

PANDEMIC (H1N1) 2009: THE ALBERTA EXPERIENCE



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EXECUTIVE SUMMARY

The purpose of this report is to provide an overview of the impact on Alberta's health care system and its response to the Pandemic (H1N1) 2009 virus (pH1N1). By combining surveillance data with the expertise from both Alberta Health and Wellness (AHW) and Alberta Health Services (AHS), this report takes a comprehensive view of the two pandemic waves, while providing contextual information to guide a public health response if a third pandemic wave materializes.

With the first and second wave of pH1N1 complete, it is possible to do a quick assessment of the magnitude of the threat it represented to Albertans and the success of the health care system response. In Alberta, for the purposes of this report, wave one lasted from April 19 to July 25, 2009 and the second wave from October 11 to December 5, 2009. The first wave peaked the week of June 14; the second wave, the week of October 25.

Overall, a younger population had significantly more illness from pH1N1 influenza than with the typical seasonal influenza virus strains seen each year, but with less severity of illness. Incidence of disease among school aged children (aged 5–18 years) was particularly high. Deaths were lower than expected in the 65 years and over age group, but higher in younger age groups.

To describe the impact of the virus three levels of severity were defined:

1. Level 1 represents laboratory confirmed cases who were hospitalized or died.
 - 1,276 confirmed cases were hospitalized, with the age ranging from under one year to 95 years. The median age was 34 years.
 - About 19% of hospitalized cases were admitted to an intensive care unit (ICU), with patient ages ranging from under one year to 80 years of age. The median age was 39 years and 16% of all pH1N1 ICU cases were Aboriginal (estimated that 4% of Alberta population are Aboriginal).
 - Forty-five (19%) pH1N1 influenza cases admitted to ICU died.
 - As of May 31, 2010, there were 71 deaths among individuals with laboratory confirmed pH1N1 virus. The ages of those who died ranged from under one year of age to 90 years old. The median age was 50 years old.
 - The vast majority of the pH1N1 influenza related deaths (96%) and ICU cases (83%) had known or identified underlying conditions. Some of these conditions include asthma, chronic lung disease, obesity, diabetes and current smokers.
 - The average length of stay was 9.9 days in the second wave versus 8.9 days in the first wave. In the first wave, 25-to-64 year olds tended to stay the longest in critical care, and in the second wave it was people in the 19-to-24 year age group.
 - On average, confirmed and suspected pH1N1 cases occupied 16% of the critical care unit beds (range: 0 to 35%).

- Fourteen critical care sites in Alberta reported the number of patients using ventilators on a daily basis. During the second wave, there were five incidences where at least one sites reported had more than 80% of the ventilators being used.
2. Level 2 represents laboratory confirmed cases who were not hospitalized or did not die and people with influenza-like illness (ILI) who sought medical care.
 - Sentinel physicians in The Alberta Reporting and ReseArch NeTwork (TARRANT) program usually see ILI and lower respiratory tract infections (LRTI) in approximately 2% of patients during seasonal influenza peaks; these patients made up between 6% and 7% during the peak of the second wave.
 - During the second wave, 24,273 emergency department and urgent care centre visits screened positive for ILI, with positive screens peaking in the influenza reporting week 44 (week starting November 1, 2009). During the second wave, 8% to 34% of emergency and urgent care visits were ILI related, with almost half (48%) of the visits in children (newborns to 18 year olds).
 - During the second wave, staff at the Influenza Assessment Centres assessed 9,371 people. From the assessments, 114 (1%) people were sent to emergency departments. The opening of the IACs took significant pressure off the emergency departments.
 3. Level 3 represents self-reported cases of ILI that were managed in the community.
 - The management of ILI in the community had a major effect on societal functioning. For instance in Edmonton, in schools that coded absenteeism due to illness, 42,598 schools days were missed in the first wave and 86,721 days in the second wave. The number of parental absences is unknown.
 - In the fall, absenteeism for illness or family illness at AHW ranged from 4.3% up to 7.9% between October 28 and November 25 2009.
 - Within the former Alberta Health Services health regions of Capital, Calgary, Aspen and David Thompson, 62,178 AHS employee-absence days occurred during the peak period of Wave 2 (October 21 to November 27, 2009). During the Wave 2 peak, there was an increase from an average of 2000 absences a day to 2500.
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PREVENTION AND TREATMENT

1. As of May 31, 2010 approximately 1,354,180 doses of the pH1N1 vaccine had been administered to 1,310,085 Albertans (some children under ten years of age received a second dose of the vaccine). 1,289,432 were administered by Alberta Health Services personnel, 44,061 by First Nations, Inuit Health and 20,151 administered by community pharmacists. An estimated 36% of Albertans had been immunized by the end of May 2010.
2. By target group the following rates of coverage were achieved: under 65 years at high risk, 32%; age 6 months to 4 years, 52%; health care workers, 52%; pregnant women, 35%; those living on-reserve, 66%.
3. The rate of serious adverse reactions temporally associated with vaccine was 1.4 per 100,000 doses, which is higher than other vaccine campaigns. The vast majority of reactions have been mild and self-limiting.

PROVISIONAL ASSESSMENT

The magnitude of health effects for this epidemic was similar to that of a moderately serious seasonal influenza but with the context that the virus was significantly different from previous strains.

These differences included:

1. unusual porcine and avian sequences in addition to the usual human sequences and an increased risk of unusual virulence;
2. the unusual seasonality including a first wave very late in the usual influenza season (immediately following a normal seasonal influenza) followed very rapidly by second wave (very early in the subsequent season);
3. an unusual age distribution of serious illness and death where the overall mortality was similar to a moderate influenza year but with much reduced mortality in the elderly and a corresponding increase in mortality in adults; and
4. adults who became ill tended to have seriously compromised respiratory systems.

The health system response was also unusual for the following reasons:

1. Public health had to mount three separate and very different influenza campaigns in a time frame where it would usually only do one or at most two and the campaigns would be very similar.
2. Public health delivered vastly more influenza immunizations in a shorter period of time than ever before and achieved record level coverage levels in many populations including high risk and aboriginal populations.
3. The Provincial Laboratory for Public Health and the acute care system, including Health Link Alberta, physician offices, emergency departments, hospital beds and ICU beds, experienced significant stress as the large number of seriously ill adults threatened to overwhelm human and institutional capacity.
4. Surveillance systems provided decision makers with timely and detailed situation reports that while not ideal were used for the first time to inform decisions makers and trigger interventions. Actions included the opening of the mass influenza assessment centers, mass immunization clinics, proactively increased emergency and hospital staffing, and release of antiviral medications. To measure the effect of these interventions as well as tracking the epidemic curve in real-time, multiple systems were engaged.
5. To handle the increased public health and acute care demands in an operational system with very limited surge capacity, operations had to displace some routine and potentially important activities. Public health postponed routine immunizations, the provincial laboratory prioritized or restricted some testing, infection control activities were reduced to aid in influenza control activities, and elective surgeries and family practitioner visits for needed but not acute reasons were delayed.
6. A new more effective vaccine was developed, approved, delivered, used, and monitored for adverse events in real-time and more rapidly than ever before.

The provincial response was unusual for the following reasons:

1. Agencies from federal, provincial and regional jurisdictions cooperated in an unprecedented fashion to share information and act to prevent disease and mitigate damage. AHS, AHW, AEMA, PHAC, FNIH¹, shared personnel, vaccine, antivirals, and expertise to ensure that Albertans were protected even with unresolved issues of jurisdiction and protocol.
 2. The restructuring of AHW and AHS immediately prior to the first wave meant that the professionalism and dedication of staff was required to overcome the lack of clarity of institutional roles and responsibilities.
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¹ AHS = Alberta Health Services; AHW = Alberta Health & Wellness; AEMA = Alberta Emergency Management Agency; PHAC = Public Health Agency of Canada; FNIH = First Nations and Inuit Health, Health Canada

TIMELINES

MAJOR HISTORICAL EVENTS

Pandemic Influenza

1918 *“Spanish Flu” (H1N1)*

Resulted in 20-50 million deaths worldwide

1957/58 *“Asian Flu” (H2N2)*

Strain has not circulated since 1968

Lack of immunity for those under age 30

Approximately one million deaths

1968/69 *“Hong Kong Flu” (H3N2)*

Approximately one million deaths

New Strains in Humans

1977 *“Russian Flu” (H1N1)*

Similar to the H1N1 virus circulating prior to 1957

1997 *H5N1*

First documented direct bird to human transmission (occurred in Hong Kong)

18 hospitalized, six dead

2002 *H7N2*

Evidence of one person in the United States (Virginia) infected following a poultry outbreak

2003 *H5N1*

Two Hong Kong family members hospitalized, killing one

2003 *H7N7*

89 people infected in the Netherlands (poultry workers), most presented with conjunctivitis

2004 *H5N1*

44 people infected in Thailand and Vietnam, with 32 dying.

This strain may be moving to be endemic in Asia

2004 *H7N3*

Caused illness in two Canadian poultry workers

New Strains in Humans continued...

2004 *H1N7*

Two infants in Egypt were infected representing the first known human infections. Their father was a poultry merchant.

2005 H5N1

First human case was identified in Cambodia (a total of four cases were identified). Indonesia reported seven confirmed cases with four deaths.

The World Health Organization (WHO) reported 142 laboratory-confirmed cases with 74 deaths.

Countries with confirmed cases included: Thailand, Vietnam, Indonesia, and China.

2006 H5N1

Overall, 115 confirmed cases globally with 79 deaths.

2007 H5N1

A total of 88 cases confirmed with 59 deaths. Cases were found in Indonesia, Cambodia, China, Lao People's Democratic Republic, Myanmar, Nigeria, Pakistan and Vietnam.

2007 H7N7

The United Kingdom reported four cases of H7N7 avian influenza among poultry workers.

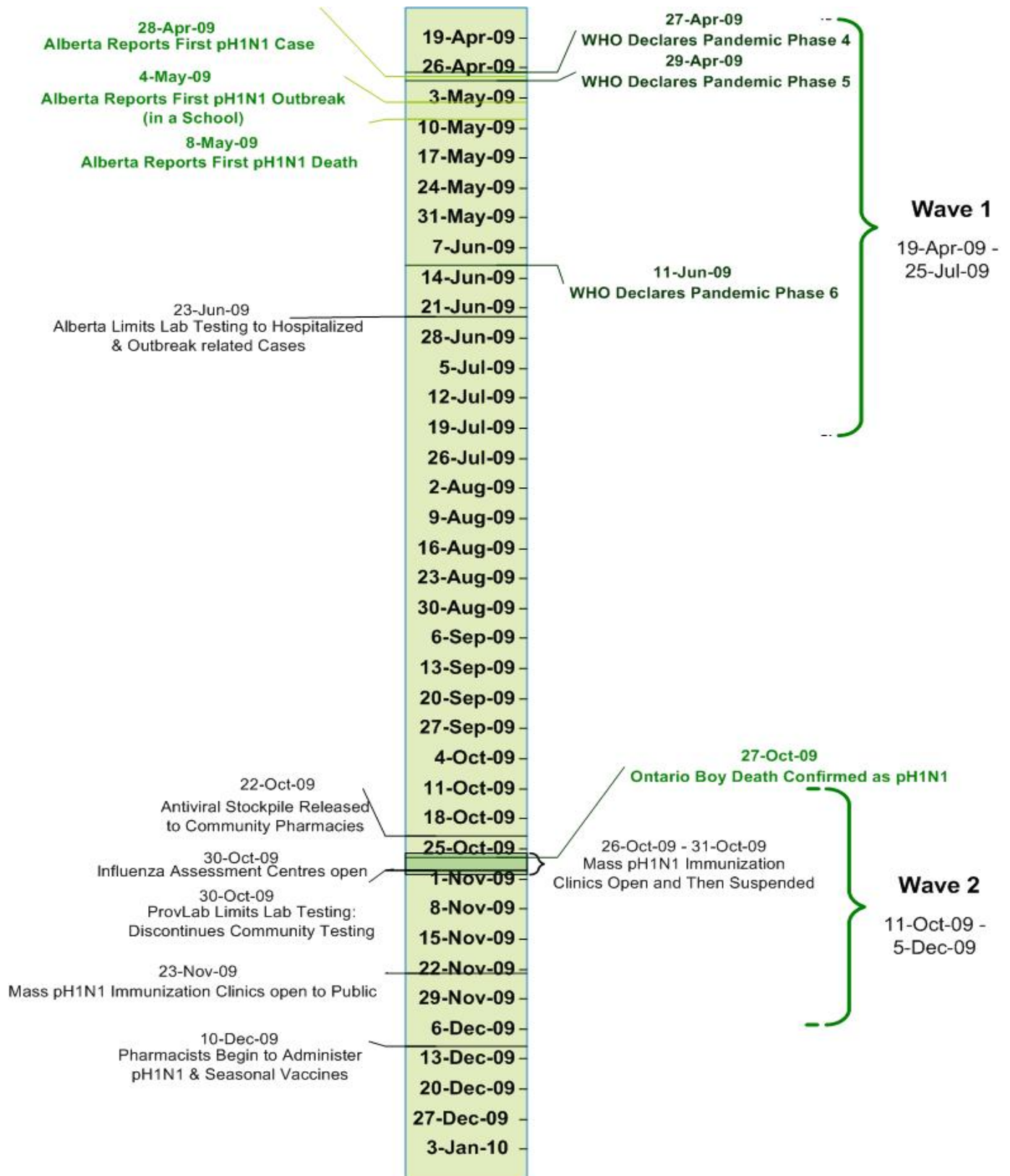
2009 H1N1

In April, 2009 Mexico reported cases of severe respiratory illness. The circulating strain was found to be the same as two cases reported in the United States (California and Texas).

