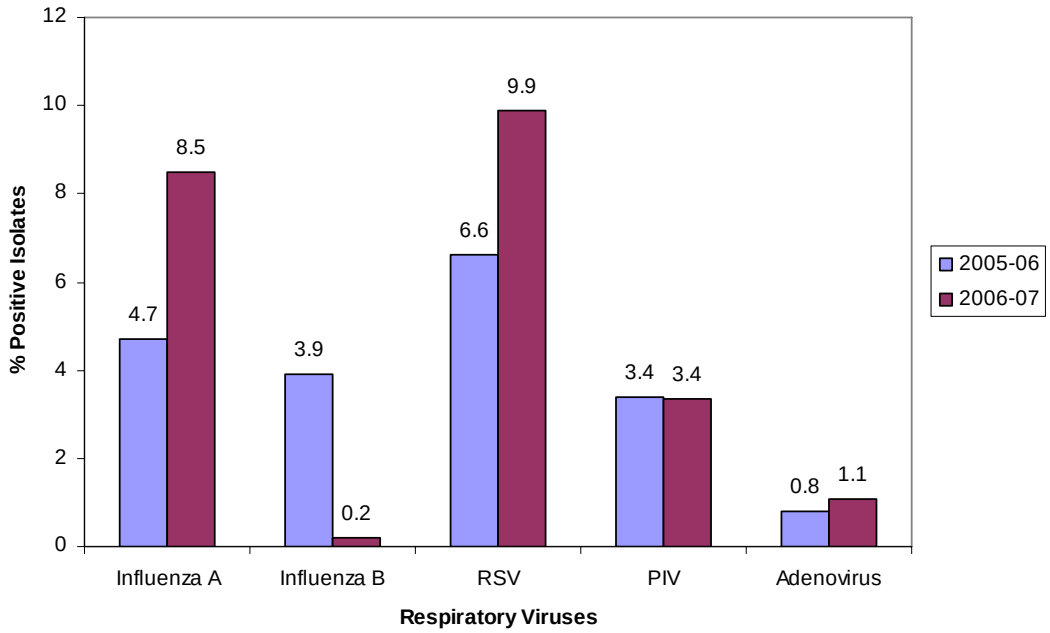
Source: Centre for Immunization and Respiratory Infectious diseases

Figure 5. Number of isolates testing positive for select respiratory viruses, Ontario, 2005-06 and 2006-07



Source: Centre for Immunization and Respiratory Infectious diseases

Figure 6. Proportion of isolates testing positive for select respiratory viruses, Ontario, 2005-06 and 2006-07



Source: Centre for Immunization and Respiratory Infectious diseases

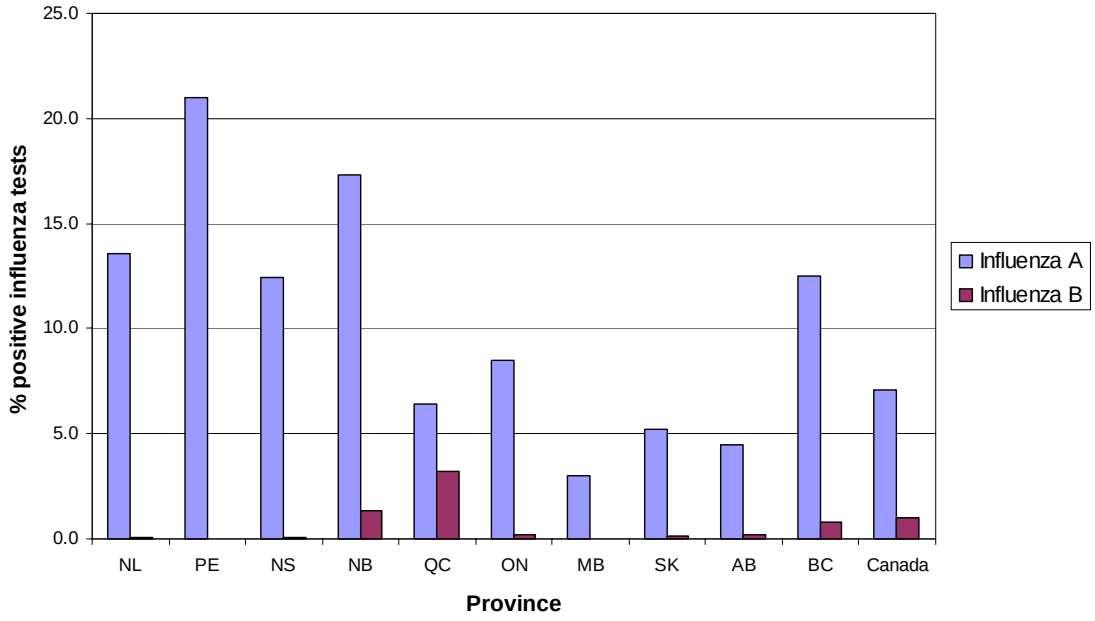
Influenza, Canada

During the 2006/07 surveillance season, the Centre for Immunization and Respiratory Infectious Diseases (CIDPC) reported that 8,133 (8.1%) isolates in Canada tested positive for influenza: 7,116 (87.5%) tested positive for influenza A and 1,017 (12.5%) for influenza B. These figures represented a 9.6% increase in the total number and 0.4% increase in the percentage of positive influenza isolates as compared to Canada's 2005/06 season, when a total of 7,422 specimens testing positive were reported. These figures also represented a 57.2% increase in the number and a 26.5% increase in the percentage of positive influenza A isolates. However, the number and percentage of positive influenza B isolates decreased 64.9% and 26.5% respectively.

The highest percentage of positive influenza A isolates was in Prince Edward Island (21.0%) and the highest percentage of positive influenza B isolates was in Quebec (3.2%) (Figure 7).

The highest rate of positive influenza A tests per 100,000 population was in New Brunswick (38.8/100,000 population), while the lowest rate was in Manitoba (6.4/100,000 population). For influenza B, the highest rate of positive tests was in Quebec (10.8/100,000 population). No specimens tested positive for influenza B in Prince Edward Island and Manitoba (Table 2). In Ontario, the rate of positive influenza A tests was 20.8/100,000 and the rate of positive tests for influenza B was 0.5/100,000.

