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INFLUENZA A OUTBREAK ON A CRUISE SHIP

On 10 September 1997, Health Canada notified the United States Centers for Disease Control and Prevention (CDC) that on a cruise from New York City to Montreal during 31 August to 10 September, a total of 39 (2.7%) of 1,445 passengers and three (0.5%) of 631 crew members presented to the ship's infirmary because of acute febrile respiratory illness. All passengers disembarked in Montreal; nine (0.6%) were referred to area hospitals for respiratory complications and six were hospitalized. Influenza A was confirmed by culture.

On 11 September, a new cohort of 1,448 passengers boarded the same ship for the return voyage to New York City; the crew did not change. During 11 to 20 September, a total of 19 (1.3%) passengers and 17 (2.7%) crew members presented to the infirmary because of influenza-like illness (ILI): fever ≥ 37.8º C (100º F) and either sore throat or cough. On 15 September, public-health officials from Health Canada and CDC boarded the ship in Canada to investigate the outbreak and advise ship officials on control measures. On 17 September, one nasopharyngeal swab was positive for influenza A by a rapid viral antigen detection test. Active surveillance for ILI was instituted among the crew; those with ILI were confined to their cabins and started on rimantadine. All non-ill crew members were started on rimantadine prophylaxis for 14 days. All 631 crew members were administered the 1997-1998 influenza vaccine. On 17 September, all passengers on the second cruise were notified of the outbreak, and non-ill passengers were offered rimantadine prophylaxis. Passengers presenting to the infirmary with ILI were given rimantadine for 5 days.

Based on a survey of 1,284 passengers during 17 to 18 September, a total of 994 (77.4%) were aged ≥ 65 years, 336 (26.2%) had chronic health conditions associated with increased risk for severe complications of influenza, 52 (4.1%) reported an ILI, and 1,020 (80.8%) of 1,262 passengers reported using rimantadine prophylaxis. On 20 September, two (0.1%) passengers who disembarked in New York City were referred to area hospitals for respiratory complications. Thirteen isolates received at CDC for viral culture were characterized as influenza A/Sydney/05/97-like(H3N2). On 20 September, a new group of passengers boarded in New York City; this group was notified of the previous outbreaks. During 21 to 24 September, no new cases of ILI were detected.

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Source: *J Miller, DVM, Division of Quarantine, National Center for Infectious Diseases, CDC, Atlanta; T Tam, MD, Field Epidemiology Training Program, LCDC, Ottawa; C Afif, MA, S Maloney, MD, M Cetron, MD, Division of Quarantine, K Fukata, MD, A Klimov, PhD, H Hall, Division of Viral and Rickettsial Diseases, National Center for Infectious Diseases, CDC, Atlanta; D Kertesz, MD, Division of Respiratory Diseases, J Hockin, MD, Field Epidemiology Training Program, LCDC, Ottawa (adapted from MMWR, Vol 46, No 46, 1997).*

Editorial Comment

Outbreaks of influenza on cruise ships have not been well characterized in the past. However, one similar influenza A outbreak has been documented on a cruise ship travelling between

Tahiti and Hawaii in October 1997[1]. Over 4 million people vacation on North American cruise ships annually; many passengers are likely to have one or more risk factors for influenza-related complications as found among the passengers on the cruise described in the above report. Cruise ships are closed or semi-closed settings where elderly persons with chronic medical conditions are in close proximity to one another. Therefore, during an influenza outbreak, infection control measures akin to those recommended for nursing homes[2] need to be considered.

The National Advisory Committee on Immunization (NACI) recommends influenza vaccination for those persons at high risk of influenza complications embarking on foreign travel to destinations where influenza is likely to be circulating. Influenza vaccine takes approximately 2 weeks for maximal protection. NACI also recommends amantadine hydrochloride, an antiviral medication effective as chemoprophylaxis for influenza A, as a supplement to vaccination in people at high risk expected to have an impaired immune response to the vaccine and as an adjunct to late vaccination of people at high risk[3]. Given the experience of this outbreak, travellers at high risk of influenza complications destined for cruise vacations need to be offered vaccination also. The use of amantadine should also be considered. Regardless of cruise ships' ports of call or the season, cruise vacations represent a unique opportunity for prolonged and intimate mixing of international travellers from both hemispheres.