The WHO raised the pandemic alert level to Phase 5 indicating a pandemic was considered imminent.

An 2009 Alberta timeline is depicted in **Figure 1** and detailed in Appendix A.

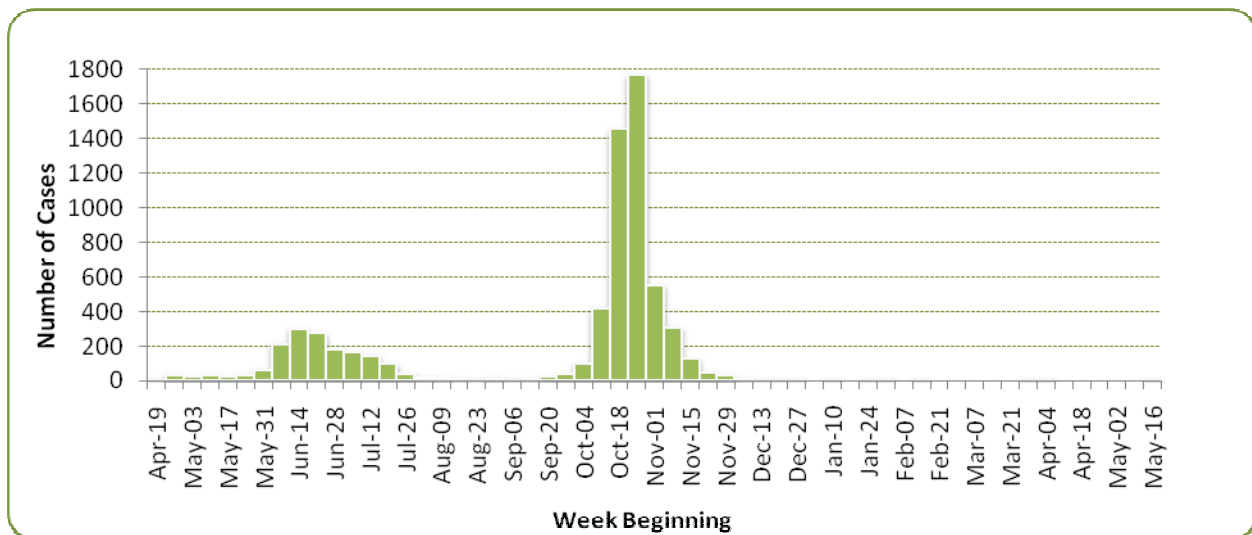
Figure 1: Pandemic (H1N1) 2009 Timeline



On April 17, the Public Health Agency of Canada (PHAC) was notified by Mexican health authorities of clusters of severe respiratory illness occurring in Mexico. On April 21, the PHAC received notification that the United States had two cases of human swine influenza in California. The World Health Organization (WHO) declared the events in Mexico as worthy of international concern on April 25. On April 26, Canada reported its first cases of pH1N1 influenza. The WHO moved to pandemic alert phase 4 on April 27, then phase 5 on April 29. On June 11, the WHO raised the influenza pandemic alert to phase 6, its highest level, where it remained at the end of the second wave. On August 10, 2010, WHO announced that the pH1N1 influenza virus has moved into the post-pandemic period.

Alberta reported its first laboratory confirmed pH1N1 influenza case on April 28, 2009 (see [Figure 2](#)).

Figure 2: Epi-Curve of Weekly Confirmed Pandemic (H1N1) 2009 Influenza Cases in Alberta, by Date Specimen Collected



Source: Alberta Health and Wellness pH1N1 Influenza Dataset

Wave 1 was defined as the week the first case in Alberta was confirmed, April 19 to July 25. The second wave was defined as occurring from October 11 to December 5. Pandemic (H1N1) 2009 influenza cases continue to occur world-wide. The first wave peaked the week of June 14 and the second wave the week of October 25.

OVERVIEW OF pH1N1 VIRUS

As of the end of May 2010, there have been no major shifts in the pH1N1 virus. The number of cases of Tamiflu resistant virus is low and considered isolated. The pH1N1 virus initially affected young adults, especially those who travelled to Mexico or close contacts of those travelers. School-aged children have been the majority of Alberta's confirmed cases in both waves. The proportion of seniors affected by pH1N1 virus is small relative to seasonal influenza viruses. Early on, several groups were deemed at higher risk for complications, including: pregnant women, persons under 65 years of age with chronic conditions and children under five years of age. People of Aboriginal descent were also identified as a risk group in Wave 1.

This particular strain of influenza virus rapidly spread around the world, with air travel contributing to the rapid spread. The pH1N1 virus was the dominant influenza strain across the globe from the beginning of July and continued to be dominant at the end of the second wave. The clinical symptomology and manifestations of the pH1N1 virus were consistent across all countries with the overwhelming majority of cases presenting with mild illness, similar to typical seasonal influenza cases. Very severe and fatal illness was, for the most part, limited to people with medical risk factors (especially respiratory disease). However, a small number of young, healthy people presented with severe and fatal illness.

The Atlanta Center for Disease Control (CDC) has proposed a pandemic severity index chart (see [Table 1](#)) that presumes a 30% infection rate and no antiviral, vaccine or other intervention that then results in a case fatality rate that determines severity.

Table 1: CDC Pandemic Severity Index chart

Category	Case Fatality Rate	Example(s)
1	less than 0.1%	Seasonal Flu and Swine Flu
2	0.1% to 0.5%	Asian Flu and Hong Kong Flu
3	0.5% to 1%	
4	1% to 2%	
5	2% or higher	Spanish flu

Source: CDC, Centers for Disease Control and Prevention (CDC). Pandemic Planning Update IV. Available from <http://www.flu.gov/professional/panflureport4.html>

If 30% of Albertans were infected that would mean 1.1 million affected with 1300 hospitalized and 71 deaths. This is significantly less than the case fatality rate of 0.1% for Category 1 and is presumably in part due to the success of the vaccination campaign, antiviral usage, personal protective equipment use and adoption of personal protective behaviors. If the pandemic had been of severity of Category 2 and an infection rate of 30%, the projected number of deaths in Alberta would be 5,500 and that would have swamped the acute care system.

BURDEN OF DISEASE

For the purpose of this document, the burden of the Pandemic (H1N1) 2009 pH1N1 virus has been classified into three levels:

- Level 1 represents laboratory confirmed cases who were hospitalized or died,
- Level 2 represents laboratory confirmed cases who were not hospitalized or did not die and people with influenza-like illness (ILI) who sought medical care, and
- Level 3 represents self-reported cases of ILI that were managed in the community.

An individual could have been represented in any or all three levels depending on how they accessed the health care system.

It is important to note that the information for hospitalizations and deaths includes individuals who tested positive for pH1N1 virus; however it is not known whether the virus was directly related to their hospitalization and/or death. An additional review will be needed to fully understand the underlying cause of death and the role that the pH1N1 virus may have played.

Information on the burden of the pH1N1 was also impacted by the restriction of laboratory testing to those: 1) in hospital, or 2) presenting to emergency departments or physicians in the TARRANT program or outbreak investigations.

LEVEL 1

Pandemic (H1N1) 2009 influenza Level 1 represents laboratory confirmed pH1N1 cases that were hospitalized or died.

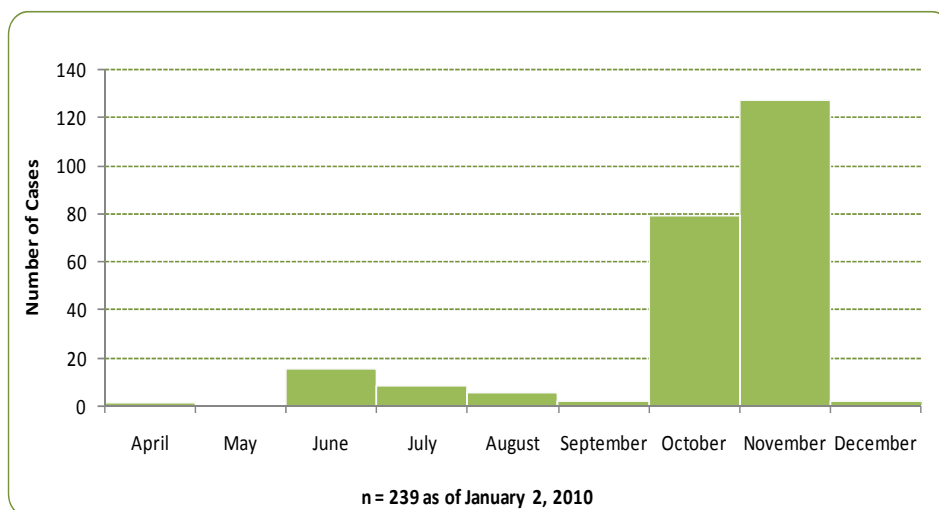
HOSPITALIZED CASES

As of July 31, 2010, 1,276 individuals who tested positive for pH1N1 virus had been hospitalized, with ages ranging from under one year to 95 years of age. The median age was 34 years old.

Cases Admitted to Intensive Care Units (ICU)

About 19%, or 240 out of 1,276 hospitalized cases, were admitted to an ICU (see **Figure 3**), with patient ages ranging from under one year to 80 years of age. The median age was 41 years. About 54% of pH1N1 ICU cases were male; 16% of all pH1N1 ICU cases were Aboriginal.

Figure 3: Number of lab confirmed pH1N1 influenza cases admitted to ICU, by Month



Forty-five (19%) pH1N1 influenza cases admitted to ICU died.

Source: Alberta Health and Wellness pH1N1 Influenza Dataset

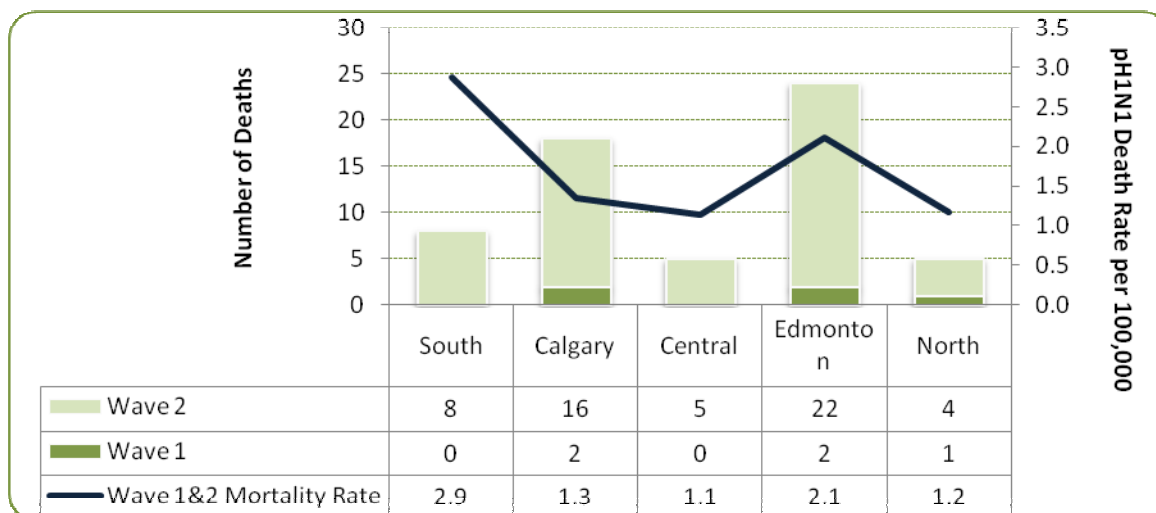
Of the 240 ICU cases, 83% had at least one underlying condition, with 17% of those cases having asthma and 19% of cases having chronic lung disease (including Chronic Obstructive Pulmonary Disease, COPD); 28% were obese; and 23% were current smokers.