Figure 7. Proportion of isolates testing positive for influenza, Canada, 2006-07



Source: Centre for Immunization and Respiratory Infectious diseases

Table 2. Laboratory surveillance of influenza, by province, Canada, 2006/07

	NL	PE	NS	NB	QC	ON	MB	SK	AB	BC
Population 2007	506,300	138,600	934,100	749,800	7,700,800	12,803,900	1,186,700	996,900	3,474,000	4,380,300
# of isolates tested	1,241	138	1,000	1,681	26,162	31,321	2,520	5,987	25,909	4,905
# pos. tests influenza A	168	29	124	291	1,679	2,658	76	311	1,167	613
Rate / 100,000	33.2	20.9	13.3	38.8	21.8	20.8	6.4	31.2	33.6	14.0
% positive influenza A	13.5	21.0	12.4	17.3	6.4	8.5	3.0	5.2	4.5	12.5
# pos. tests influenza B	1	0	1	22	835	62	0	7	49	40
Rate / 100,000	0.2	0.0	0.1	2.9	10.8	0.5	0.0	0.7	1.4	0.9
% positive influenza B	0.1	0.0	0.1	1.3	3.2	0.2	0.0	0.1	0.2	0.8

Source: Centre for Immunization and Respiratory Infectious diseases 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 2006/07 surveillance season, the CIDPC reported 2,696 (3.4% of isolates tested) laboratory-confirmed PIV isolates in Canada, 1,400 (1.9% of isolates tested) laboratory-confirmed adenovirus isolates, and 10,401 (11.5% of isolates tested) laboratory-confirmed RSV isolates. Compared to 2005/06 surveillance season, this represented a 8.4% decrease in the number and 0.6% decrease in the percentage of positive PIV, a 13.3% decrease in the number and 0.5% decrease in the percentage of positive adenovirus, and 77.7% increase in the number and 4.4% increase in the percentage of positive RSV isolates.

Composition of the 2006/07 Influenza Vaccine in Canada

The influenza vaccine for the 2006/07 season was developed based on antigenic characteristics of current and emerging influenza virus strains. The trivalent influenza vaccine developed for the 2006/07 season included the following: an A/New Caledonia/20/1999 (H1N1)-like strain, an A/Wisconsin/67/2005 (H3N2)-like strain, and a B/Malaysia/2506/2004-like strain.

Influenza Strains Circulating in Canada

The predominant circulating influenza A strain in Canada during the 2006/07 surveillance season was A/Wisconsin/67/2005 (H3N2)-like (62% of all strain-characterized isolates), which is similar to the influenza A/(H3N2) component of the 2006/07 influenza vaccine. Additional circulating strains included A/New Caledonia/20/1999 (H1N1)-like (26%), B/Shanghai/361/2002-like (11%), and B/Malaysia/2506/2004-like (1%).

During the 2006/07 season, the National Microbiology Laboratory (NML) at Public Health Agency of Canada sub-typed and strain-characterized 904 influenza A and 119 influenza B isolates.

Of the 904 influenza A isolates, 628 (69.5%) were A/Wisconsin/67/2005 (H3N2)-like, and 276 (30.5%) were A/New Caledonia/20/ 1999(H1N1)-like. Of the 119 influenza B isolates, 107 (89.9%) were B/Shanghai/361/2002-like and 12 (10.1%) were B/Malaysia/2506/ 2004-like (Table 3).

Table 3. Influenza A & B strains circulating in Canada 2004/05 to 2006/07 seasons

Season	Main Circulating Strains	Season's Vaccine Strains
2006/07	A/New Caledonia/20/1999 (H1N1)-like A/Wisconsin/67/2005 (H3N2)-like B/Shanghai/361/2002-like B/Malaysia/2506/2004-like	A/New Caledonia/20/1999 (H1N1)-like A/Wisconsin/67/2005 (H3N2)-like B/Malaysia/2506/2004-like
2005/06	A/California/7/2004 (H3N2)-like A/New Caledonia/20/1999 (H1N1)-like A/Wisconsin/67/2005 (H3N2)-like B/Malaysia/2506/2004-like B/Hong Kong/330/2001-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/Fujian/411/2002 (H3N2)-like A//New Caledonia/20/1999 (H1N1)-like B/Shanghai/361/02

Source: National Microbiology Lab (NML), Centre for Immunization and Respiratory Infectious Diseases (CIRID), 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.

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 and 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

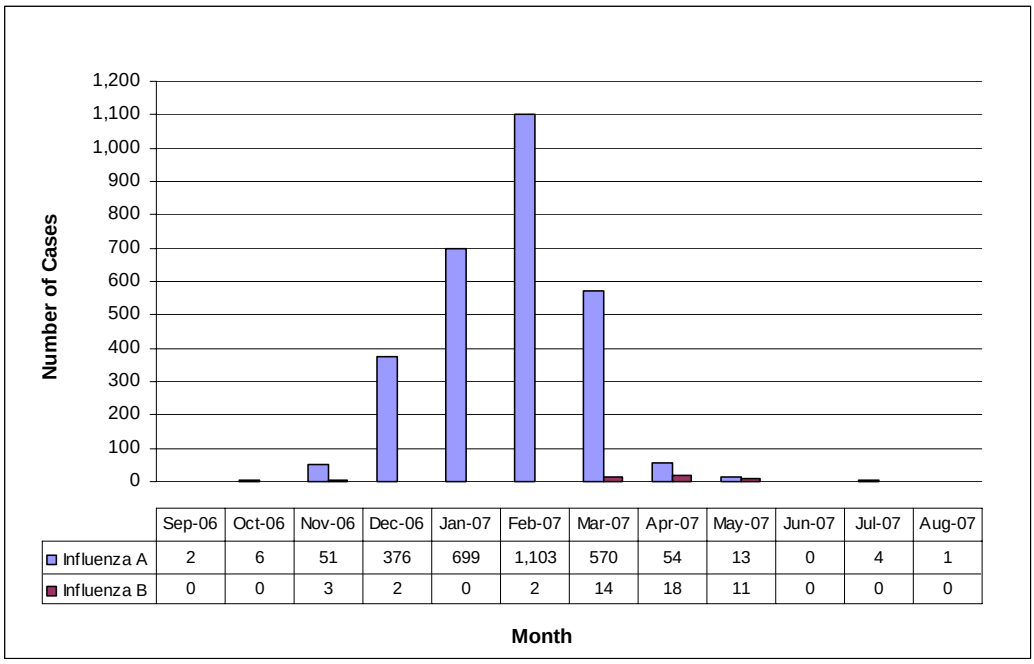
- epidemiologic link to laboratory-confirmed case

iPHIS Results

Between September 1, 2006 and August 31, 2007, a total of 2,920 confirmed influenza cases were reported through iPHIS. This was a 22.1% increase in reported influenza cases as compared to the 2,391 cases of influenza reported through iPHIS during the previous season. Of these 2,920 cases, 2,870 (98.3%) were influenza A, 50 (1.7%) were influenza B. Peak activity occurred in February, with a total of 1,105 confirmed cases reported. Of these, 1,103 (99.8%) were influenza A and 2 (0.2%) were influenza B (Figure 8).

The number of influenza cases per 100,000 population was highest in the North East region of the province at 34.25/100,000. The South West region demonstrated the lowest regional rate at 16.27/100,000 population (Figure 9).