As the cruise ship industry caters primarily to persons at high risk for influenza-related complications, cruise ship companies need to develop and implement influenza vaccination programs for their crew members to reduce transmission to these passengers. Companies need also to plan contingency measures for controlling onboard outbreaks. Development of surveillance programs for respiratory illnesses on cruise ships, similar to those in place for the surveillance of diarrheal illnesses, may be considered to enable monitoring of disease activity and early implementation of control measures.

The influenza A strain identified on this cruise ship outbreak, A/Sydney/05/97-like (H3N2), is related but antigenically distinguishable from A/Nanchang/933/95, the A(H3N2) component included in the 1997-1998 vaccine. A/Sydney/05/97-like (H3N2) viruses were first detected in June 1997 in Australia and New Zealand[1]. In Australia these viruses accounted for 29% of the total influenza A(H3N2) isolates this year but had not been identified in North America prior to the cruise ship outbreak. The extent of circulation of the influenza A/ Sydney/05/97-like (H3N2) strain in Canada and the effect of this virus' circulation on vaccine effectiveness remains to be determined. As vaccine effectiveness is partially dependent upon the match between the vaccine and circulating strains, protection may be less than expected if this strain circulates widely[1,3]. However, as of 12 December, 1997, influenza activity in Canada reported to the FluWatch program is relatively low with sporadic cases of influenza-like illness reported in all provinces and territories except Saskatchewan (no reports received) and the Yukon Territory (zero activity reported). Thirty-seven isolates of influenza virus have been reported; all except one are influenza A and further characterization of the isolates is underway.

The introduction of this antigenic variant to a North American cruise in early September 1997 demonstrates how rapidly new influenza strains can circulate globally in an era of international mobility. International cooperation in the monitoring of influenza activity is of paramount importance in the early detection of potential pandemic strains. In May 1997, the first case of an avian strain of influenza A(H5N1) occurred in a child in Hong Kong and several more cases have since been confirmed. As of 5 January 1998, evidence suggests that person-to-person transmission may be possible but is inefficient. Nevertheless, this represents a major antigenic shift from strains previously known to cause human illness. Public-health resources have been mobilized in Hong Kong and internationally in response to this potential public-health threat.

References

1. CDC. *Update: Influenza activity – United States, 1997-98 season*. MMWR 1997;46:1094-98.
2. CDC. *Prevention and control of influenza. Recommendations of the Advisory Committee on Immunization Practices (ACIP).* MMWR 1997;46(RR-9):1-25.
3. National Advisory Committee on Immunization. *Statement on influenza vaccination for the 1997-1998 season*. CCDR 1997;23(ACS-2):1-12.

A SUMMARY OF THE 1996-1997 CANADIAN FLUWATCH PROGRAM

Background

FluWatch is a national surveillance project for influenza-like illness (ILI) that was piloted in 1995-1996, and became fully activated during the 1996-1997 influenza season. Prior to FluWatch, national influenza surveillance relied on aggregate laboratory data submitted to the Laboratory Centre for Disease Control (LCDC) from 21 laboratories across the country and case-by-case data from about one-half of these laboratories. LCDC also received isolates for virus characterization, and six provinces regularly reported data from their own surveillance programs. LCDC then compiled surveillance information and prepared monthly summaries for dissemination. The interpretation of influenza data at the national level was complicated; mechanisms used to measure influenza activity varied from province to province, and laboratory results were often delayed because of processing and reporting time.

FluWatch was developed to enhance the existing national influenza surveillance system by collecting consistent and timely national data. It is a collaborative project between the provinces and territories, College of Family Physicians of Canada (CFPC), sentinel physician reporting programs in British Columbia and Calgary, and LCDC.

Design

CFPC's National Research System (NaReS) recruited at least one physician from each of the 1991 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 1 October 1996 to mid-April 1997, 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. Both groups of patients were broken down by age category. Reports

were either faxed or the information was conveyed via telephone to LCDC on a weekly basis. LCDC would then collate the data and prepare a report which would be distributed once every 2 weeks.