DEATHS

As of May 31, 2010, there were 71 deaths among individuals with laboratory confirmed pH1N1 virus². The ages of those who died ranged from under one year of age to 90 years old. The median age was 50 years old.

The graph (see **Figure 4**) below presents the number of deaths in each pandemic wave by zone. As expected, the two major cities have the highest numbers of deaths, where as the South Zone had the highest rate of deaths (2.9 per 100,000). The high pH1N1 death rate in the South Zone could be due to high variance in the data due to small numbers, the severity of the cases, or different thresholds for reporting cases.

Figure 4: Number of Reported Deaths and Mortality Rate of Individuals Positive for pH1N1 virus by Wave and Health Zone



Source: Alberta Health and Wellness Influenza Dataset

² Appendix B – Q4: provides pH1N1 death rates across Canada.

The vast majority of the pH1N1 influenza related deaths (96%) had known or identified underlying conditions which increased their likelihood of complications from influenza. Fifty four percent of cases who died had asthma and/or other chronic lung conditions. **Table 7** (on page 25) shows the chronic conditions among hospitalized cases and deaths.

LEVEL 2

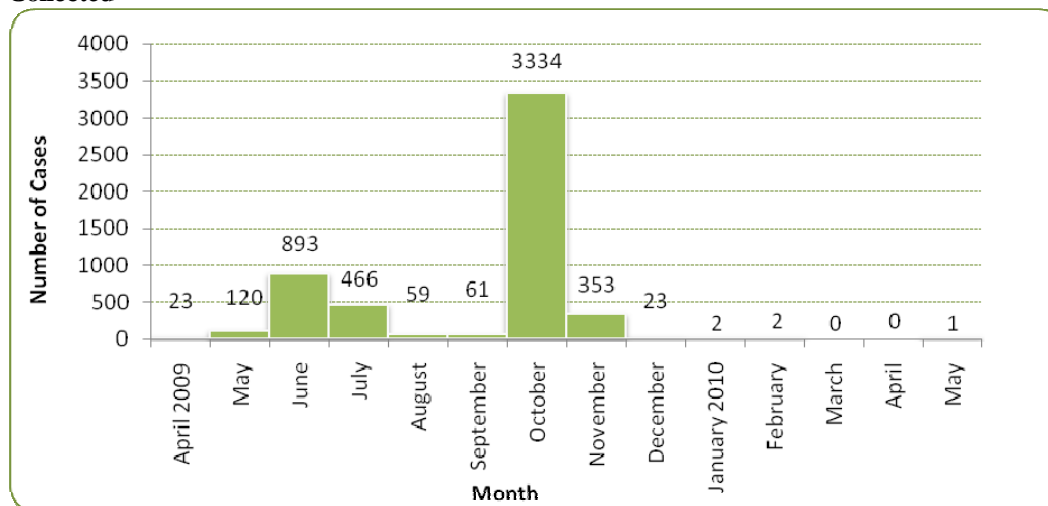
Pandemic (H1N1) 2009 influenza Level 2 represents: 1) laboratory confirmed cases of pH1N1 virus, who were not hospitalized or did not die and 2) people with ILI who sought medical care at physician offices, emergency departments and influenza assessment centres.

During the first of the pH1N1 waves, multiple respiratory viruses were circulating in Alberta. However, in the second wave, the pH1N1 virus was the predominant respiratory virus. A rapid increase in the number of specimens sent to the Provincial Laboratory for Public Health (ProvLab) for testing impacted laboratory capacity, and as a result laboratory protocols changed on October 22 to test only cases of influenza with severe illness requiring hospitalization. On October 30, the ProvLab ceased testing of community based specimens for pH1N1 virus and only tested hospitalized, outbreak related (excluding schools), The Alberta Reporting and ReseArch NeTwork (TARRANT) sentinel physician specimens and patients with unexplained respiratory illness and deaths, as requested by public health. At that point in the pandemic, patients with ILI were typically treated as having the pH1N1 virus.

LABORATORY-CONFIRMED CASES

Specimen collection and laboratory testing protocols changed throughout the pandemic waves in response to the evolving pandemic and possibly the effect of attendant media coverage. Because of these and other factors, laboratory confirmed non-hospitalized cases gave an indication of illness trends, but were not indicative of the population with mild illness. Nonetheless, these samples were important in characterizing community spread and evaluating whether a virus shift was occurring and in estimating other respiratory viruses circulating. Laboratory confirmed pH1N1 cases peaked in June for Wave 1 and October for Wave 2 (see **Figure 5**). The age range for the 5,337 non-hospitalized confirmed cases was between less than one to 99 years of age, with a median age of 21 years.

Figure 5: Lab-Confirmed, Non-Hospitalized pH1N1 Influenza Cases in Alberta, by Month Specimen Collected



Source: Alberta Health and Wellness Influenza Dataset

ILI-SCREENING

Not all people with ILI were tested for pH1N1 virus. The decision to test for pH1N1 virus was based on physician clinical judgment and on the ProVLab test prioritization as a part of pandemic preparedness. Laboratory data was used for surveillance, as was the monitoring of ILI reports.

Emergency Department Visits

In Edmonton and Calgary, the electronic capture of ILI screening information (see AHS criteria for emergency department screening in box on next page) in emergency departments and urgent care centres (UCC)³ occurred during the second wave. In December 2009 the following rural hospitals began to electronically report ILI screening results: Fort McMurray, Red Deer, Lethbridge and Medicine Hat. The data represent visits, not people. A person could be represented more than once in the data, if they had multiple visits to the emergency departments and urgent care centres and screened positive for ILI.

During the second wave, 24,273 emergency department and urgent care centre visits had people who screened positive for ILI. The number of visits that screened positive peaked in the influenza reporting week 44 (week starting November 1, 2009).

During the second wave, 8% to 34% of emergency and urgent care visits were ILI related (see **Figure 6**).

AHS criteria for Emergency Department and Urgent Care Centres Influenza-Like Illness Screening:

1. Does the Adult patient have an acute onset of new cough or change in existing cough?

Plus one or more of the following:

- Fever (temperature of $\geq 38.0C$ at triage or by history)
- Sore throat
- Joint pain
- Muscle aches
- Severe exhaustion

2. Does the pediatric patient have an acute onset of respiratory symptoms such as:

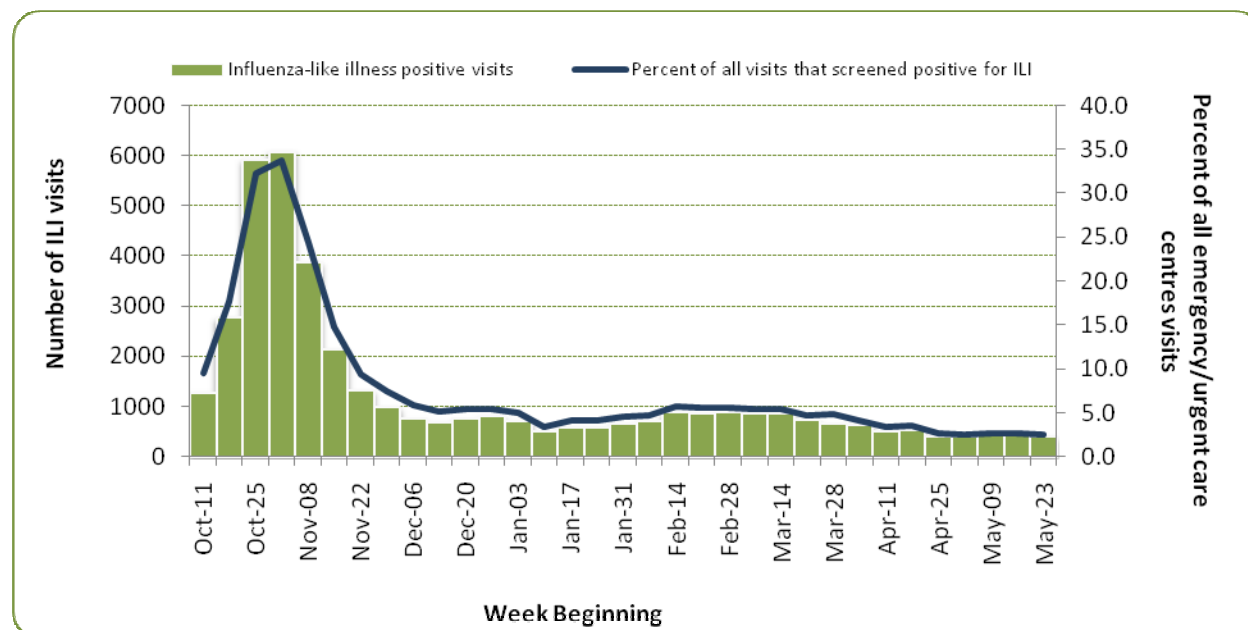
- Cough
- Runny nose
- Sneezing
- +/- fever

Influenza-Like Illness in the General Population (National definition used by Alberta Health and Wellness (AHW) for Reporting)

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 years, gastrointestinal symptoms may also be present. In patients under five years or older than 65 years, fever may not be prominent.

³ **Urgent Care Centres** are medical facilities for people who have unexpected but not life-threatening health concerns requiring same-day treatment. The urgent care team is comprised of nurses, doctors, and other health care providers. Urgent care centres operate separately from hospitals.

Figure 6: Level 2 ILI seen in Emergency Departments/Urgent Care Centres, Edmonton and Calgary, 2009/10



Source: ARTSSN-Emergency Department data –EDIS and REDIS, extracted August 10, 2010

Notes: Level 2 refers to visits to emergency departments or urgent care centres that screened positive for influenza-like illness

Of the ILI-screening in emergency departments and urgent care centres, almost half (48%) of the visits were in children (ages: new born to 18 years) – see **Table 2**. There was no significant gender difference between males and females who were seen with ILI.

Table 2: Age and gender distribution of people who screened positive for ILI in Emergency Departments and Urgent Care Centres, Edmonton and Calgary, from October 11 to December 5, 2009

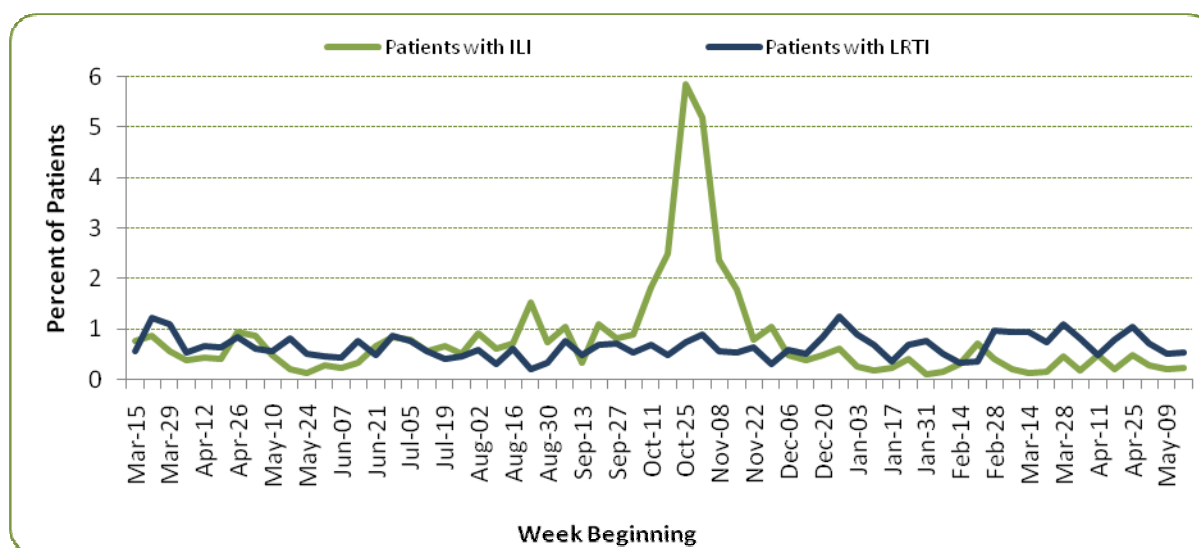
	Wave 2	
	% of total	Rate per 100,000
Total	100	671.2
Age groups		
Under 2 years	12	2911.4
2-4	12	2123.8
5-9	10	1156.1
10-18	14	823.0
19-24	10	788.9
25-44	23	508.4
45-64	12	318.7
65 years and older	5	284.1
Unknown	1	
Gender		
Females	51	654.5
Males	49	677.1

Source: ARTSSN-Emergency Department data –EDIS and REDIS, extracted January 14, 2010

TARRANT Sentinel Physicians

TARRANT, The Alberta Reporting and ReseArch NeTwork, provides information on seasonal influenza and pH1N1 influenza. Sentinel physicians were used to monitor community spread and quickly identify areas of concern. The purpose of the program is the surveillance of ILI as seen by sentinel physicians who participate in the program. TARRANT physicians are not proportionately distributed throughout the province but at a higher concentration in the Calgary Zone. TARRANT collected, analyzed, and reported community-based clinical ILI and collect specimens for virological data and made a significant contribution to pH1N1 surveillance (see **Figure 7**).). When community-based specimens were not tested at ProvLab during test prioritization in the second wave, testing of TARRANT specimens provided ongoing surveillance of respiratory viruses causing ILI in the community.

