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INFLUENZA IN CANADA – 1997-1998 SEASON

Introduction

The Laboratory Centre for Disease Control (LCDC) maintains a national influenza surveillance program, FluWatch. The objective of FluWatch is to provide a national picture of influenza activity. This program has elements which include: 1) laboratory-based influenza virus identification; 2) reporting by laboratories, and provincial and territorial epidemiologists who collaborate by exchanging information on cases; 3) outbreaks; and 4) influenza-like illness (ILI) surveillance. In addition, international reporting on influenza activity by the World Health Organization and other national reporting programs is reviewed weekly and reported through FluWatch.

A number of mechanisms were used to disseminate information on influenza activity to public-health professionals and the public. Weekly summaries of laboratory surveillance data were made available via the LCDC *FAXlink* (dial 613-941-3900 from a telephone-equipped fax machine), fax, and electronic mail. Tabulated details of isolations by laboratories as well as graphic representation of reporting trends, by region, were included. Summaries of influenza activity worldwide and, in particular, in North America and Europe were included periodically in the weekly *News Brief* sent to chief medical officers of health, provincial and territorial epidemiologists, and laboratory directors. FluWatch reports, which included an assessment of laboratory data and ILI reporting, mapped the geographic distribution of ILI across Canada and summarized international influenza activity. The reports were available through *FAXlink*, fax, and the FluWatch Website <http://www.hc-sc.gc.ca/hpb/lcdc/bid/dsd/fluwatch/index.html>. Surveillance reports on influenza virus activity were published periodically in the *Canada Communicable Disease Report*.

National surveillance for ILI was initiated for the winter of 1995-1996, and became fully activated during the 1996-1997 influenza season. Prior to this, influenza surveillance relied on aggregate laboratory data submitted to LCDC from participating laboratories across the country; case-by-case data was also collected from about one-half of these laboratories. LCDC also received isolates for virus strain characterization. The ILI surveillance program was developed to enhance the existing influenza surveillance system by collecting consistent and timely national data. It is a collaborative project among the provinces and territories, the College of Family Physicians of Canada (CFPC), sentinel physician reporting programs in British Columbia, Newfoundland and the Calgary area, and LCDC.

This report summarizes case-by-case data on laboratory-confirmed influenza infection and reports of ILI for the 1997-1998 season. Comparison is made with the previous four seasons: 1993-1994, 1994-1995, 1995-1996, and 1996-1997[1-4].

Methods

Laboratory-confirmed influenza: Laboratories participating in the case-by-case surveillance program were asked to report the numbers of isolations and identifications made by direct antigen detection and seroconversion, i.e. ≥ fourfold rise in titre by any method, to LCDC. Laboratory-confirmed case-by-case data were presented by the province from which the specimen originated (some laboratories received out-of-province samples), and were analyzed by week of onset of illness and the age of the case.

Influenza-like illness reported by sentinel physicians: The CFPC's National Research System (NaReS) was responsible for much of the recruitment of sentinel physicians. The objective was to recruit at least one physician from each of the census divisions across Canada. The exception was in British Columbia and the

Calgary area where sentinel physicians were already involved in local surveillance programs. For one clinic day per week, between 22 October 1997 to 5 May 1998, physicians were asked to complete a report form with the number of patients seen and the number of patients meeting a standard definition for ILI. The case definition for ILI was *"acute febrile respiratory illness (fever and/or chills) characterized by one or more of the following: cough, sore throat, arthralgia, myalgia, or prostration which in the opinion of the attending physician could be due to influenza virus."* Both groups of patients were broken down by age category. Reports were either faxed, or the information was conveyed via electronic mail or telephone to LCDC on a weekly basis. LCDC would then collate the data and prepare a report which was distributed once every 2 weeks, or weekly when influenza activity was considered to be high, to participating physicians and provincial, territorial, federal, and international health authorities.

Results

Laboratory-confirmed influenza: During the 1997-1998 laboratory surveillance period (1 September 1997 to 31 August 1998), a total of 3,802 cases-by-case records were reported to LCDC by 15 laboratories in eight provinces (Table 1). This compared with 1,930 cases reported by 13 laboratories in seven provinces for the previous season (1996-1997). The variation in numbers of confirmed cases and distribution of virus type and subtype among provinces should be interpreted with caution; these numbers are likely to reflect differences in population size and distribution, reporting practices and criteria, and the availability of diagnostic services.