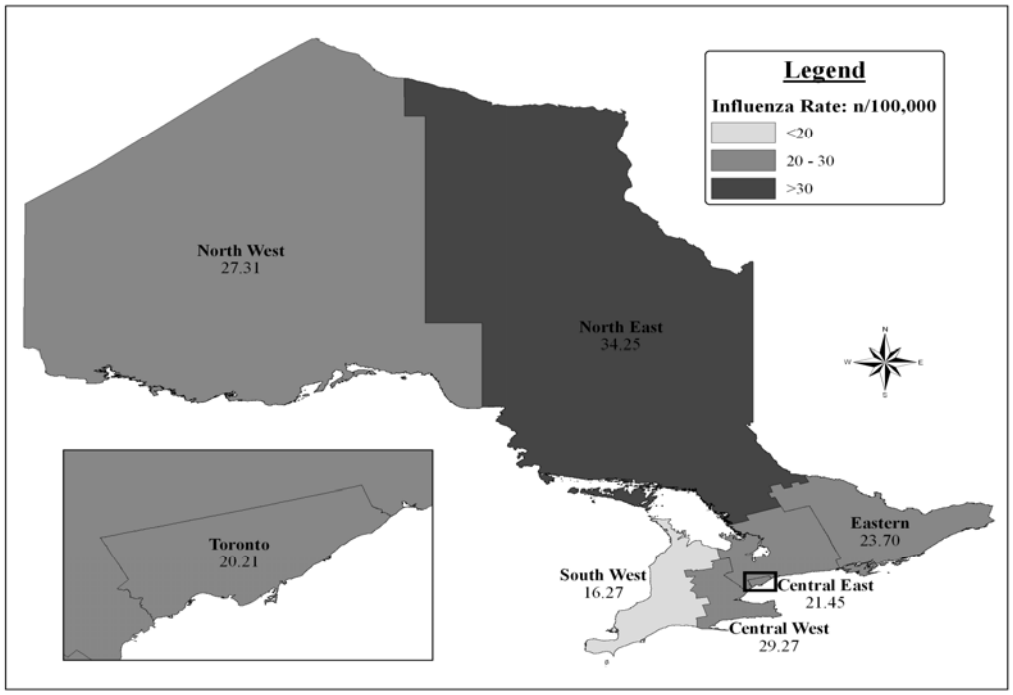
Figure 8. Total number of confirmed influenza A and influenza B cases, by episode date, Ontario, 2006-07



	Sep-06	Oct-06	Nov-06	Dec-06	Jan-07	Feb-07	Mar-07	Apr-07	May-07	Jun-07	Jul-07	Aug-07
Influenza A	2	6	51	376	699	1,103	570	54	13	0	4	1
Influenza B	0	0	3	2	0	2	14	18	11	0	0	0

Source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [20/03/2008]

Figure 9. Rate of influenza per 100,000 population, by region in Ontario, 2006-07



Source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [20/03/2008]
Source for population: Provincial Health Planning Data Base (PHPDB), extracted [17/03/2008]

Among Health Units, Haliburton-Kawartha-Pine Ridge District had the highest rate of influenza (79.84/100,000 population), and Windsor-Essex County the lowest (8.88/100,000 population) (Table 4).

Table 4. Confirmed influenza cases by health unit and region, Ontario, 2006-07

	Health Unit	Number of influenza cases (A&B)	Population 2006	Rate/100,000 [4]
North West	Northwestern	49	80592	60.80
	Thunder Bay	16	157445	10.16
	TOTAL NORTH WEST	65	238037	27.31
North East	Algoma	23	119913	19.18
	North Bay Parry Sound	75	125861	59.59
	Porcupine	49	88415	55.42
	Sudbury	37	197326	18.75
	Timiskaming	10	34920	28.64
	TOTAL NORTH EAST	194	566435	34.25
Eastern	City Of Ottawa	186	840095	22.14
	Eastern Ontario	37	199491	18.55
	Hastings-Prince Edward	28	163175	17.16
	KFLA	106	188608	56.20
	Leeds, Grenville and Lanark	26	170497	15.25
	Renfrew	11	100298	10.97
	TOTAL EASTERN	394	1662164	23.70
Central East	Durham Region	87	585560	14.86
	HKPR	140	175355	79.84
	Peel Region	200	1260643	15.86
	Peterborough	97	133928	72.43
	Simcoe-Muskoka	138	491102	28.10
	York Region	109	947482	11.50
	TOTAL CENTRAL EAST	771	3594070	21.45
Toronto	Toronto	532	2631725	20.21
	TOTAL TORONTO	532	2631725	20.21
South West	Chatham-Kent	11	110039	10.00
	Elgin-St. Thomas	11	88811	12.39

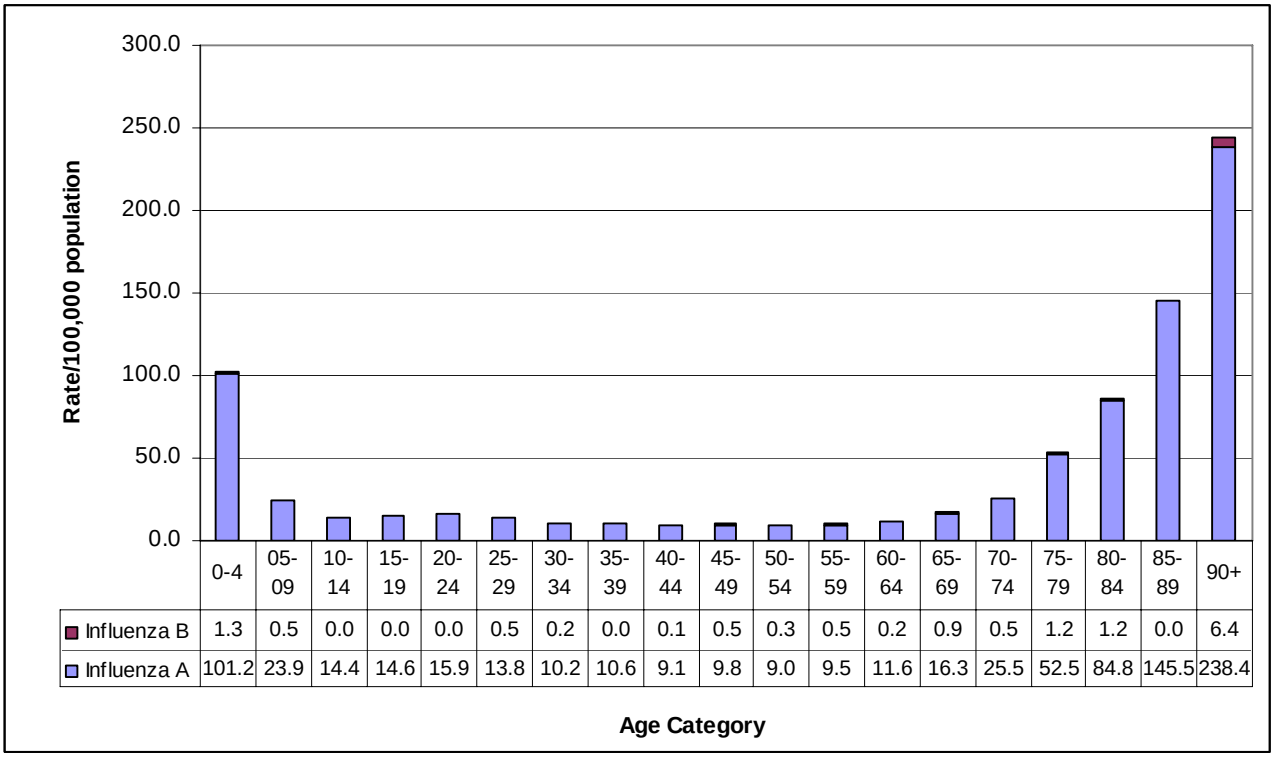
[4] Age standardized rates were calculated for some health units. However, because the differences between crude and age-standardized rates were very small, crude rates are reported here.