Figure 7: Percentage of Patients Presenting with ILI and Lower Respiratory Tract Infections (LRTI) Seen by TARRANT Sentinel Physicians



Source: TARRANT

Health Link Alberta (HLA) Calls

Health Link Alberta (HLA) is another system that monitors the health and concerns of the community and was used for pH1N1 surveillance. HLA is a provincial, 24 hour a day, seven day a week nurse-staffed telephone advice and health information service that provides the public with advice and information about health symptoms and concerns. During Waves 1 and 2, HLA provided information about the pH1N1 vaccine, mass immunization clinics, and answered general questions on pH1N1 and seasonal influenza.

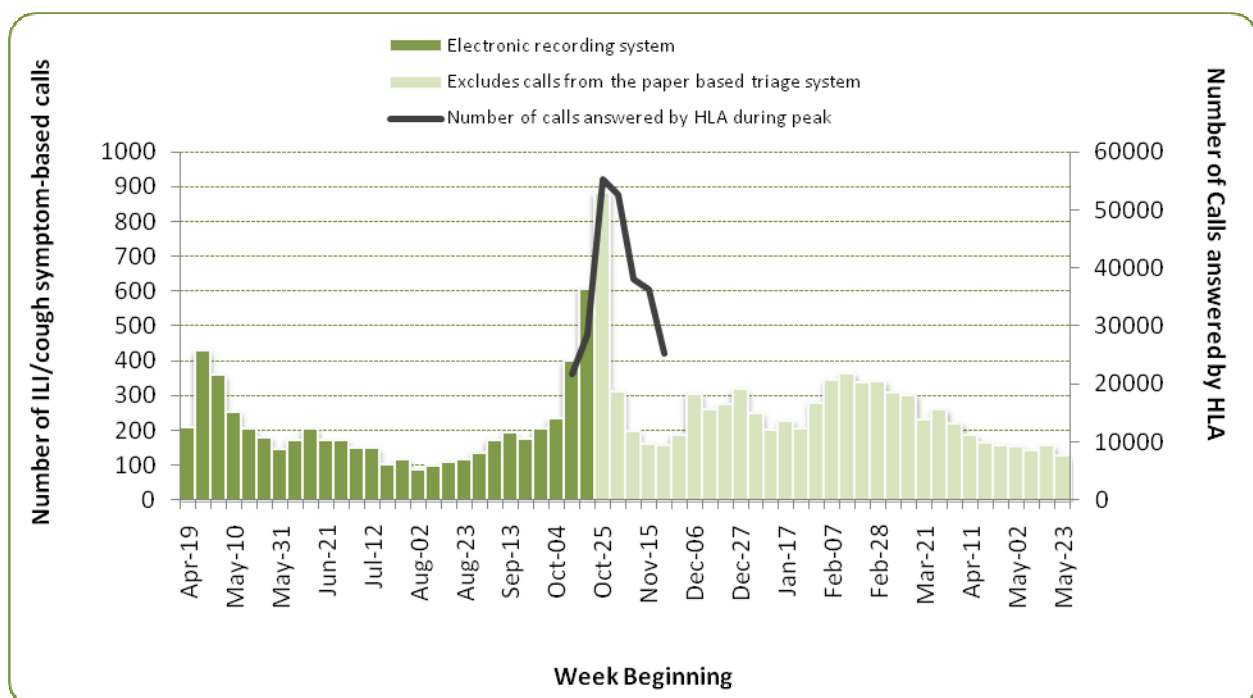
HLA provides a symptom based triage system that electronically captures information related to the person with the symptoms. For the pH1N1 surveillance response, the calls related to cough and/or ILI were of particular interest. These calls gave an indication of the proportion of the public who may have been infected with the pH1N1 virus, but did not seek medical care or were not tested for the virus. ILI-coded calls included people who also had coughs.

HLA classifies the disposition (outcome) of calls into three categories: 1) referred to a health care provider (e.g. family physician), 2) told to go to the emergency department, or 3) told to care for themselves (self-care). The information in **Figure 8** represents calls received by HLA that were referred to seek medical care from either a health care provider or an emergency department.

In mid-October, HLA call centres were overwhelmed with calls from the community. On October 27, 2009, HLA enhanced their capacity to respond to the surge in calls by adding a paper-based system. As a result, data from that point forward under-represent the actual ILI-related calls managed by HLA. In October and November, HLA administered over 32,000 ILI paper protocols, which are not included in **Figure 8**.

During the first wave, there were 2,898 calls (42% of all coughs/ILI calls in the first wave) referred to medical care. During the second wave, there were 2,903 of the electronically recorded calls (33% of all cough/ILI calls in the second wave) referred to medical care. To estimate the dispositions from the paper records, the proportions of medical care referrals from the electronic records were applied to the paper counts. It was estimated (including both electronic and paper records) that approximately 13,000 cough and/or ILI calls were referred to medical care during the second wave. HLA calls related to coughs and/or ILI and subsequently referred to seek medical care were highest in children and in females (**Table 3**).

Figure 8: Health Link Alberta calls related to coughs and/or ILI that were advised to seek medical care (physician or Emergency Department), Alberta, 2009/10



Source: ARTSSN-Health Link Alberta - SharpFocus, extracted August 10, 2010

Notes: Data represents calls triaged by Health Link Alberta where the client was told to see a health care professional or to go to the emergency department. On October 27, 2009 Health Link Alberta incorporated a paper triage system in response to the increased call volumes. These data are not represented.

Table 3: Age and gender distribution of Health Link Alberta clients with coughs and/or ILI referred to seek medical care, by Pandemic Wave, Alberta, 2009/10

	Wave 1		Wave 2*	
	% of total	Rate per 100,000	% of total	Rate per 100,000
Total	100	80.1	100	80.3
Age groups				
Under 2 years	13	372.0	15	426.2
2-4	5	113.3	11	230.9
5-9	5	60.9	9	125.9
10-18	5	31.2	10	71.7
19-24	3	31.6	8	70.1
25-44	12	30.8	22	59.4
45-64	7	20.7	11	32.5
65 years and older	2	18.5	3	20.1
Unknown	48		11	
Gender				
Females	55	86.8	57	91.3
Males	43	69.3	36	57.5
Unknown	2		7	

Source: ARTSSN-Health Link Alberta - SharpFocus, extracted August 10, 2010

Notes: Data represents calls triaged by Health Link Alberta where the client was told to see a health care professional or to go to the emergency department. *On October 27, 2009 Health Link Alberta incorporated a paper triage system in response to the increased call volumes. These data are not represented.

LEVEL 3

During both waves of the pandemic, there were people infected with the pH1N1 virus who did not seek medical care. It is very difficult to describe this population.

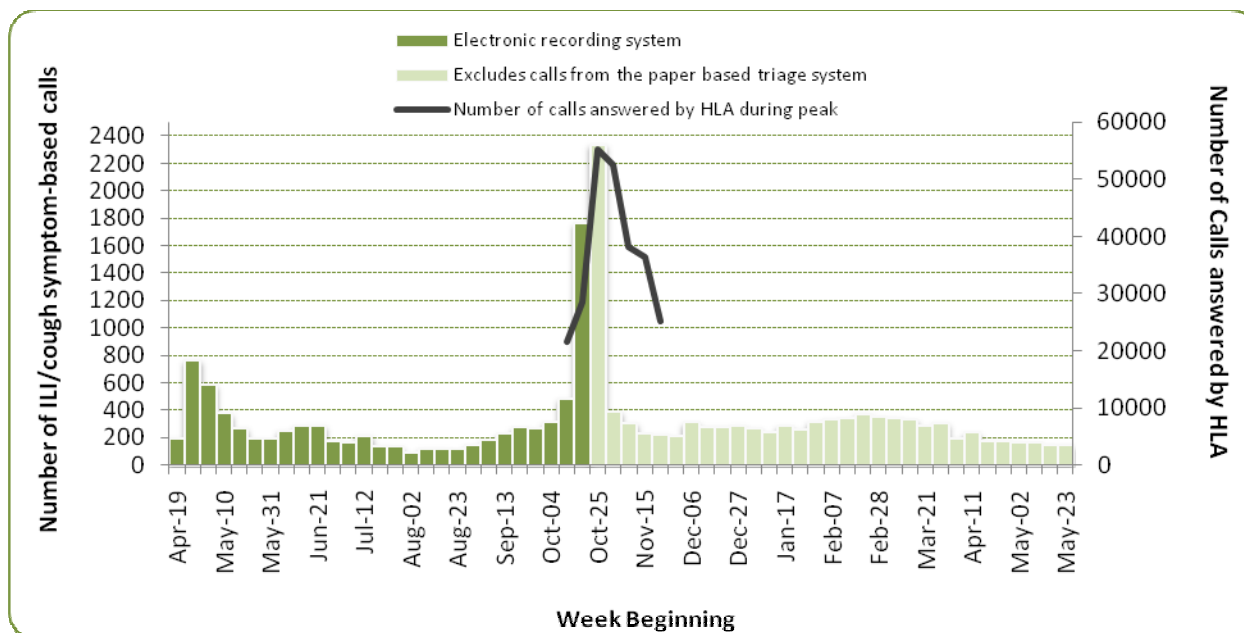
Pandemic (H1N1) 2009 influenza Level 3 represents self-reports of ILI that were managed in the community.

HEALTH LINK ALBERTA

HLA tracked the number of symptom-based triage calls related to coughs and ILI where a person was deemed to be able to manage their conditions on their own (self-care). Of the Health Link Alberta cough/ILI triaged calls where self-care was recommended, 4,079 (58%) of callers were told to self-care during Wave 1, and 5,926 (67%) were told to self-care in Wave 2 (see **Figure 9**). Including the information from the paper system, it was estimated that 27,500 cough and/or ILI calls were not of an emergent nature, and these people were thought capable of managing their illness at home.

In late October, the electronic recording system was at capacity, thus a paper system was incorporated in addition to the electronic system. Therefore, **Figure 9** gives an under representation of ILI calls as of October 27.

Figure 9: Health Link Alberta calls related to coughs and/or ILI, where self-care was recommended Alberta, 2009/10



Source: ARTSSN-Health Link Alberta - SharpFocus, extracted August 10, 2010

Notes: Health Link Alberta calls where the client was recommended to manage their symptoms at home (Self-care). On October 27, 2009 Health Link Alberta incorporated a paper triage system in response to the increased call volumes. These data are not represented.

Health Link Alberta calls related to coughs and/or ILI and told to manage their illness at home were highest in children and in females (see **Table 4**).

Table 4: Age and gender distribution of Health Link Alberta clients with coughs and/or ILI recommended to manage symptoms at home, by Pandemic Wave, Alberta, 2009/10

	Wave 1		Wave 2*	
	% of total	Rate per 100,000	% of total	Rate per 100,000
Total	100	112.8	100	163.8
Age groups				
Under 2 years	11	438.0	11	662.4
2-4	6	180.3	11	450.4
5-9	6	110.3	14	382.3
10-18	4	42.3	14	190.9
19-24	3	37.9	6	102.6
25-44	10	36.5	20	106.7
45-64	6	25.9	9	54.2
65 years and older	2	20.3	2	27.0
Unknown	52		15	
Gender				
Females	54	122.6	51	166.5
Males	41	92.9	37	120.1
Unknown	4		13	

Source: ARTSSN-Health Link Alberta - SharpFocus, extracted August 10, 2010

Notes: Health Link Alberta calls where the client was recommended to manage their symptoms at home (Self-care). *On October 27, 2009 Health Link Alberta incorporated a paper triage system in response to the increased call volumes. These data are not represented.

SUB-POPULATION GROUPS

ABORIGINAL PEOPLES

The first hospitalized pH1N1 case in Canada, and the first death associated with pH1N1 were both in Alberta and both were Aboriginal. Hence, monitoring of the virus among Aboriginals was important during the pandemic waves (see [Table 5](#)).

In Alberta, laboratory confirmed cases of pH1N1 virus in people self-reporting Aboriginal ethnicity (First Nation, Métis and Inuit) made up 3% of the total cases (180 out of 6,623 cases). The age range of these cases was new born to 80 years, with a median age of 25 years. Aboriginal people represent approximately 4% of the Alberta population.