At the conclusion of its first full season, the FluWatch program was evaluated by participating physicians in order to measure whether it achieved stated goals, and to gauge the degree of user satisfaction with its design and implementation.

Results

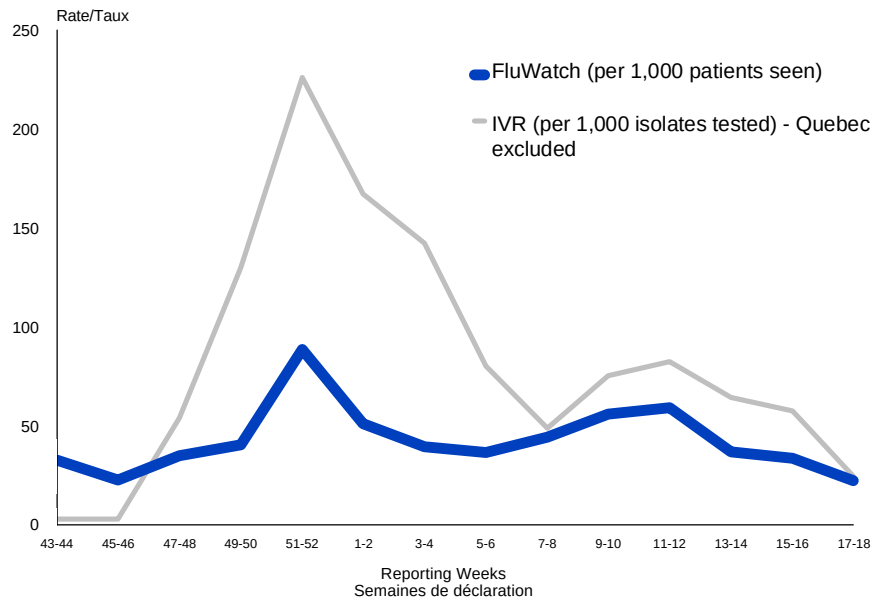
Of the 290 census divisions across Canada, 273 had CFPC member physicians available for recruitment. Although 223 individual physicians reported at any time during the FluWatch season, on average 110 physicians (49%) participated in FluWatch on a weekly basis. The enlisted physicians were not equally distributed across the country. The percentage of census divisions by province and territory, with at least one physician reporting, ranged from 28% in Quebec to 100% in British Columbia and the Yukon Territory.

The physician response rate also varied between provinces (Table 1). For all of Canada, 41% of physicians submitted reports for at least 20 weeks (74%) of the FluWatch season.

Based on a separate evaluation questionnaire, the sentinel physicians saw an average of 32.8 patients per day during the FluWatch season. A total of 3,818 cases of ILI were diagnosed from 89,952 patients seen (42.5 per 1,000 patients seen).

The first peak in cases of ILI in Canada occurred during the Christmas holiday season. A second, smaller wave occurred mid- to late March. This trend is consistent with that observed in the laboratory-confirmed isolates that were reported to LCDC (Figure 1). This similarity remained after ILI rates were standardized to provincial populations. Overall, the greatest proportion of FluWatch cases occurred in the 20- to 44-year-old age group (33%), followed by those 45 to 64 years of age (19%). The largest rate of ILI was in the 0- to 19-year-old age group (50 per 1,000 patients seen).

Figure 1
Comparison of FluWatch ILI vs. laboratory-confirmed cases of influenza (IVR)* by reporting week, Canada, 26 October 1996-4 May 1997



* IVR = interactive voice response reporting system
SIRV = système de réponse vocale

Table 1
Breakdown of census divisions with at least one sentinel physician reporting and physician response rate, by province, FluWatch Program, 1996-1997