Table 2 shows laboratory-confirmed case-by-case data, by province and influenza type and subtype. The majority of isolates, 3,780 (99%), were of type A virus, only 22 (<1%), were of type B. These results represent a 300% increase in the reporting of laboratory-confirmed influenza A, and a decrease in influenza B virus infections when compared with the previous season[4]. Of the 3,780 influenza A virus identifications, 288 were further characterized; 280 were of the H3N2 subtype and eight were of the H1N1 subtype.

Figure 1 shows laboratory-confirmed case-by-case data, by type and week of onset, for five regions: Atlantic Canada, Quebec, Ontario, the Prairies, and British Columbia. Although early, confirmed cases were recorded in September and October in British Columbia, Manitoba, Ontario, and Quebec, these preceded any significant increases in reporting by 8 to14 weeks. Peak activity of influenza A virus started in Quebec in early January 1998 and showed a slight progression from east to west, and also into the Atlantic provinces. The largest number and proportion of cases were recorded in Ontario, 1,465 cases (39%); Quebec, 818 cases (22%); Alberta, 556 cases (15%); and British Columbia, 408 cases (11%) (Table 2). Marked peaks in influenza A reporting were evident in the Prairies, Ontario, and Quebec. There was very little reporting of influenza B virus infections for this time period.

Figure 2 shows the proportionate distribution of laboratory-confirmed case-by-case infections, by age group, reported to LCDC. During the 1997-1998 season most were recorded in persons aged ≥ 65 years (41%) and in children < 10 years of age (24%). This represents a noticeable change from the 1996-1997 season when 19% of cases were in the ≥ 65-year-old age group and 39% were in the < 10-year-old age group.

Table 1
Laboratory-confirmed cases of influenza reported to LCDC, by laboratory, Canada, 1997-1998

Province	Laboratory	No. of Cases
Newfoundland	Newfoundland Public Health Laboratory, St John's	1
Nova Scotia	Queen Elizabeth II Health Science Centre – Victoria General Site, Halifax	102
Quebec	Laboratoire de santé publique du Québec, Sainte-Anne-de-Bellevue	818
Ontario	Kingston Public Health Laboratory	149
	Central Public Health Laboratory, Toronto	1,221
	Hospital for Sick Children, Toronto	41
	The Toronto Hospital	16
	Women's College Hospital, Toronto	4
	Windsor Public Health Laboratory	35
Manitoba	Cadham Provincial Laboratory, Winnipeg	201
Saskatchewan	Department of Health, Regina	206
	Department of Health, Saskatoon	44
Alberta	Provincial Laboratory of Public Health for Northern Alberta, Edmonton	375
	Provincial Laboratory of Public Health for Southern Alberta, Calgary	181
British Columbia	Division of Laboratories, Health Branch, Vancouver	408
Total		**3,802**

Table 2
Laboratory-confirmed cases of influenza, by province and influenza type and subtype, Canada, 1997-1998

Influenza Type	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	Total
Type A Not subtyped	1		102		815	1,423	200	244	363	344	3,492
H1N1						7				1	8
H3N2						20	1	6	193	60	280
Total type A	**1**		**102**		**815**	**1,450**	**201**	**250**	**556**	**405**	**3,780**
Type B					3	15	1			3	22
Total	**1**		**102**		**818**	**1,465**	**202**	**250**	**556**	**408**	**3,802**

Laboratory confirmations: Virus isolation, 2,043 reports (54%), and direct antigen detection, 1,379 reports (36%), were the most commonly recorded methods for laboratory confirmation of case-by-case influenza infection. The remaining cases, 380 reports (10%) for which information was available, were confirmed by serology. This distribution is somewhat different to the previous season, 1996-1997, when 73% of confirmations were by virus isolation, 16% by direct antigen detection, and 11% by serology.

Types of influenza virus circulating during the 1997-1998 season: Figure 3 shows the temporal distribution, by week of onset, of virus identifications for case-by-case data reported to LCDC. One peak occurred during the 1997-1998 influenza season. This peak, which occurred from mid-January to late March, 1998, was predominated by influenza A virus.