Aboriginal people with pH1N1 influenza were overrepresented among hospitalized cases. These 166 hospitalized cases made up 13% of the 1,276 Albertans hospitalized.

The age range for hospitalized Aboriginals was less than one year to 80 years. The median age of Aboriginal pH1N1 hospitalized influenza cases of 25 years was younger than the 34 years for all hospitalized cases. Many of those hospitalized had one or more underlying conditions. Out of the 121 Aboriginal people hospitalized with known underlying conditions, 35 (29%) had asthma, 27 (22%) had chronic lung diseases other than asthma, 16 (13%) were immune-suppressed, 23 (19%) had diabetes and 21 (17%) were obese. Nine of the Aboriginal women hospitalized were pregnant.

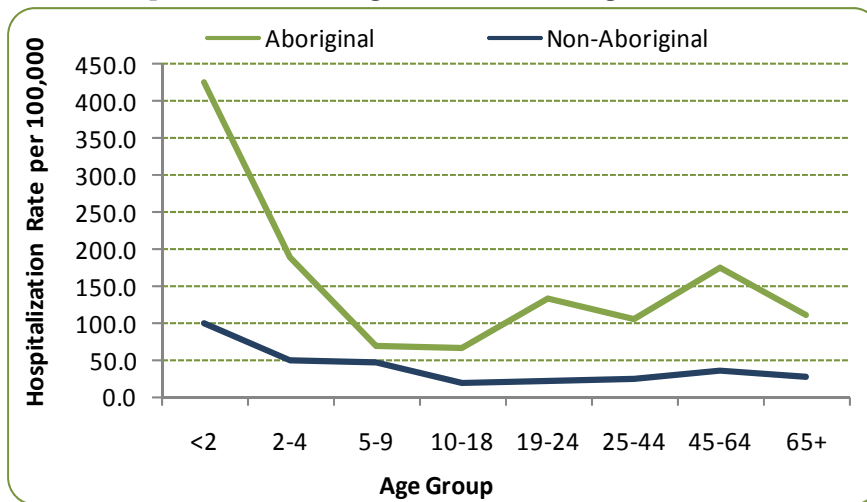
The number of Aboriginal people with pH1N1 influenza admitted to ICU was 38 (23% of all hospitalized Aboriginal cases). Thirteen deaths occurred among Aboriginals confirmed positive for pH1N1 virus, which was 18% of all pH1N1 deaths. The age range for these 13 deaths was under one year of age to 73 years, with a median age of 39 years, which was younger than the median age for all 71 deaths, which was 50 years.

Table 5: Pandemic (H1N1) 2009 Influenza Cases by Classification, and by Wave for both Total Alberta Population and Aboriginal Population in Alberta

	Wave 1		Wave 2	
	Total	Aboriginal	Total	Aboriginal
Lab Confirmed Cases	1588	28	4,710	150
Hospitalizations	119	17	1,095	143
Deaths	5	3	55	9

Source: Alberta Health and Wellness pH1N1 Influenza Dataset

Figure 10: Age-Specific Hospital Admission Rate per 100,000 Population Among Individuals Confirmed with pH1N1 virus, Aboriginal and Non-Aboriginal, Alberta 2009/10



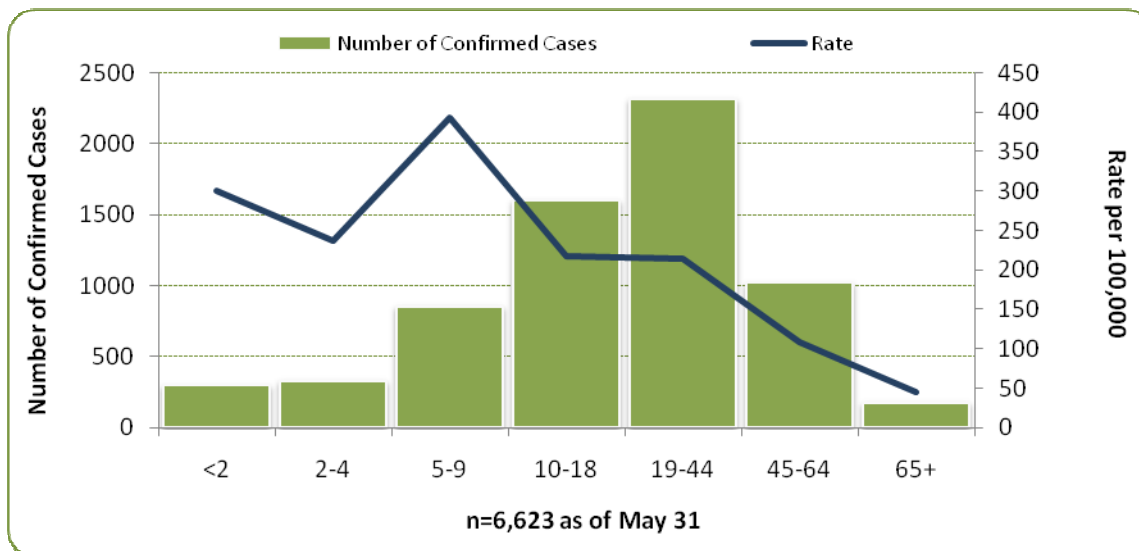
The Aboriginal confirmed pH1N1 influenza cases had a higher rate of admission to hospital than non-Aboriginal cases at each age group. Children under two years of age had significantly higher admission rates.

Source: Alberta Health and Wellness pH1N1 Influenza Dataset

CHILDREN

The novel pH1N1 influenza virus has affected the younger population significantly more than the typical seasonal influenza virus strains seen each year. Incidence of disease among school aged children (five to 18 years of age) was particularly high (see Figure 11).

Figure 11: All Laboratory Confirmed pH1N1 Influenza Cases in Alberta and Incidence Rates, by Age Group



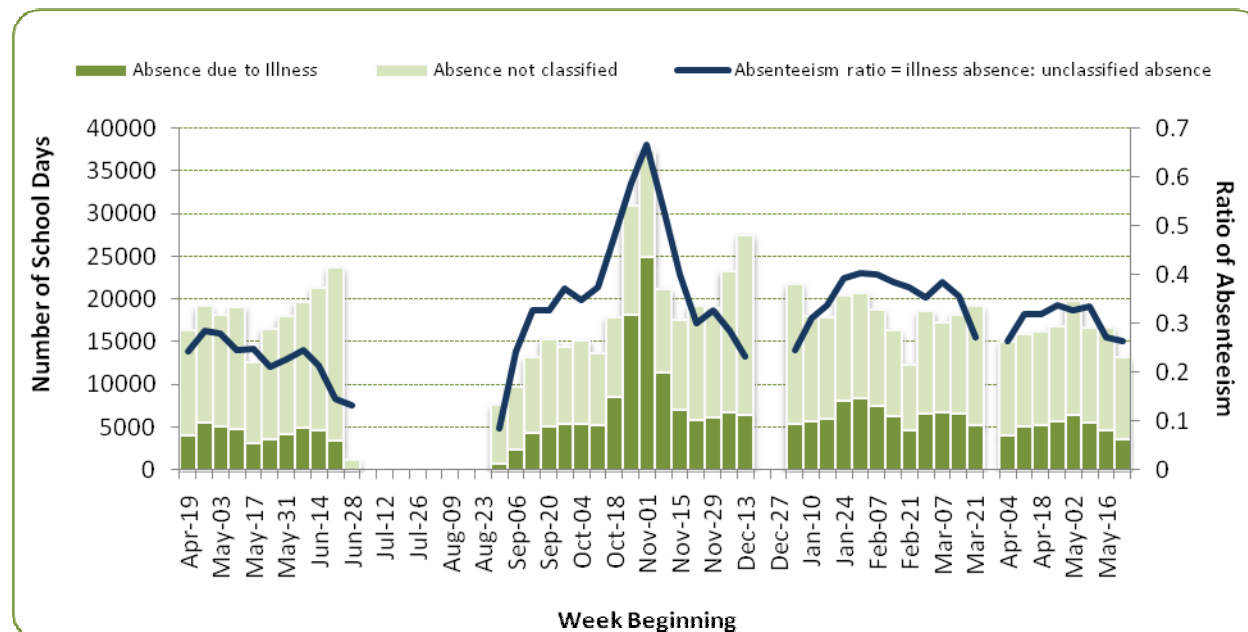
Source: Alberta Health and Wellness pH1N1 Influenza Dataset

School Absenteeism

The monitoring of illness in children is often done through school absenteeism, especially in the kindergarten to grade six cohorts. Children can be absent from school for many reasons, illness being only one of them. In looking at the (absenteeism due to illness) : (total absenteeism) ratio, a peak occurred in week 44 (starting November 1, 2009) (see Figure 12). At the peak, the number of children absent from school almost doubled

from previous weeks. In Edmonton, during the first wave, a total of 184,641 school-absence-days⁴ occurred (with the last five weeks of the wave falling on summer break); 175,878 school-absence-days occurred during the second wave. In Edmonton schools that actually coded absenteeism due to illness, 42,598 schools days were missed in the first wave and 86,721 days in the second wave.

Figure 12: Absenteeism in Kindergarten to Grade Six students, by Pandemic Wave, Edmonton, 2009/10



Source: ARTSSN-School data: Edmonton Public Schools and Edmonton Catholic Schools, extracted August 10, 2010

CLOSED FACILITY OUTBREAKS

The majority of ILI outbreaks occurred in schools for both waves. During Wave 2, more types of facilities reported outbreaks indicating wider community spread (see **Table 6**).

Table 6: Outbreaks of pH1N1 Influenza by Facility Type for Wave One and Two, 2009

Facility	Wave 1	Wave 2
Acute Care Facility	0	3
Child Care Facility	0	13
Hospital	1	0
Long Term Care Facility	3	6
School (Kindergarten – Grade 12) ^A	11 ^B	982
Seniors Lodge/Assisted Living	0	2
Other	0	5
TOTAL	15	1,011

Source: Alberta Outbreak Reporting Database

^A School outbreaks included both pH1N1 laboratory confirmed outbreaks and presumed pH1N1 outbreaks (not laboratory confirmed).

^B This number represents the school outbreaks that were assigned EI numbers and reported to AHW. The number is an underestimate of the actual number of school outbreaks that occurred. For example, in the Edmonton Zone, 99 ILI school outbreaks occurred during Wave 1. The reporting requirements for ILI school outbreaks changed for Wave 2, in that all school outbreaks were reportable to AHW regardless of whether an EI number was assigned or not.

⁴ School-absence-day is a collective measure of absenteeism. Each day represents a unit of time which a student is absent from school, thus 50 students absent for one day would represent 50 school-absence days.

CHRONIC UNDERLYING CONDITIONS

Chronic underlying health problems were more prevalent among hospitalized and deceased cases than in the general population. **Table 7** provides the percent of cases (those who were hospitalized and/or died) with reported chronic underlying health problems. Chronic respiratory disease (including Chronic Obstructive Pulmonary Disorder (COPD)), diabetes, heart disease, and obesity were the underlying conditions most likely to be reported.

Table 7: Percentage of persons tested positive for pH1N1 virus, by Condition

Condition	Percentage of Cases with Underlying Conditions	
	Deaths	Hospitalized Cases
Chronic Heart Disease	28%	12%
Diabetes	19%	13%
Obesity	25%	17%
Immune Suppressed	15%	8%
Asthma	19%	23%
Chronic Lung Disease (including COPD)	35%	18%
Pregnant	0%	5%

Approximately 77% of hospitalized pH1N1 influenza cases had one or more conditions (987 out of 1,276 cases). Of the deaths, 96% (68 out of 71 deaths) had one or more underlying conditions.

Source: Alberta Health and Wellness pH1N1 Influenza Dataset

Notes: Totals do not add to 100% due to some people having more than one condition.

IMPACT ON THE HEALTH CARE SYSTEM

The Pandemic (H1N1) 2009 experience not only impacted those who got ill, but also their families, the people they worked with or attended school with, as well as the health system. The pandemic began near the beginning of a major restructuring activity in the Alberta health care system; where 12 provincial boards were amalgamated into one administrative body.