Province	Total number of census divisions (1991 Census)	Number of census divisions with NaReS physicians available for recruitment	Number of census divisions with at least one physician reporting	Response rate (% of physicians reporting a minimum of 20 weeks)
Newfoundland	10	10	9	36 (4/11)
Prince Edward Island	3	3	2	67 (2/3)
Nova Scotia	18	17	12	31 (4/13)
New Brunswick	15	15	8	42 (5/12)
Quebec	99	94	26	20 (6/30)
Ontario	49	49	43	43 (25/58)
Manitoba	23	18	15	19 (3/16)
Saskatchewan	18	15	10	73 (8/11)
Alberta	19	19	13	33 (3/9)*
British Columbia	30	29	29	52 (29/56)
Yukon	1	1	1	100 (2/2)
Northwest Territories	5	3	2	0 (0/2)
TOTAL	290	273	170	

* excluding Calgary area sentinel physician reporting program

Reporting

During the influenza season, 15 FluWatch reports (one every 2 weeks) were prepared by LCDC. Each report included a map identifying the presence or absence of ILI activity within each census division for that 2-week period. The map was accompanied by graphics depicting rates of laboratory-confirmed isolates by province and territory and text describing local, national, and international influenza activity. The FluWatch report was disseminated to the sentinel physicians, NaReS representatives, federal and provincial epidemiologists and laboratories, the World Health Organization, and the United States Centers for Disease Control and Prevention. Other summary articles were prepared for the Canada Communicable Disease Report on a monthly basis, and information was also posted on the LCDC Website. The Website document received 700 to 800 hits per month.

Discussion

On average, 110 physicians participated in FluWatch on a weekly basis during the 1996-1997 influenza season. Over 76% of physicians who responded to the program evaluation questionnaire (121 of 132 physicians who received questionnaires responded) stated that they would be willing to participate again in the 1997-1998 season, and 84% found the case definition for ILI to be appropriate. Because physicians were either not available or not recruited in all census divisions, FluWatch data may not have been representative of influenza activity throughout Canada. The ability of FluWatch to provide consistent national data was also hampered by the variable response rate in some of the regions that did report. However, from those ILI reports that were submitted to LCDC, a bimodal pattern for the 1996-1997 influenza season was apparent. This trend was supported by the laboratory-confirmed data, evidence that FluWatch was an accurate indicator of national influenza activity (Figure 1).

When one considers national ILI and laboratory rates together, trends in activity appear to peak at the same time (Figure 1). However, when reviewing data from a province such as Ontario with regular reporting from a large number of census divisions, FluWatch rates did appear to anticipate the laboratory findings (Figure 2), in terms of peak activity.

The age distribution of ILI cases is not surprising when one considers that FluWatch captures the “walking population,” i.e. people who visit a family physician’s office or clinic. FluWatch 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 seen in the 20- to 44-year-old age group.

The majority of physicians (75%) who completed and submitted program evaluation questionnaires reported that the frequency of reports, issued once every 2 weeks, was acceptable, and stated that they liked the map. At the federal, provincial, and territorial Influenza Surveillance Meeting, held 5-6 June 1997, the provincial and territorial influenza surveillance representatives reported that they found the FluWatch text to be useful, but suggested that the map should be revised to increase its usefulness and ease of interpretation. The provincial and territorial representatives also requested that they receive the raw ILI data for their regions each week.