	Grey Bruce	46	161328	28.51
	Huron	32	61446	52.08
	Health Unit	**Number of influenza cases (A&B)**	**Population 2006**	**Rate/100,00 ** **
	Lambton	13	132340	9.82
	Middlesex-London	49	436166	11.23
	Oxford	19	106800	17.79
	Perth	40	77169	51.83
	Windsor-Essex	36	405254	8.88
	TOTAL SOUTH WEST	257	1579353	16.27
Central West	Brant	21	136663	15.37
	City Of Hamilton	255	519067	49.13
	Haldimand-Norfolk	23	111093	20.70
	Halton	113	456560	24.75
	Niagara	84	435125	19.30
	Waterloo	124	491635	25.22
	Wellington-Dufferin-Guelph	87	265025	32.83
	TOTAL CENTRAL WEST	707	2415168	29.27
TOTAL		2,920	12,686,952	23.02

Source for population: Provincial Health Planning Data Base (PHPDB), extracted [17/03/2008]
Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [20/03/2008]

Age distribution of influenza cases showed that the highest proportion of cases were among children less than four years of age. Among adults, those ≥ 65 years of age had the highest rate of influenza. Most cases occurred in those aged ≥ 65 years (Figure 10).

Figure 10. Confirmed Influenza Rates per 100,000 population, by Age Groups Ontario, 2006-07



	0-4	05-09	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90+
Influenza B	1.3	0.5	0.0	0.0	0.0	0.5	0.2	0.0	0.1	0.5	0.3	0.5	0.2	0.9	0.5	1.2	1.2	0.0	6.4
Influenza A	101.2	23.9	14.4	14.6	15.9	13.8	10.2	10.6	9.1	9.8	9.0	9.5	11.6	16.3	25.5	52.5	84.8	145.5	238.4

Source for population: Provincial Health Planning Data Base (PHPDB), extracted [17/03/2008]
Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [20/03/2008]

Respiratory Infection Outbreaks in Institutions

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), complex continuing care (CCC), psychiatric hospitals under the Public Hospital Act, 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)

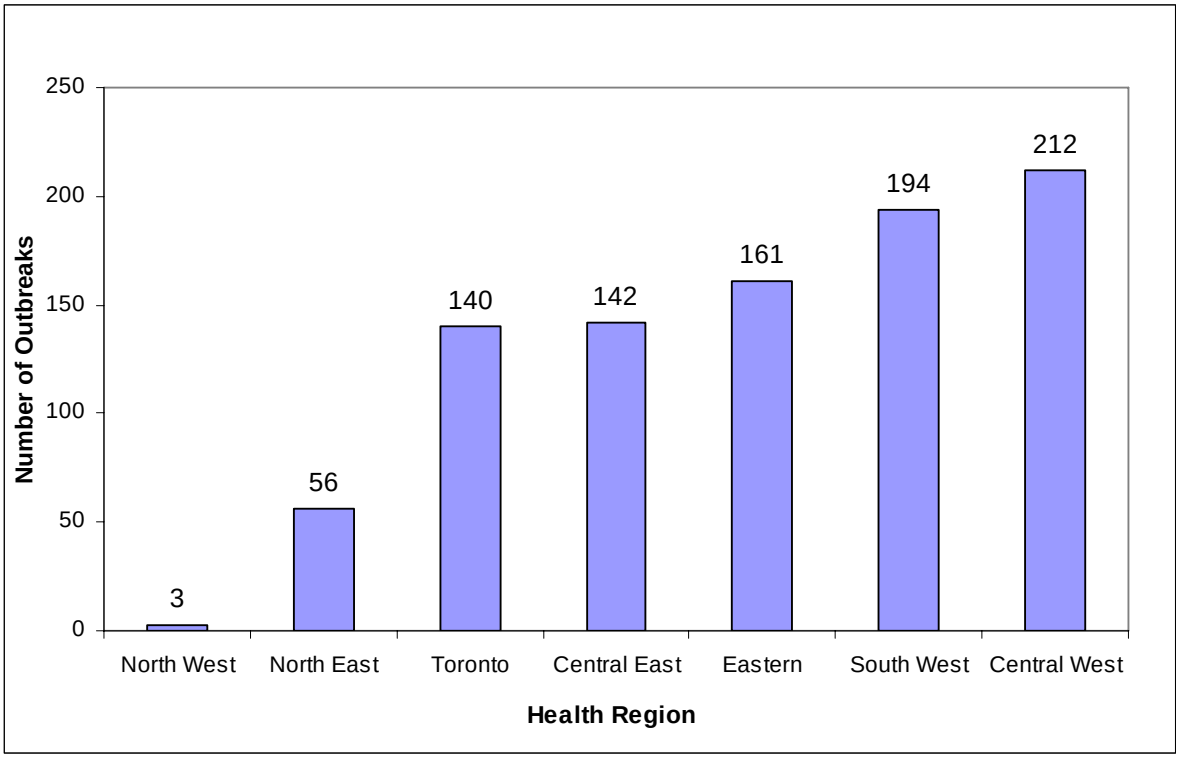
- Two or more cases of nosocomially-acquired influenza-like illness occurring within 48 hours on a specific hospital unit, with at least one laboratory confirmed as influenza.

Results

There were 908 confirmed institutional respiratory infection outbreaks reported to the PHD during the 2006/07 surveillance season (September 1, 2006 – August 31, 2007), of which 185 (20.4%) were attributed to influenza. This represented a 14.7% increase in the total number of institutional respiratory infection outbreaks when compared to 792 confirmed institutional respiratory infection outbreaks during the 2005/06 surveillance season. In addition, this represented a 22.5% increase in the number of influenza outbreaks and a 12.8% increase in the number of non-influenza outbreaks, when compared to the previous season's 151 influenza and 641 non-influenza outbreaks.

The number of institutional respiratory outbreaks reported by health regions ranged from three reported by the North West region to 212 reported by the Central West region (Figure 11)

Figure 11. Number of institutional respiratory infection outbreaks by health region, Ontario, 2006-07



Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [16/11/2007]

The number of outbreaks reported by health units ranged from none reported by Algoma and Northwestern health units to 140 reported by Toronto.

Causative Organisms

Of the 908 reported respiratory infection outbreaks, 185 (20.4%) were laboratory-confirmed influenza. Influenza A was determined to be the causative organism in 181 (19.9%) outbreaks, influenza B in 4 (0.4%). A number of non-influenza organisms were identified in 225 outbreaks. The causative organism was unknown for 498 (54.9%) institutional respiratory infection outbreaks (Table 5).