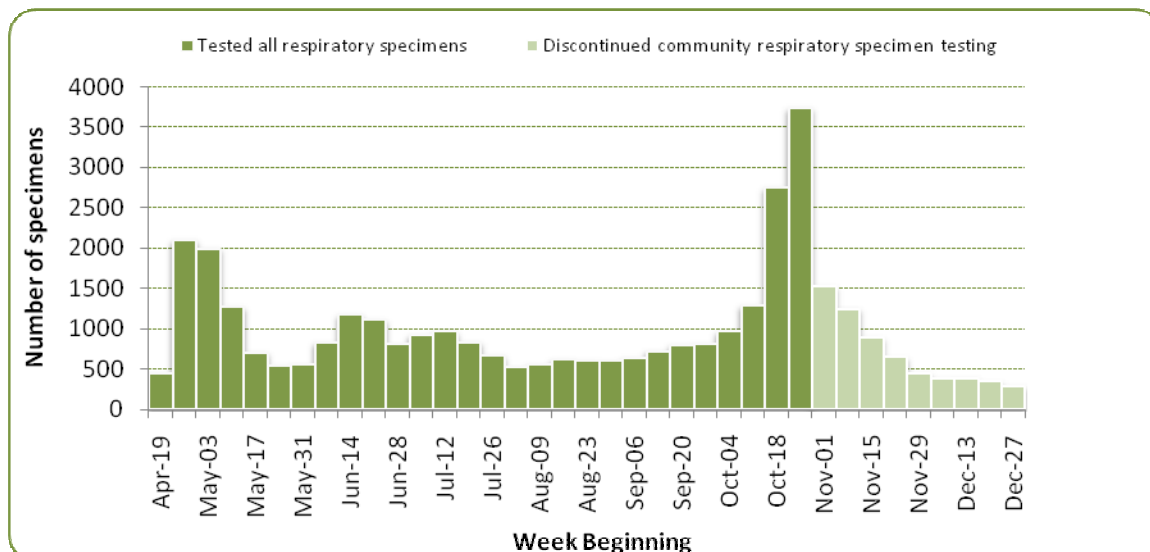
Previously it was mentioned that ProvLab changed their testing algorithm for respiratory specimens as a result of demands on, and capacity of, the health care system. Other areas of the health care system were also under heavy demand. This section addresses some such areas and their participation in surveillance activities during the pandemic.

PROVINCIAL PUBLIC HEALTH LABORATORY

The Provincial Laboratory for Public Health (ProvLab) was the primary testing laboratory for testing pH1N1 in Alberta and provided early detection and laboratory surveillance for the Pandemic (H1N1) 2009 virus. Typically influenza season begins in September and continues through the end of April. Last year, the 2008-09 influenza season continued into the first pandemic wave starting in the week beginning April 19, 2009. The workload activity in the ProvLab for influenza testing for the first wave peaked the week of April 26, 2009 and again in the week beginning October 25, 2009. (See **Figure 13**.)

In an average influenza season, ProvLab tests about 600 respiratory virus specimens per week; whereas in the peak of first and second waves, there was a four and seven fold increase, respectively, in the volume of specimens tested. Since the beginning of the pandemic, the ProvLab tested 36,796 respiratory virus specimens for the pH1N1 virus; 10,691 in the first wave and 13,744 in the second wave. Because of this very heavy workload, the ProvLab prioritized testing for hospitalized patients with severe ILI and non-school outbreak specimens on October 30, 2009; respiratory test of specimens from community physician offices and school outbreaks were discontinued.

Figure 13: Respiratory viruses testing for Alberta, 2009/10

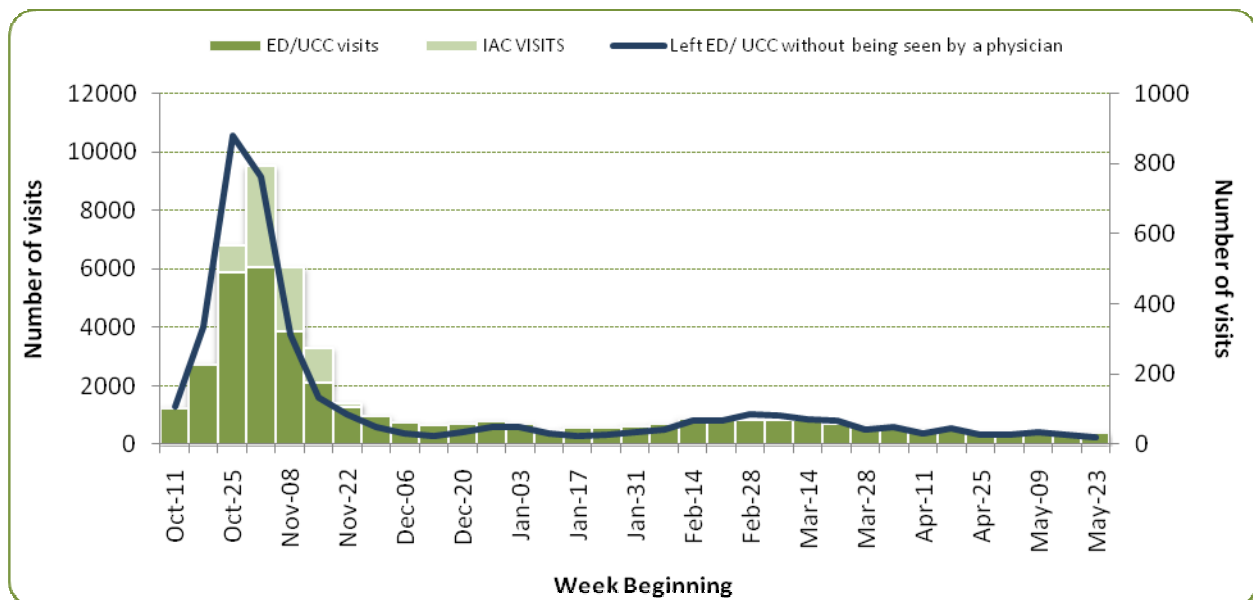


Same: CNPHI-Alberta (Data Integration for Alberta Laboratories (DLAL) & Alberta Influenza Case Management Tool) – respiratory virus laboratory data from Provincial Public Health Laboratory (ProvLab)

EMERGENCY VISITS

A typical day in an emergency department or urgent care centre is very busy. During the second wave, at least 27,000 people who came into the Edmonton and Calgary emergency departments and urgent care centres screened positive for ILI. When the emergency health care system was approaching capacity, Influenza Assessment Centres (IACs) were opened to reduce a portion of the extra burden on emergency departments and urgent care centres. **Figure 14** shows the impact of the IACs on reducing the burden on both emergency departments and urgent care centres in Edmonton and Calgary during the second pandemic wave.

Figure 14: ILI Cases Screened Positive in Emergency Departments, Urgent Care Centres and IACs, Edmonton and Calgary, 2009/10

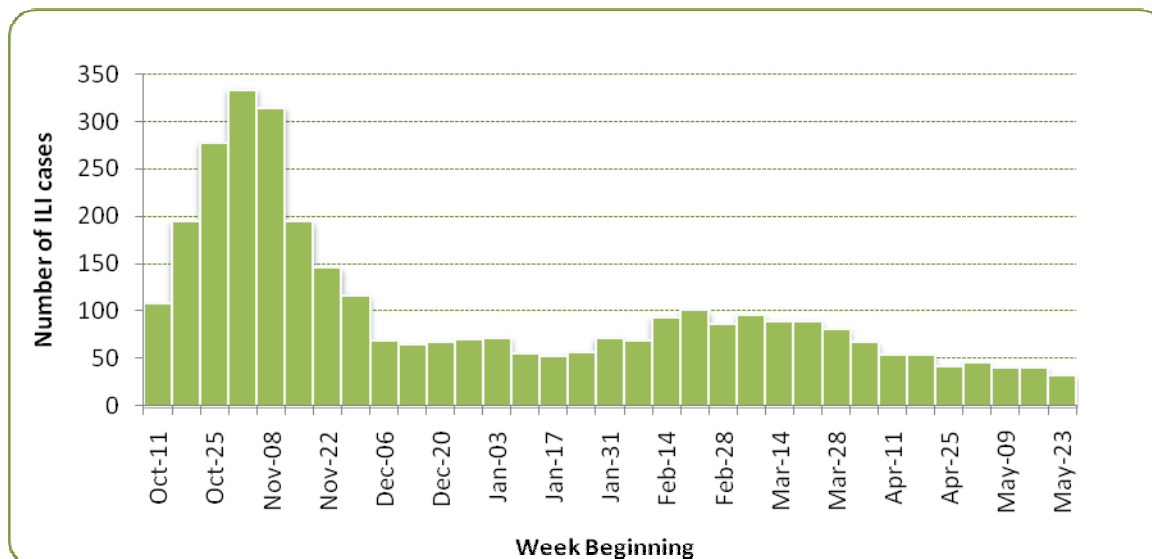


Source: ARTSSN-Emergency Department data – EDIS and REDIS, extracted August 10, 2010
 Notes: ED = Emergency Department UCC = Urgent Care Centres

During the second wave in Edmonton and Calgary, approximately 2,670 (11%) out of 24,273 people who screened positive for ILI left the emergency departments or urgent care centres without being seen by a physician. The number of people that left without being seen by a physician peaked in influenza reporting week 43, the same week the IACs opened. The number of people left without being seen might serve as a proxy to the capacity of the system and wait time.

Emergency departments are typical entry points into hospital care. Of the 24,273 people that screened positive for ILI in Edmonton and Calgary, 1,680 (7%) were admitted to hospital (see **Figure 15**).

Figure 15: ILI Cases Screened Positive in Emergency Departments that were Admitted to Hospital, Edmonton and Calgary, 2009/10

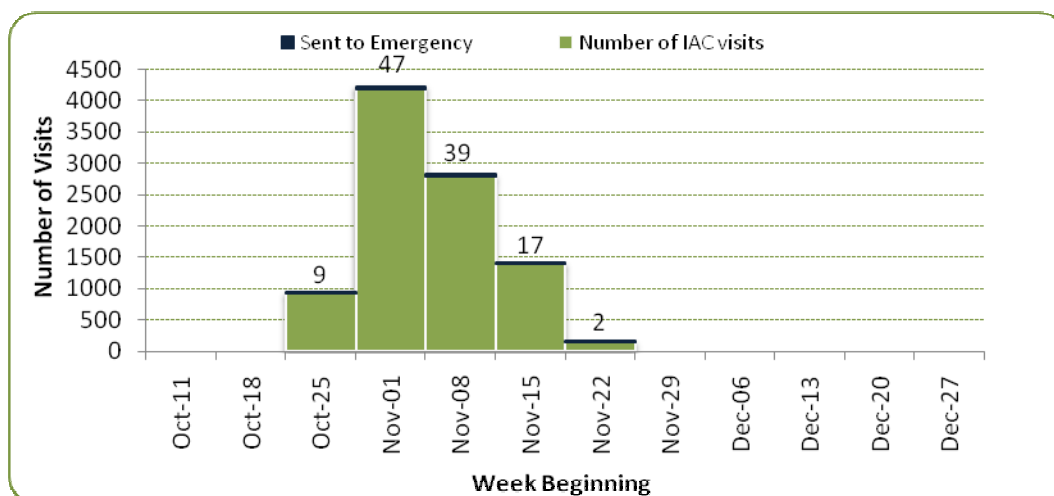


Source: ARTSSN-Emergency Department data – EDIS and REDIS, extracted August 10, 2010

INFLUENZA ASSESSMENT CENTRES (IACs)

The first IAC in Alberta opened in the Edmonton Zone on October 30, 2009 and was shortly followed by centres in the Calgary and South Zones. During the second wave, staff at the IACs assessed 9,371 people. From the assessments, 114 (1%) people were sent to emergency departments (see **Figure 16**).

Figure 16: Number of People Seen at IACs Including those Sent to Emergency Departments, Alberta, 2009/10



Source: Alberta Influenza Assessment Centres

Of the people assessed, most were children (ages less than one to 18) and those aged 25-44 years (see **Table 8**). Older adults (aged 65 years and older) appeared to use IACs the least. Gender differences were minimal, with slightly more females assessed than males.

Table 8: Age and Gender Distribution of Clients who were Assessed at the Influenza Assessment Centres by Percentage of Total and Rate per 100,000 Population, Alberta, 2009/10

	Wave 2	
	% of total	Rate per 100,000
Total	100	262.2
Age groups		
Under 2 years	6	579.1
2-4	8	537.5
5-8	8	459.3
9-18	13	268.3
19-24	10	292.7
25-44	35	304.6
45-64	17	171.7
65 and older	2	60.3
Gender		
Females	57	297.7
Males	43	226.9

Source: Alberta Influenza Assessment Centres

HOSPITAL CAPACITY

LENGTH OF STAY IN HOSPITAL

During the first and second waves, the length of stay was obtainable for pH1N1 cases who were admitted to an Edmonton or Calgary hospital (**Table 9**). These 743 patients stayed a total of 1,298 days within critical care and 6,011 days in non-critical care hospital units. The average length of stay was slightly higher in the second wave compared to the first wave (critical care days: 9.9 versus 8.9; non-critical care days 8.2 versus 7.3, respectively). In the first wave, females tended to stay longer in hospital compared to males. This pattern was reversed for the second wave.

In the first wave, 25-64 year olds tended to stay the longest in critical care, and in the second wave it was the 19-24 year age group. For non-critical care days in hospital, the 19-24 age group had the highest average number of days in the first wave, with the 65 year and older age group highest in the second wave.