Figure 1
Laboratory-confirmed cases of influenza, by region, type, and week of onset, Canada, 1997-1998

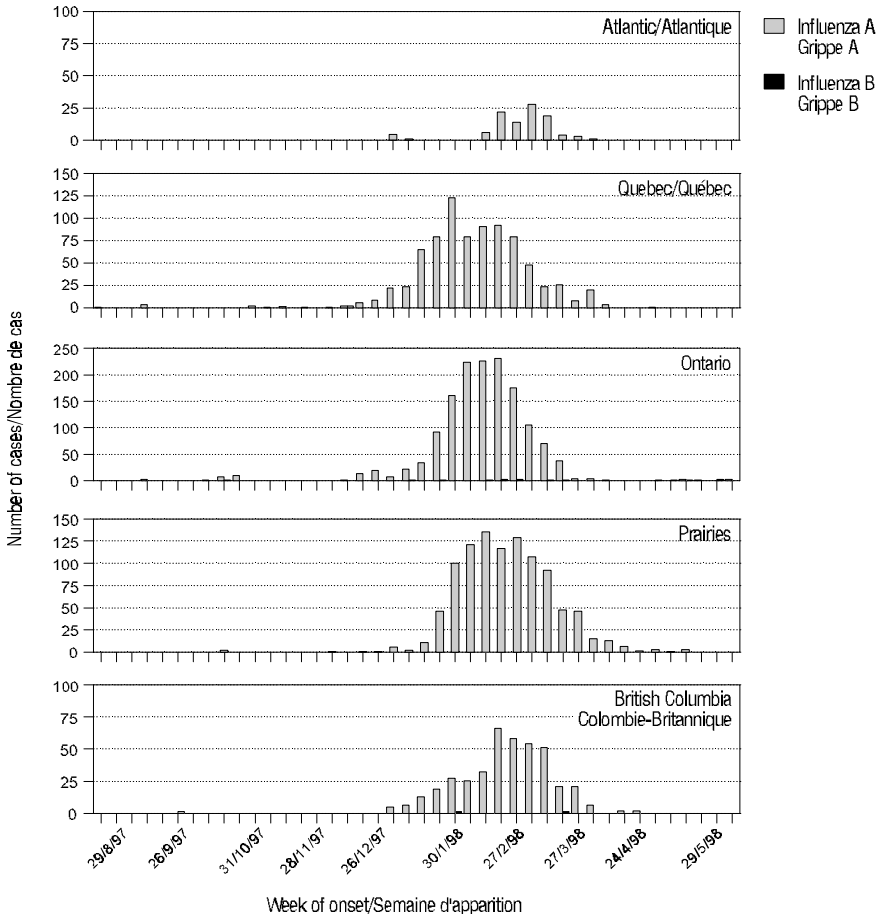


Figure 2
Proportionate distribution of laboratory-confirmed cases of influenza, by age group, Canada, 1996-1997 and 1997-1998

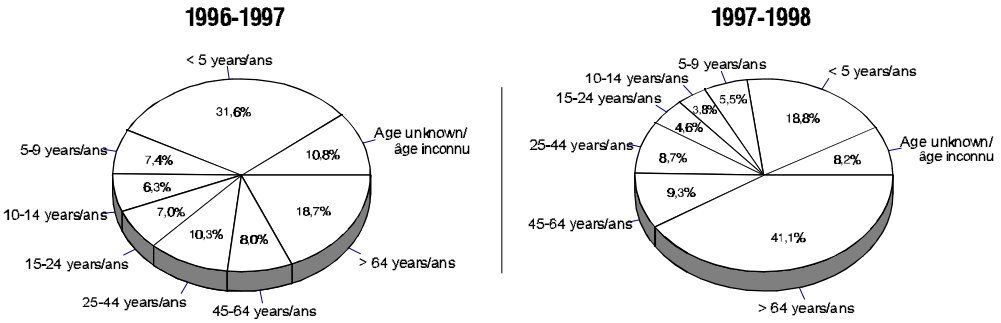
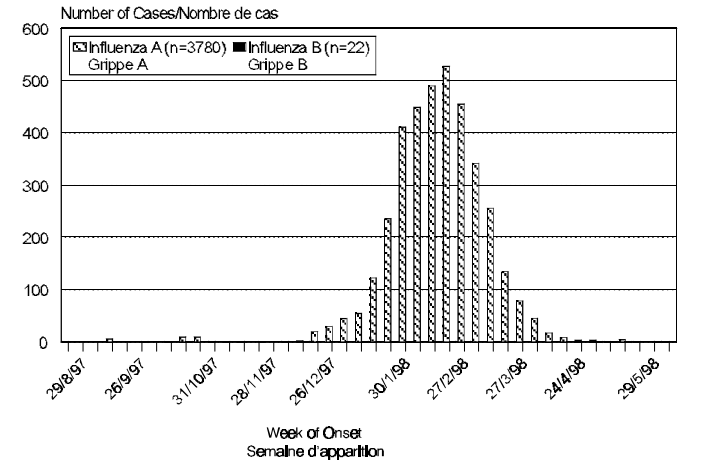