Table 5. Number of outbreaks, by causative organism, Ontario, 2006-07

Causative Organisms	# of Outbreaks	% of Total Outbreaks
Influenza A	181	19.9
Influenza B	4	0.4
TOTAL Influenza (A&B) Outbreaks	185	20.3
PIV	64	7.1
RSV	93	10.2
Enterovirus or Rhinovirus	67	7.4
Others/multiple others	1	0.1
Unknown	498	54.9
TOTAL Non-influenza Outbreaks	723	79.7
ALL OUTBREAKS	**908**	**100.0**

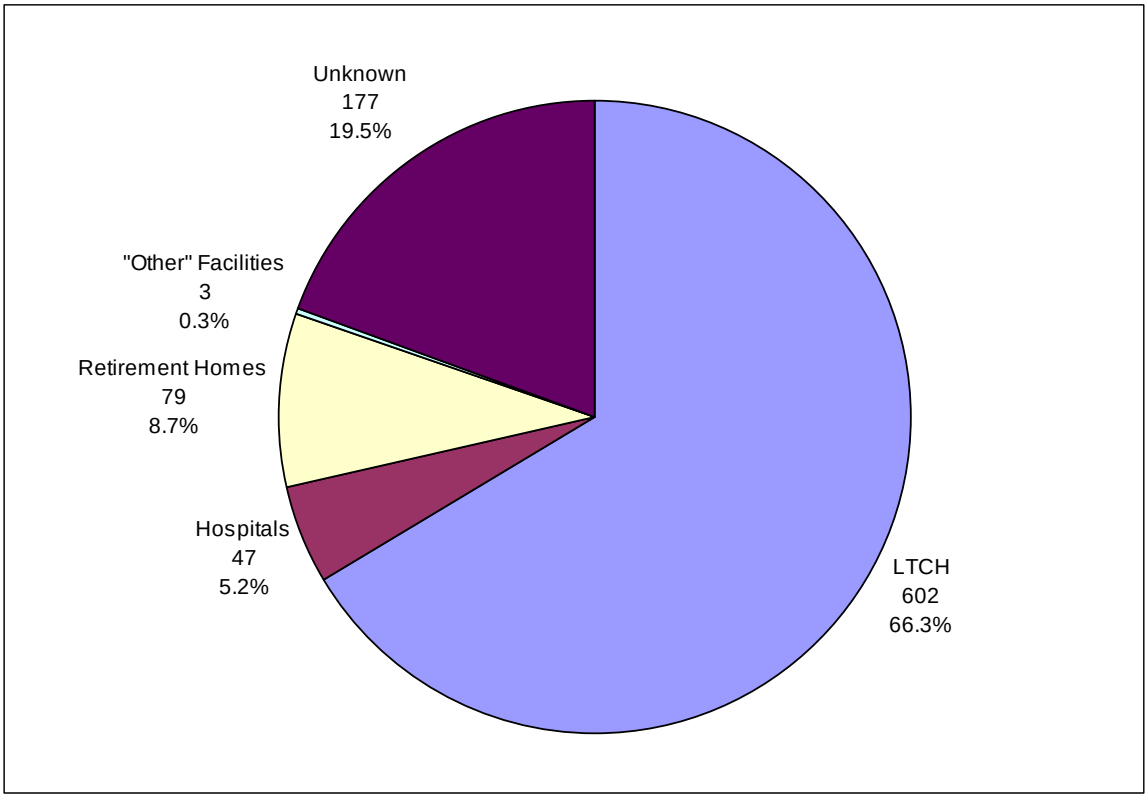
Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [16/11/2007]

Institution Type

Of the total number of respiratory infection outbreaks in institutions, 602 (66.3%) occurred in LTCHs, 47 (5.2%) in hospitals, 79 (8.7%) in retirement homes and three (0.3%) were in “other” facilities. One hundred and seventy-seven (19.5%) of all outbreaks were in unknown settings where the health unit reported the setting type as “unknown” or did not record the exposure setting in iPHIS.(Figure 12).

Of the 47 respiratory infection outbreaks that occurred in hospitals, 12 (25.5%) occurred in acute care hospitals, 22 (46.8%) were in complex continuing care, 12 (25.5%) were in psychiatric hospitals, and one in a hospital not listed under the public hospital act (Table 6).

Figure 12. Respiratory infection outbreaks by institution type, Ontario, 2006-07



Source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [16/11/2007]

Table 6. Number of respiratory infection outbreaks, by type of hospital, Ontario, 2006-07

Type of Hospital	# of Outbreaks	% of Hospital Outbreaks (n=47)
Acute Care	12	25.5
Chronic Care	22	46.8
Psychiatric (Under Public Hospital Act)	12	25.5
Other Hospital (Not Under Public Hospital Act)	1	2.1
TOTAL	**47**	**100**

Source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [16/11/2007]

Of the 602 outbreaks that occurred in LTCHs 499 (82.9%) were in nursing homes, 84 (14.0%) were in Public homes for the aged and 19 (3.2%) in Charitable homes for the aged (Table 7).

Table 7. Number of respiratory infection outbreaks, by type of LTCH, Ontario, 2006-07

Type of LTCH	# of Outbreaks	% of LTCH Outbreaks (n=665)
Nursing Home	499	82.9
Public Home for the Aged	84	14.0
Charitable Home for the Aged	19	3.2
TOTAL	602	100

Source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [16/11/2007]

Influenza Outbreaks

A total of 185 institutional influenza infection outbreaks were reported. Of all the influenza outbreaks, 19 (10.2%) occurred in hospitals, 112 (60.6%) were in LTCHs, 21 (11.4%) were in retirement homes, 2 (0.5%) in other facilities. Thirty-one (16.8%) of the influenza outbreaks were in unknown settings where the health unit recorded the setting type as "unknown" or did not record the exposure setting in iPHIS (Table 8).

Table 8. Number of influenza outbreaks, by type of institution, Ontario, 2006-07

Type of Institution	# of Outbreaks	% of Total # of Influenza Outbreaks (n=185)
Acute Care	10	5.4
Chronic Care	3	1.6
Psychiatric	6	3.2
TOTAL HOSPITALS	19	10.2
Nursing Home	86	46.5
Home for the Aged	26	14.1
TOTAL LTCHs	112	60.6
Retirement Homes	21	11.4
Other Facilities (do not fall in listed categories)	2	0.5
TOTAL RETIREMENT HOMES AND OTHERS	23	11.9
TOTAL UNKNOWN	31	16.8
TOTAL INFLUENZA OUTBREAKS	**185**	**100**

Source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [16/11/2007]

Respiratory Infection Outbreaks Other Than Influenza

A total of 723 institutional outbreaks were attributed to non-influenza organisms. Twenty-eight (3.9%) occurred in hospitals, 490 (67.8%) in LTCHs, 57 (7.9%) in retirement homes, two (0.3%) in "other" facilities, and 146 (20.2%) were in unknown settings where the health unit recorded the setting type as "unknown" or did not record the exposure setting in iPHIS(Table 9).