Table 9: Length of Stay Information on Pandemic (H1N1) Influenza Cases who were Hospitalized, Edmonton and Calgary, 2009/10

	Wave 1 (n=84)		Wave 2 (n=659)	
	Number of patient days	Average length of stay (# patient days per patient)	Number of patient days	Average length of stay (# patient days per patient)
Total				
Critical Care days	134	8.9	1164	9.9
Non-critical care days	615	7.3	5396	8.2
Age groups				
Critical Care days				
Under 2 years	1	0.7	34	4.8
2-4	0	0.0	31	5.1
5-9	3	1.3	10	2.0
10-18	8	2.6	28	7.0
19-24	0	0.0	63	20.9
25-44	42	13.9	398	9.9
45-64	81	13.5	541	12.0
65 years and older	0	0.0	59	8.5
Non-Critical Care days				
Under 2 years	12	3.0	327	5.1
2-4	19	3.8	155	4.4
5-9	58	5.3	175	3.7
10-18	56	4.3	400	10.3
19-24	40	13.5	287	7.4
25-44	115	6.1	1083	6.9
45-64	264	11.5	2099	10.0
65 years and older	51	8.5	868	13.2
Males				
Critical Care days	48	6.9	718	11.4
Non-critical care days	208	5.8	3169	9.3
Females				
Critical Care days	86	10.7	445	8.2
Non-critical care days	407	8.5	2227	7.0

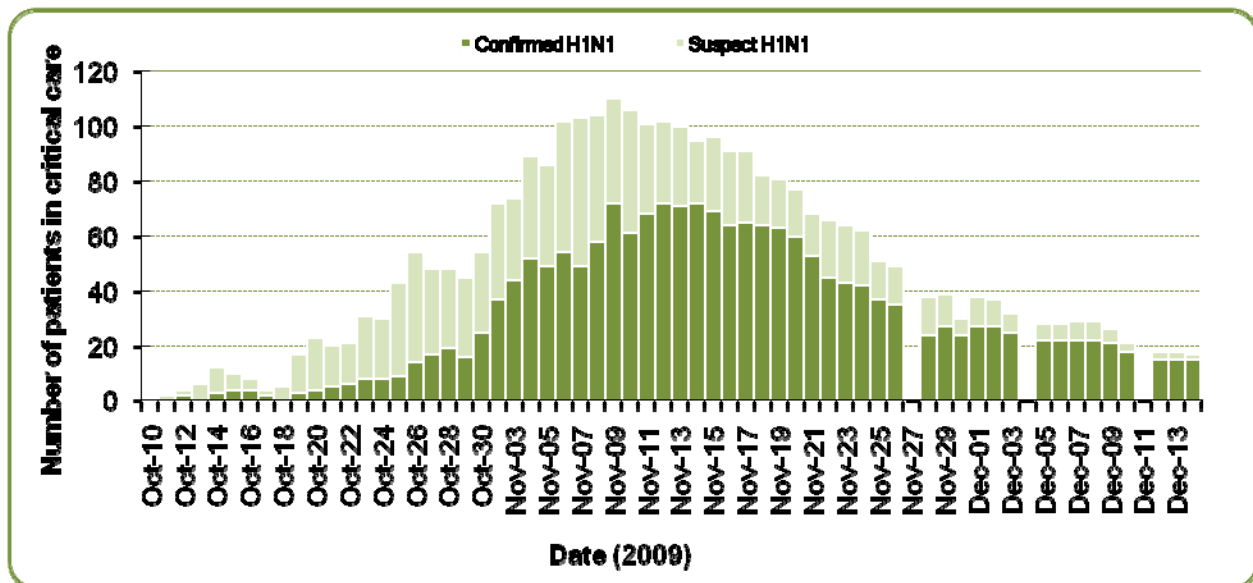
Source: ARTSSN Data Repository – Edmonton ADT data and Calgary Clinibase, Extracted: January 19, 2010

CRITICAL CARE UNIT CAPACITY

A hospital can have multiple critical care units⁵. Critical care units have the trained staff and equipment needed to provide intensive medicine to pH1N1 cases; these units were important for the treatment of severe pH1N1 cases during the pandemic.

During the second wave, the average number of suspect or confirmed pH1N1 influenza patients in critical care units was 50 patients per day (ranging from one to 110 patients a day) - see **Figure 17**.

Figure 17: Number of Confirmed and Suspect Pandemic (H1N1) 2009 Influenza Cases in Critical Care Units

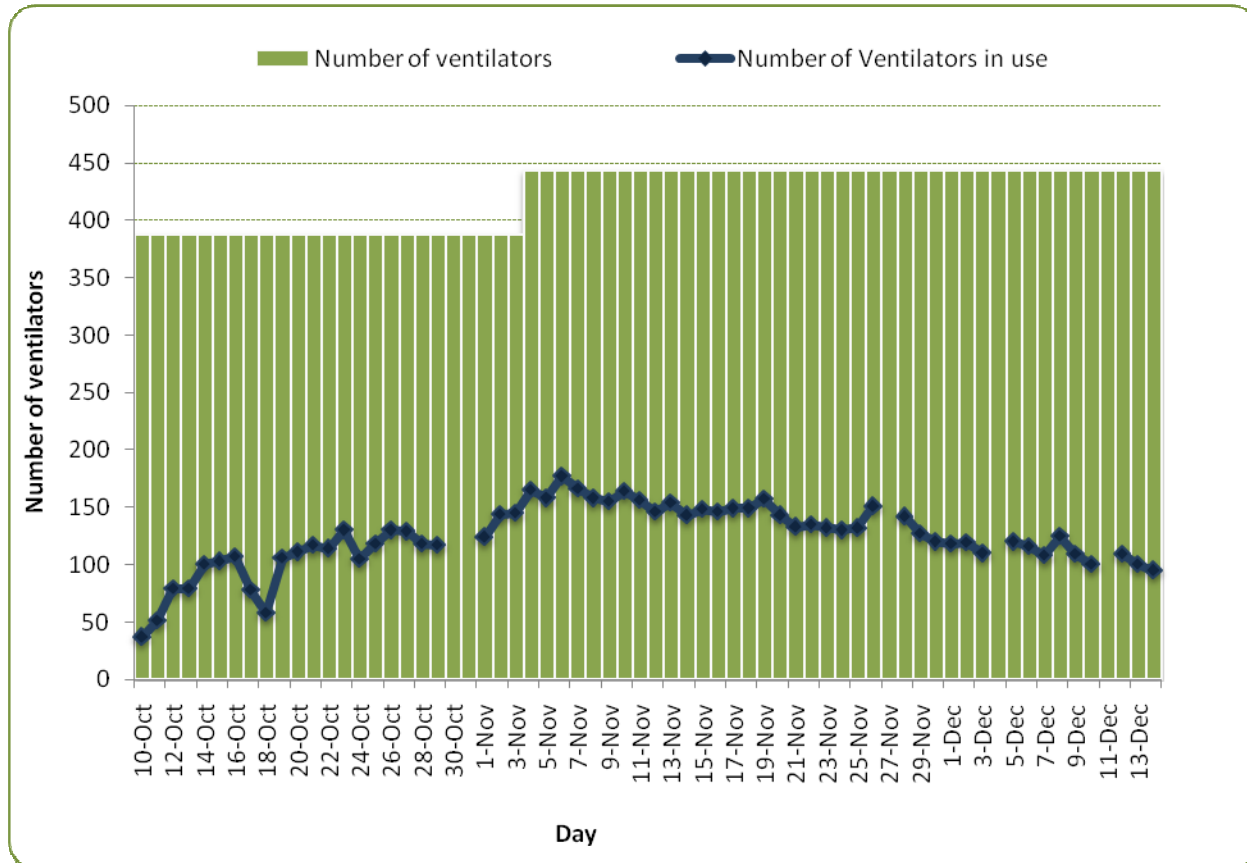


Source: Alberta Critical Care Network Reports
 Note: Dates where no values appear represents missing data.

The capacity of the critical care units was monitored during the second wave (see **Figure 18**). On average, confirmed and suspected pH1N1 cases occupied 16% of the critical care unit functional beds (range: 0 to 35%).

⁵ Critical Care Units are specialized departments that provide intensive care medicine. These include Intensive Care Units (ICUs).

Figure 18: Number of Critical Care Beds Occupied by Confirmed and Suspect pH1N1 Influenza Cases, Alberta (2009)



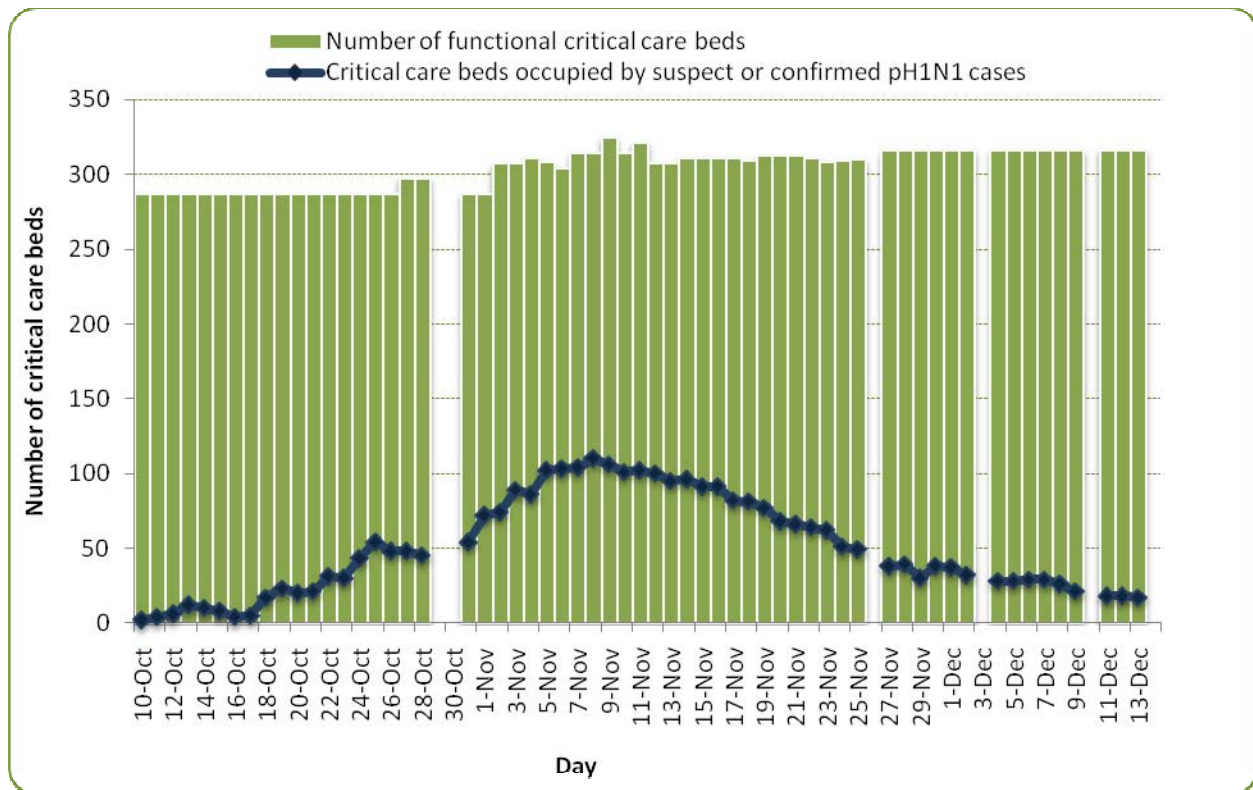
Source: Alberta Critical Care Network Reports

Note: Dates where no values appear represents either a zero value or missing value

VENTILATOR CAPACITY

Fourteen critical care sites in Alberta reported the number of patients using ventilators on a daily basis during the second wave (see [Figure 19](#)). Based on this information, there were five incidences where at least one site had more than 80% of the ventilators being used.