Figure 4 compares the seasonal distribution of laboratory-confirmed case-by-case influenza infections for the 1997-1998 season with the previous four seasons. The 1997-1998 season did not show the bimodal pattern observed in the previous season, although the total number of confirmed cases was substantially higher. Strain characterization by the Laboratory for Respiratory Viruses, Bureau of Microbiology, LCDC, was completed on 440 influenza A isolates and one influenza B isolate. The breakdown was as follows: A/Sydney/5/97-like (H3N2) (361), A/Wuhan/359/95-like (H3N2) (71), A/Texas/36/91-like (H1N1) (8), and B/Beijing/184/93-like (1). The provincial distribution of the 361 A/Sydney-like isolates was British Columbia (9), Alberta (37), Saskatchewan (38), Manitoba (14), Ontario (198), Quebec (41), New Brunswick (4), Prince Edward Island (4), Nova Scotia (6), and Newfoundland (10). The provincial distribution of the 71 A/Wuhan-like isolates was British Columbia (1), Alberta (7), Saskatchewan (4), Ontario (19), Quebec (32), New Brunswick (1), and Nova Scotia (7). All A/Texas-like isolates and the B/Beijing-like isolate were from Ontario.

Figure 3
Laboratory-confirmed influenza cases, by type and by week of onset, Canada, 1997-1998



Influenza-like illness reported by sentinel physicians: One hundred and ninety-one sentinel physicians were recruited in 138 of the 288 census divisions across Canada; the majority of well-populated urban and rural divisions were represented, with the exception of Quebec. One hundred and sixty-seven physicians representing 122 census divisions submitted at least one report during the season; on average, 115 physicians (69%) submitted a report each week. The sentinel physicians were not equally distributed across the country. The percentage of census divisions by province and territory, with at least one physician reporting, ranged from 7% in Quebec to 100% in Newfoundland and the Yukon Territory. The physician response rate also varied between provinces and territories. For all of Canada, 100 of 167 (60%)

Figure 4
Seasonal distribution of laboratory-confirmed influenza infections, Canada, 1993-1998