Table 9. Number of outbreaks caused by non-influenza organisms, by type of institution, Ontario, 2006-07

Type of Hospital	# of Outbreaks	% of Total # of Non-influenza Outbreaks (n=640)
Acute Care	2	0.3
Chronic Care	19	2.6
Psychiatric	6	0.8
Other	1	0.1
TOTAL HOSPITALS	28	3.8
Public Home for the Aged	64	8.9
Nursing Home	413	57.1
Charitable Home for the Aged	13	1.8
TOTAL LTCHs	490	67.8
Retirement Homes	58	7.9
Other Facilities (do not fall in listed categories)	1	0.3
TOTAL RETIREMENT HOMES AND OTHERS	59	8.2
TOTAL UNKNOWN	146	20.2
TOTAL NON-INFLUENZA OUTBREAKS	**723**	**100**

Source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [16/11/2007]

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=867; 95.5% of all outbreaks) was 18 days (range 5-71 days). The median duration of outbreaks caused by influenza A was 16 days (range 8-49 days) (Table 10). This is comparable to results from 2005/06 when the median duration for all respiratory infection outbreaks was 17 days; for influenza A the median durations was 16 days. There was an insufficient number of institutional outbreaks to determine the median duration in days for influenza B outbreaks for the 2006/07 surveillance season.

The median duration of respiratory infection outbreaks caused by non-influenza organisms was 21 days for PIV, 23 days for RSV, and 19 days for all other organisms. The median duration for outbreaks in which the causative organisms was unknown was 17 days (range 5-52 days) (Table 10).

Table 10. Median duration of outbreaks by causative organism, Ontario, 2006-07

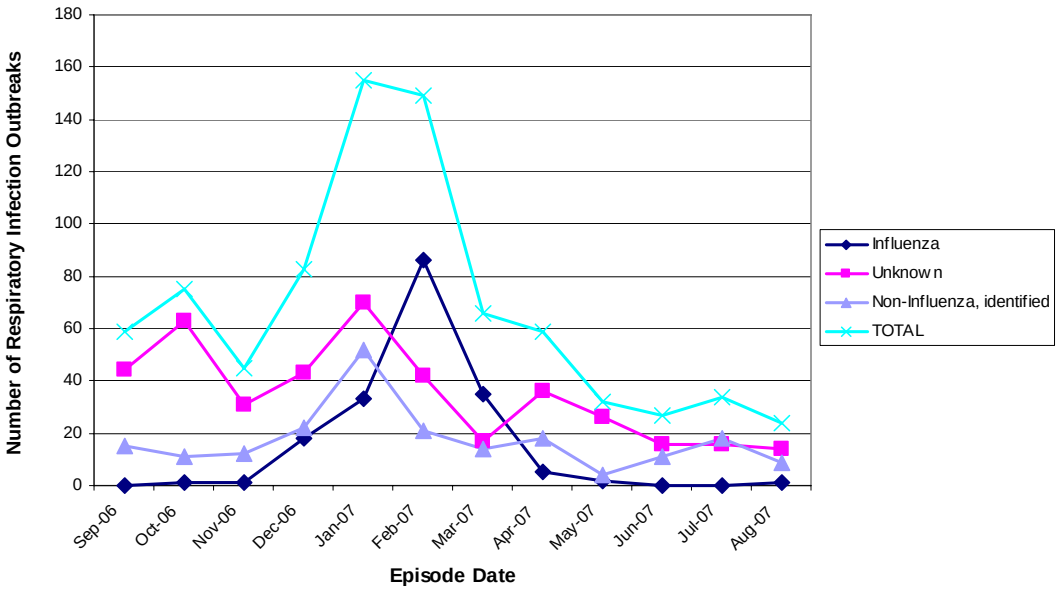
Causative Organism	Median duration (days)	Range (days)
All types of organisms	18	5-71
Influenza A	16	8-49
PIV	21	10-71
Other organisms (Enterovirus, Rhinovirus, other)	19.5	7-58
RSV	23	9-67
Causative organism unknown	17	5-52

Source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [16/11/2008]

Occurrence of Respiratory Infection Outbreaks, including influenza

Peak activity for all institutional respiratory infection outbreaks occurred from January to February, with a total of 83 outbreaks in December, 155 in January, and 149 in February. Only 33 (21.3%) out of 155 outbreaks that occurred in January were due to influenza. In February, influenza outbreaks comprised over half of all reported outbreaks (86 out of 149 (57.7%)) (Figure 13), i.e., peak activity for influenza outbreaks in institutions was in February.

Figure 13. Number of institutional respiratory infection outbreaks by causative agent and month, Ontario, 2006-07



Source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [16/11/2007]

Attack Rates for Institutional Respiratory Infection Outbreaks, Residents

During the 2006/07 surveillance season, the median institutional attack rate for residents in all respiratory infection outbreaks in LTCHs was 16.7% (range 1.2% - 100.0%). This rate represents outbreaks for which sufficient numerator and denominator data were available for analysis (n=487)[1]. This represents 80.9% of the total number of LTCHs, which had institutional respiratory infection outbreaks.

The median attack rate among residents for influenza infection outbreaks in LTCHs was 14.6% (range 1.8% - 64.3%)[2]. Sufficient numerator and denominator data was available for 99.1% of the total number of influenza infection outbreaks in LTCHs (n=111)[2].

For non-influenza outbreaks in LTCHs, adequate numerator and denominator data were available for 77.1% of the total number of non-influenza infection outbreaks in LTCHs (n=378). The median attack rate was 18.1% (range 1.2% - 100.0%)[2].

In the 2005/06 season, the median institutional attack rate for residents in all respiratory infection outbreaks in LTCHs was 9.3%. Among residents for influenza infection outbreaks in LTCHs, the median attack rate was 8.1%. Finally, for non-influenza outbreaks in LTCHs, the median attack rate was 10.1%. The attack rates for the 2006/07 surveillance season represent approximately a 7-8% increase when compared to the median attack rates for the 2005/06 season.

[1]Source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [29/04/2008]

[2]Source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [23/04/2008]

Complications and Mortality for Respiratory Infection Outbreaks

During the 2006/07 surveillance season, a total of 296 deaths among resident and patient cases were reported from respiratory infection outbreaks in institutions. The majority of these deaths occurred in LTCHs, with a total of 223 (75.3%) deaths. Facilities for which health units did not report an exposure setting or reported as "unknown" facilities had a total of 57 (19.3%) deaths. Given that the majority of reported respiratory infection outbreaks occurred in LTCHs, it is most likely that LTCHs represent the majority of exposure settings for these outbreaks. The remainder of these deaths occurred in hospitals, with 9 (3.0%) deaths and retirement homes, with 7 (2.4%) deaths. "Other" facilities did not report any deaths for the 2006/07 season. The mean case fatality rate for all institutions that reported outbreaks was 2.4%. The case fatality rate for hospitals, LTCHs, retirement homes, and "unknown" facilities were 1.6%, 2.0%, 0.8%, and 2.0% 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 370 out of total 8,289 resident cases, a case hospitalization rate of 4.5%.

A total of 3 out of 3,525 staff cases were hospitalized as a consequence of respiratory infection outbreaks resulting in a staff hospitalization rate of 0.1%.

510 of all cases developed radiologically-confirmed pneumonia as a result of respiratory infection outbreaks. 490 of them were among residents/patients, resulting in a case-pneumonia rate of 4.0% and 20 among the staff, with a case-pneumonia rate of 0.6%.