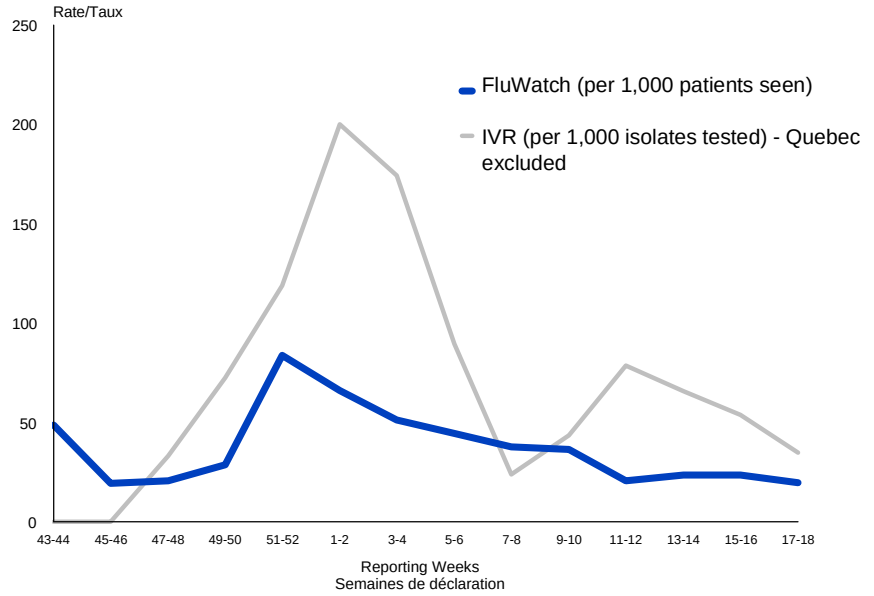
Conclusions

The similar trends observed between FluWatch and the laboratory data indicate the success of FluWatch as an indicator of true influenza activity. However, to provide consistent national data, FluWatch should be more representative of activity across the country. It is essential that all census divisions are represented. For the 1997-1998 season, the provinces are working with their local NaReS representatives to assist in the recruitment of physicians in all their census divisions. Efforts are also being made to include First Nations communities.

To ensure that FluWatch provides timely national data, methods to improve the weekly physician response rates have also been considered. These include simplifying the report form, faxing the report form out each week to act as a reminder, and providing special recognition to those physicians who do report regularly. It is also hoped that, by decentralizing parts of the program, local partnerships will develop between the physicians, public-health, and local NaReS representatives thereby fostering continued and regular participation.

Finally, the dissemination of the FluWatch data has been modified for next season. The provinces will receive the raw ILI data for their census divisions on a weekly basis. The FluWatch report will be prepared every 2 weeks, except during periods of elevated activity when it will be prepared on a weekly basis. The report will include a modified FluWatch map and information on

Figure 2
Comparison of FluWatch ILI vs laboratory-confirmed cases of influenza (IVR)* by reporting week, Ontario, 26 October 1996-4 May 1997



* IVR = interactive voice response reporting system
SIRV = système de réponse vocale

local, national, and international influenza activity. The map will now reflect provincial and territorial levels of influenza activity. The influenza activity score will be assigned by the provincial or territorial influenza representative, and will take several sources of information into account: ILI data, laboratory data, other provincial and territorial data including school and workplace absentee rates, and any institutional outbreaks. The activity score will be a number between zero (no activity) and three (widespread activity). The FluWatch report will continue to be disseminated both nationally and internationally.

NOTE: Due to the success of the term 'FluWatch,' all future surveillance activities for influenza at the national level will be incorporated under this term.

Source: *M Litt, BScN, MHSc, Senior Epidemiologist, Health Programs Analysis Division, First Nations and Inuit Health Programs Directorate, Medical Services Branch, P Buck, DVM, MSc, Field Epidemiologist, J Hockin, MD, MSc, Director, Field Epidemiology Training Program, Bureau of Surveillance and Field Epidemiology, P Sockett, PhD, Chief, Division of Disease Surveillance, Bureau of Infectious Diseases, LCDC, Ottawa.*

Errata

SALMONELLA ENTERITIDIS PHAGE TYPE 4 IN ONTARIO
Vol. 23-23, page 181

R Khakhria, BSc, National Laboratory for Enteric Pathogens, LCDC, Ottawa, ON should have been included under Source.

Supplement
1997
Canadian Recommendations for the Prevention and Treatment of Malaria Among International Travellers
October 1997, Volume 23S5

For those readers who have received a copy of the *1997 Canadian Recommendations for the Prevention and Treatment of Malaria Among International Travellers* either through the premium subscription or by individual order, please note the following change in the Appendix 1 (page 17).

The malaria risk information for Brazil should be replaced with the following:

Rural areas of Acre, Amazonas, Goias, Maranhao, Mato Grosso, and Para States; and territories of Tocantins, Amapa, Rondonia, and Roraima. Note: No risk for travellers to coastal states from the horn to Uruguay border and Iguassu Falls.

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