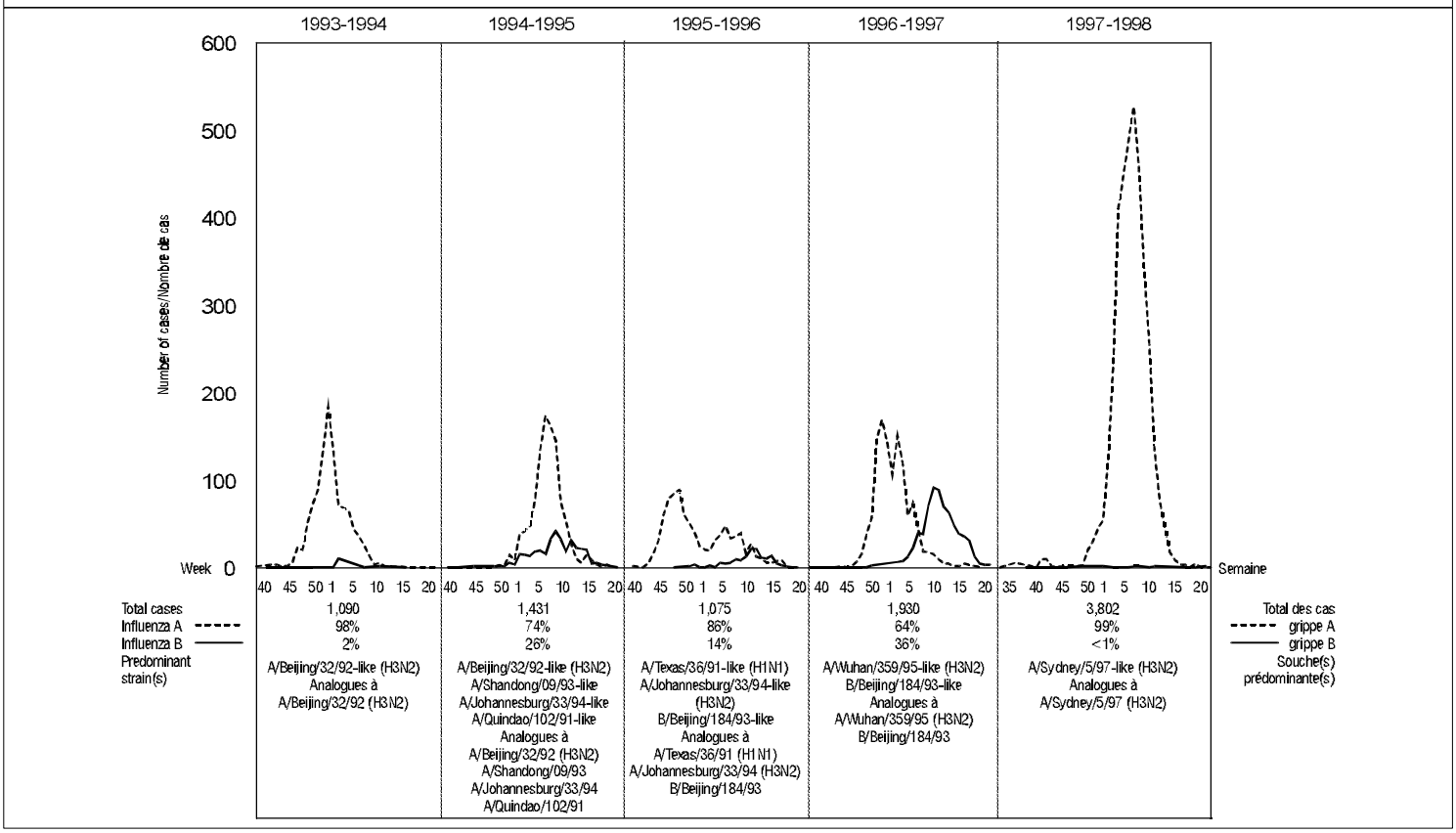
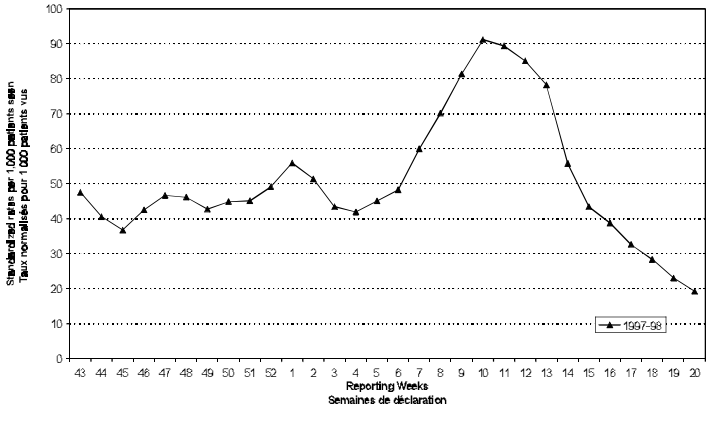


Figure 5
Influenza-like illness, Canada, weekly standardized reporting rates



physicians completed reports for at least 20 weeks (71%) of the ILI surveillance season.

Figure 5 shows the standardized rates of ILI across Canada by reporting week. The curve obtained was smoothed using the technique of Hamming and Tukey[5]. The peak in cases of ILI occurred between early February and late March. This single peak of ILI activity is consistent with that observed in the laboratory-confirmed isolates that were reported to LCDC (Figure 3). A total of 5,578 cases of ILI were diagnosed from 100,255 patients seen (56 per 1,000 patients seen). Where age was recorded, the greatest proportion of cases of ILI occurred in the 20- to 44-year-old age group (20%), followed by those 0 to 4 years of age (16%). The largest rates of ILI were in the 0- to 4-year-old age group (126 per 1,000 patients seen) and the 5- to 9-year-old age group (136 per 1,000 patients seen).