Among LTCHs, a total of 355 resident cases developed pneumonia. The case pneumonia rate was 4.3% (355/8289) among resident cases in LTCHs (Table 12).

During the 2005/06 surveillance season, a total of 282 deaths and 522 resident cases developed radiologically-confirmed pneumonia. As well, 449 hospitalizations occurred among LTCH resident cases as a result of respiratory infection outbreaks. This year's data represented a 5.0% increase in the number of deaths attributed to institutional respiratory infection outbreaks, a 6.1% decrease in the number of radiologically-confirmed pneumonia, and a 17.6% decrease in the number of resident cases hospitalized. The increase in the total number of cases to 2029 and 14 deaths in the 2006/07 season may be explained by the 14.7% increase in the number of respiratory infection outbreaks compared to the previous year. Case-fatality and case-hospitalization rates were comparable between the two years, while case-pneumonia rates were slightly lower in the 2006/07 season (Table 11).

Table 11. Complication rates for institutional respiratory infection outbreaks in residents/patients, 2005/06 and 2006/07*

Season	Total No. of resident/patient cases	No. of deaths	**Case-fatality rate**	No. of cases with pneumonia	**Case-pneumonia rate**	Total No. of resident cases	No. of hospitalizations among LTCH resident cases	**Resident-Case-hospitalization rate among LTCH residents**
2005-06	10,105	282	**2.8%**	522	**5.2%**	8,939	449	**5.0%**
2006-07	12,134	296	**2.4%**	490	**4.0%**	8,289	370	**4.5%**

Source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [15/04/2008]

Complications and Mortality among Patients/Residents, Influenza Outbreaks

There were a total of 80 deaths among 2,434 influenza cases in patients/residents, comprising 26.9% of the total number of deaths attributed to all respiratory infection outbreaks. The case-fatality rate was 3.3% for influenza outbreaks. There were 153 cases with x-ray confirmed pneumonia due to influenza outbreaks (31.2% of the total pneumonia cases from all respiratory infection outbreaks). The case-pneumonia rate was 6.3%.

LTCHs represented the majority of institutions reporting complications as a result of influenza outbreaks. Of the 80 deaths that occurred as a result of influenza outbreaks, 65 (81.3%) occurred in LTCHs, with a case-fatality rate of 3.8%, four deaths (5.0%) in hospitals, three in retirement homes (3.8%) and eight (10.0%) in facilities, for which health units did not report the setting type or reported the facility as "unknown". Of the 153 resident cases with x-ray confirmed cases of pneumonia, 112 (73.2%) occurred in LTCHs, with a case-pneumonia rate of 6.6%.

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

Institutions reporting non-influenza outbreaks noted 216 patient/resident deaths (73.0% of the total number of deaths in all respiratory infection outbreaks), and 337 cases with x-ray confirmed pneumonia. This represents 68.8% of the total number of cases who developed pneumonia in all respiratory infection outbreaks.

Of the 216 deaths attributed to non-influenza outbreaks, 158 (73.2%) occurred in LTCHs.

Table 12 . Summary of complications and mortality in LTCH residents, related to respiratory infection outbreaks, Ontario, 2006/07

Type of outbreak	No. of cases	No. of deaths	Case-fatality rate (%)	No. of resident cases hospitalized	Case-hospitalization rate (%)	No. of resident cases with pneumonia	Case-pneumonia rate (%)
Influenza	2241	75	3.4	160	7.1	139	6.2
Non-influenza[1] (includes 'unknown')	8914	205	2.3	355	4.0	321	3.6
Total Influenza and Non-influenza	**8289**	**217**	**2.6**	**370**	**4.5**	**355**	**4.3**

Source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [15/04/2008]

[1]Includes 'unknown' outbreaks in which the causative agent was not reported

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 antivirals should be given within 48 hours of symptom onset for maximum benefit.

Patients/Residents

Of the 185 institutional influenza outbreaks, antiviral use in patients/residents was reported for 93.

A total of 13,654 patients/residents were given antiviral medication as prophylaxis.

For treatment of influenza, 1062 patients/residents were given antivirals within 48 hours of onset of symptoms; 401 patients/residents were given antivirals after 48 hours of onset of symptoms.

Oseltamivir was used for treatment in all 98 outbreaks in which use of antivirals was reported. The average length of treatment among residents was 5.5 days (range 3-14). The recommended treatment duration for oseltamivir is five days.

Staff

Of the 185 influenza outbreaks, antiviral use in staff was reported for 20.

A total of 1,480 staff received antiviral medication for prophylaxis.

56 staff received antivirals for treatment, of these, 42 staff took antivirals within 48 hours of onset of symptoms; 14 staff took antivirals after 48 hours of onset of symptoms.

Among the data reported for Oseltamivir use for treatment for staff in influenza outbreaks; The average maximum length of treatment of Oseltamivir for staff related to staff exclusion policies was 6.9 days (range 5-14).

Institutional Influenza Outbreak Policies

Exclusion policy information was available for 63 of the 185 influenza outbreaks. Exclusion policies are used to exclude staff from work during an influenza outbreak if they were not immunized with the influenza vaccine or refused to take an influenza antiviral.

The median number of staff excluded from influenza outbreaks was 3 (range 1-70).

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 but is not limited to 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 week, however, sporadically occurring ILI may be reported