Discussion

The 1997-1998 season saw the highest number of laboratory-confirmed case-by-case influenza infections reported to LCDC for any influenza season in the period 1978 to 1997[1-4, 6-8]. This increase in cases was unlikely to have been substantially affected by the small increase in the number of reporting laboratories or the increase in influenza surveillance activities. The previous highest numbers of cases were recorded in the 1985-1986, 1992-1993, and 1996-1997 seasons when 1,602, 1,568, and 1,930 laboratory-confirmed infections were reported, respectively.

Reporting of virus types, to LCDC, in the 1997-1998 influenza season followed a pattern similar to that observed during the 1993-1994 season; a single peak of activity which was predominately influenza A virus (Figure 4). Although characterization identified three circulating strains of influenza A virus, the predominant strain was A/Sydney/5/97-like (H3N2). The trends observed in Canada were generally similar to those in the United States, where the main peak in activity occurred in late January or early February 1998, and the majority of virus identifications were of influenza type A. Where further characterization was performed the majority of isolates were similar to the A/Sydney-like strain[9].

In Canada, the A/Sydney-like strain was first isolated from passengers aboard a cruise ship that sailed from New York to Montreal in September 1997[10]. First identified in Australia and New Zealand in June 1997, this strain is related to yet antigenically distinguishable from the A/Wuhan/359/95-like (H3N2) strain. Antibodies generated by the A/Nanchang/933/95-like (H3N2) virus strain, which was included in the 1997-1998 influenza vaccine and is antigenically equivalent to the A/Wuhan-like strain, cross-react with A/Sydney-like viruses[11]. However, efficacy of the 1997-1998 influenza vaccine in individuals who were infected with A/Sydney-like virus is unknown. Investigations of outbreaks of A/Sydney-like virus in three long-term care facilities and a military base in the United States in December 1997 and January 1998 suggest that the vaccine provided little protection against illness; however, in two of the long-term care facilities, vaccination may have reduced mortality[12].

The temporal distribution of cases of ILI reported to LCDC was generally similar to that of the laboratory-confirmed cases. However, because physicians were either not available or not recruited in all census divisions, ILI surveillance data may not have been representative of influenza activity in all regions of Canada. The ability of the ILI surveillance program to provide consistent national data was also hampered by the variable response rate in some of the regions that did report. Unlike the 1996-1997 season[4, 13], there was only a single peak of ILI activity during the most recent season. The age distribution of reported cases of ILI likely reflects the members of the community who visit a family physician's office or clinic. The ILI surveillance program does not capture children who visit pediatricians, emergency rooms, after-hours clinics, and the elderly in long-term care facilities; hence, the largest proportion of ILI cases were reported in the 20- to 44-year-old age group.

In order to provide more consistent and representative national data, the provinces and territories are collaborating with local and national NaReS representatives in the recruitment of sentinel physicians. It is hoped that local partnerships will develop among the physicians, and public-health and local NaReS representatives, thereby fostering continued and regular collection and submission of data.

In Canada, it has been estimated that there are between 70,000 to 75,000 hospitalizations and 6,000 to 7,000 deaths attributed to pneumonia and influenza in an average year[14]. These numbers could be multiplied several times in an epidemic year. Thus, the impact of influenza should not be underestimated both in terms of morbidity and mortality, and the economic costs associated with illness. Consequently, the surveillance of influenza in Canada is being further developed to contribute to the early detection of illness in the community, the identification and monitoring of the influenza virus types and strains circulating in the community, the assessment of morbidity and mortality, and the evaluation of control programs. The latter activity will become more important as vaccination is better targeted and wider treatment options for influenza become available.

To further develop and coordinate surveillance activities across Canada, a second annual meeting of provincial, territorial, and

federal influenza representatives was held in Ottawa in the spring of 1998 to assess current ILI surveillance activities, and to discuss future collaborative approaches to surveillance and information dissemination.

Laboratories wishing to participate in the FluWatch surveillance program should contact Mr. Peter Zabchuk, Division of Disease Surveillance, Bureau of Infectious Diseases, LCDC, at 613-952-9729.

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