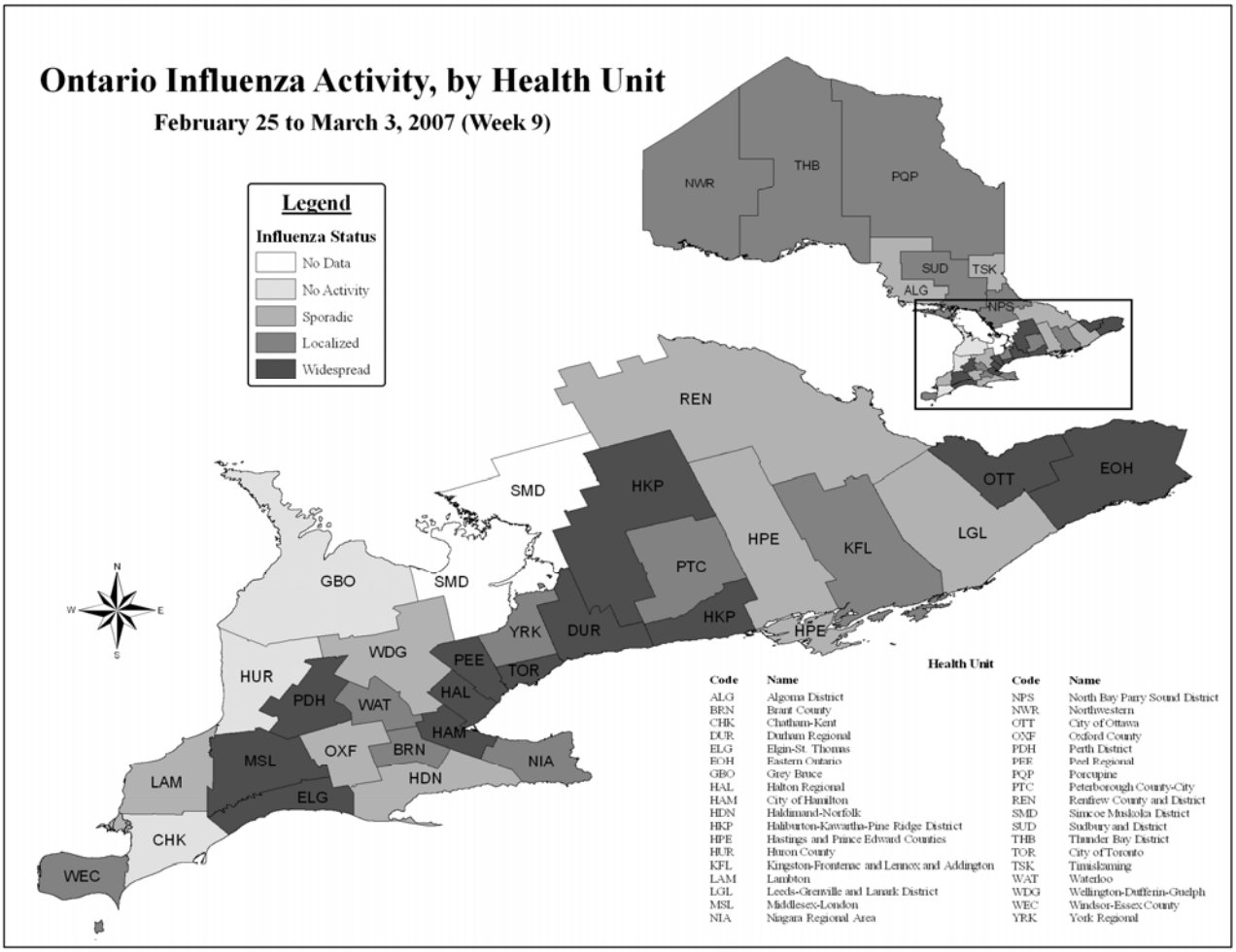
- "*Sporadic Activity*" , i.e. sporadically occurring ILI and lab-confirmed influenza with NO outbreaks detected within the influenza surveillance region

- "*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 mostly "sporadic" through the months of October and November 2006, but started to increase in early December 2006. Starting in January activity started to increase to "localized" and "widespread" in some regions throughout the province starting in January, and "widespread" only in Toronto during weeks 1-13 (January 6-March 25) and Central East region during week 9 (Figure 14). Influenza activity returned to sporadic and no activity levels in May.

Figure 14. Highest influenza activity level in Ontario, week 9, February 29-March 3, 2007



Source: Ontario Ministry of Health and Long-Term Care, Ontario Influenza Bulletin, [08/03/2007]

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, 2006 to August 31, 2007), the average 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 preceded institutional respiratory infection outbreaks reported by health units.

Figure 15. Influenza-like illness (ILI) consultation rates, Canada, by report week, 2006-2007 compared to 1996/97 through to 2005/06 seasons

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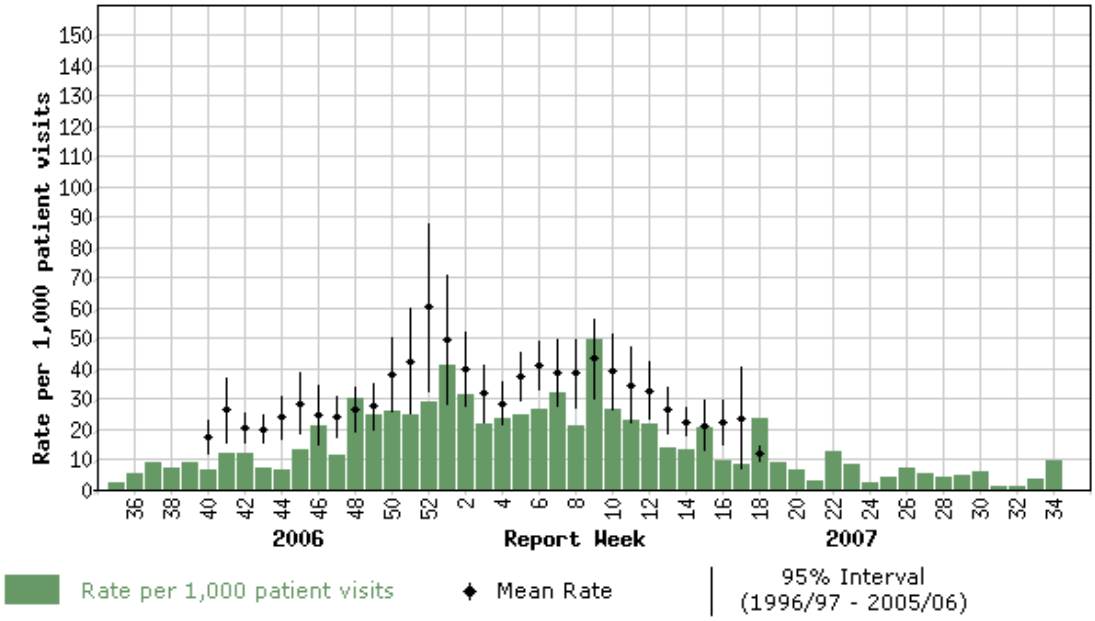

Source: FluWatch Canada

Immunization Rates in Long-Term Care Homes (LTCHs) and Hospitals

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 519 (85.9%) of 604 LTCHs in Ontario. The median vaccination coverage rate among residents was 95.3% (range 66% - 100%). In 2005/06, the median rate was 95.1% with a range of 43.7%-100%.

Staff

Staff immunization data were available for 519 (85.9%) of 604 LTCHs that reported data in Ontario. The median vaccination coverage rate among staff was 85.9% (range 16.7% – 100.0%). In 2005/06, median coverage was 83.2% (range 19.2% - 97.9%).
Immunization data were also available for 170 of 226 hospital sites in Ontario. The median vaccination coverage rate among staff was 56.7% (range1.8% - 100.0%). In 2005/06, median staff coverage was 55.6% (range 19.2% - 97.9%)

Summary

Based on the results from all of the data sources used for influenza surveillance in Ontario, influenza activity in the 2006/07 season was higher than during the 2005/06 season. This increase was attributable mostly to influenza A, while influenza B activity was lower than that of the previous season.

The proportions of positive influenza A isolates in Ontario increased significantly in the 2006/07 season. Additionally, the ratio of influenza A to influenza B isolates is higher than the rest of Canada. There are more positive influenza A isolates than influenza B isolates in Ontario for the 2006/07 season.

The proportions of positive isolates of non-influenza respiratory viruses (RSV, PIV, and adenovirus) in Ontario were similar or higher than those in the previous surveillance season and to the rest of Canada with the exception of RSV, which increased in the 2006/07 season.

The peak activity of influenza in Ontario occurred in February 2007, 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 2007.

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 CIRID was comparable to the information on the number of confirmed influenza cases reported through iPHIS. Similarly, activity levels for ILI consultations at sentinel physicians corresponded with the number of influenza cases and respiratory infection outbreaks reported by health units.