Figure 19: Number of Ventilators Used in Critical Care Units, Alberta (2009)



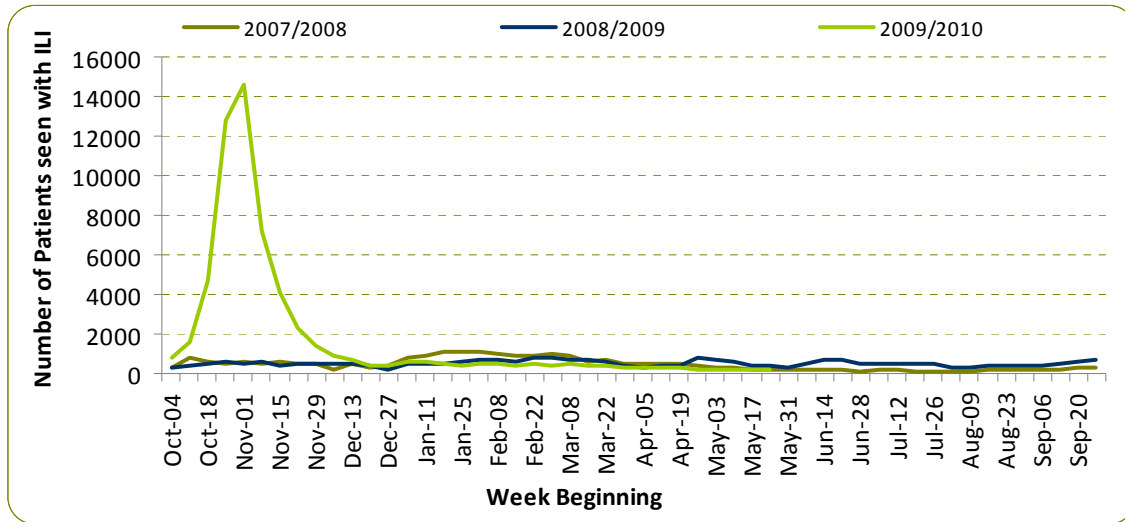
Source: Alberta Critical Care Network Reports

Note: Dates where no values appear represents either a zero value or missing value

PHYSICIAN VISITS

The number of general practitioners who diagnosed ILI cases between influenza week 40 and influenza week 49 was much higher in 2009/2010 than in the previous two influenza seasons, based on physical claims (see Figure 20).

Figure 20: Number of ILI Cases Diagnosed by General Practitioners per Influenza Week, Alberta – 2007/08 to 2009/10



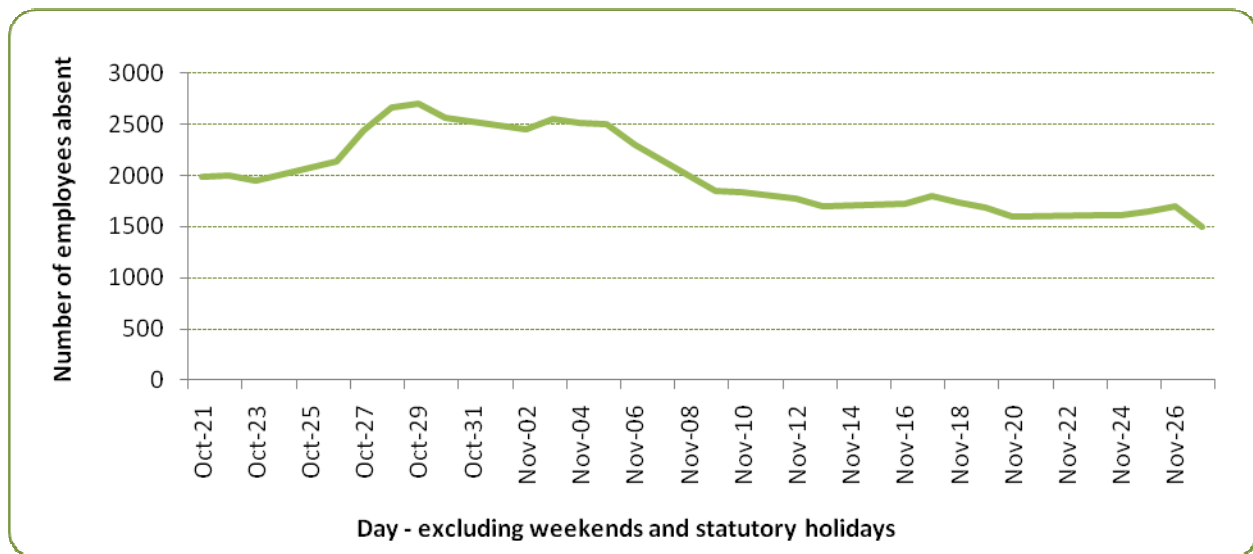
Source: Physician Claims

HEALTH CARE WORKER ABSENTEEISM

Alberta Health Services

Within the former health regions of Capital, Calgary, Aspen and David Thompson, 62,178 employee-absence-days⁶ occurred during the peak period of Wave 2 (October 21 to November 27, 2009) – see **Figure 21**. Workplace absenteeism peaked during influenza reporting week 43.

Figure 21: Workplace Absenteeism in the Four Former Health Regions (Capital, Calgary, Aspen and David Thompson), October 21-November 27, 2009



Source: Alberta Health Services Human Resources

The data presented in **Figure 21** was based on post-pandemic human resources reports and were provided for individual work days. Reporting of workplace absenteeism was difficult because human resources systems are administrative in nature and not designed for a response to a pandemic.

Alberta Health and Wellness

Within Alberta Health and Wellness, the human resources department reported a 3.5% absenteeism rate as common among employees due to sickness or family illness at any given time. In the fall, this increased to approximately 4.3%. Between October 28 and November 25 2009, the percentage of employees absent due to sickness or family illness ranged between 4.5% and 7.9%.

IMMUNIZATION SITES AND STATIONS

A large portion of pH1N1 immunizations administered in Alberta were delivered by Alberta Health Services in targeted and/or mass clinic venues. These venues were operated primarily from existing resources within Alberta Health Services. In order to meet the demand for pH1N1 immunization services, there were staff redeployed from other program areas to assist public health staff that normally provide routine immunization services.

⁶ Employee-absence-day is a collective measure of absenteeism. Each day represents a unit of time which an employee is absent from work, thus 50 employees absent for one day would represent 50 employee-absence days.

October 26th to December 23rd 2009 represents the time period with the most concentrated immunization campaign activity. During this time, an average of 37 clinics per day operated across the province. The clinics were held in various locations and ranged widely in terms of available physical space and the number of immunization stations available. The number of immunizations stations across the province ranged from almost 200 to over 800 per day (with an average of 419 stations per day). A summary by zone is presented in **Table 10** below.

Table 10: Average Number of pH1N1 Targeted and/or Mass Immunization Clinics, Stations and Vaccine Doses Delivered per day in Alberta, by Zone (Oct 26-Dec 23, 2009)

	Daily Average number of targeted and/or mass immunization clinics	Daily Average number of immunization stations	Daily Average number of stations per clinic site	Daily Average number of pH1N1 vaccine doses delivered
North Zone	16	60	4	1,878
Edmonton Zone	7	136	19	7,572
Central Zone	5	48	10	2,308
Calgary Zone	9	164	18	9,830
South Zone	3	39	13	1,971
Alberta	37	419	11	21,619

Source: Alberta Health Services Zone reports to Emergency Command Centre (ECC) – at 2:30 pm each day.

Note: Data include all days within that particular zone or geographic area where clinics were operating (excludes Nov 2nd, 3rd and 4th 2009 as clinics were suspended at this time)

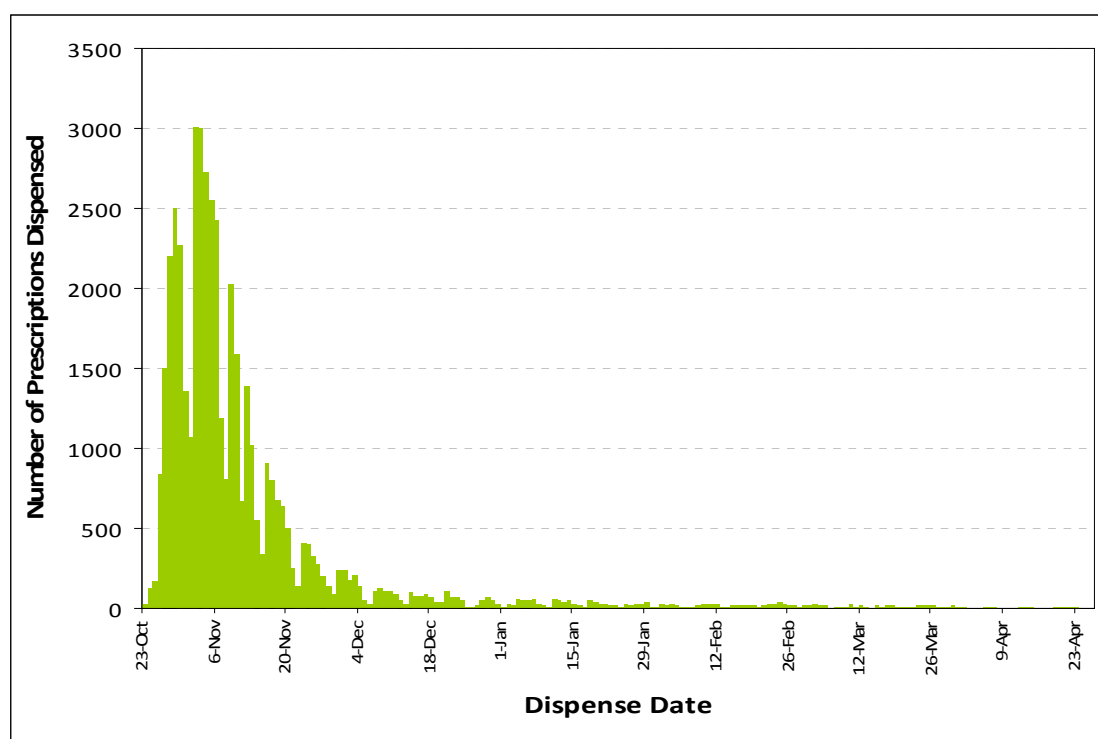
The number of pH1N1 vaccine doses administered in targeted and/or mass immunization clinics ranged from almost 7,000 doses to over 70,000 doses per day (with an average of 21,619 doses per day).

PREVENTION AND TREATMENT

ANTIVIRALS

The national stockpile became available effectively on October 22, 2009. Prior to that antivirals had only been used in institutional settings. Between Friday, October 23, 2009 and May 2, 2010, approximately 46,250 prescriptions for an antiviral had been dispensed by community pharmacies see [Figure 22](#). The age range for those prescribed antivirals was less than one year of age to 102 years. The mean age was 28 years (29 years for females; 26 years for males), while the median age was 26 years (28 years for females; 23 years for males); the age difference between males and females is statistically significant.

Figure 22: Number of Antiviral Prescriptions Dispensed by Community Pharmacies, Alberta, October 23, 2009 – May 2, 2010



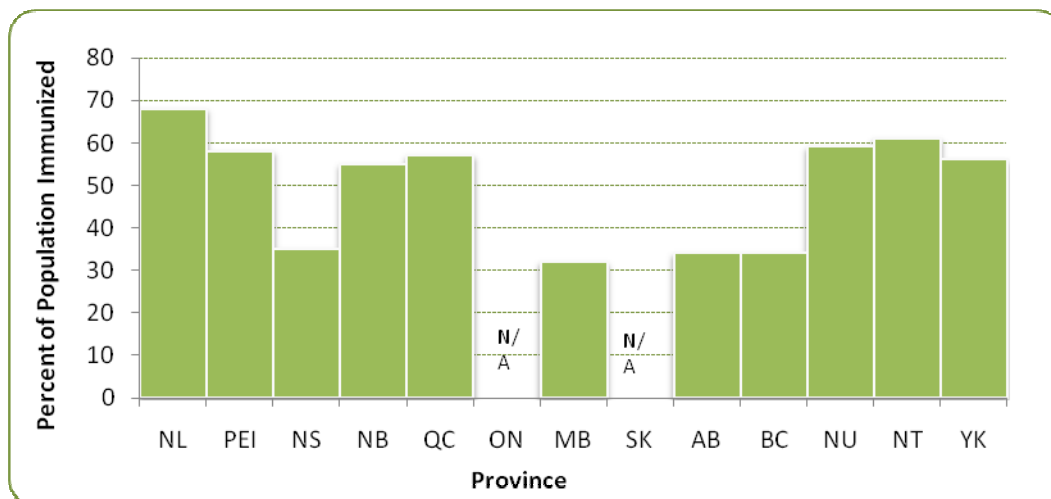
Source: Alberta Blue Cross submission to Alberta Health and Wellness
 Note: National stockpile became available on October 22, 2009.

IMMUNIZATIONS

As of May 31, 2010 approximately 1,354,180 doses of the pH1N1 vaccine had been administered to 1,310,085 Albertans (some children under ten years of age required two doses of the vaccine). An estimated 36% of Albertans had been immunized by the end of May 2010. By the end of Wave 2, over 11 million doses of the pH1N1 vaccine had been administered in Canada. The estimated immunization rate varied by province and territory, with Newfoundland and Labrador having the highest rate (67%) and Alberta having one of the lowest rates⁷ (see [Figure 23](#)).

⁷ Appendix B – Q1: provides addition details regarding the standardization of immunization data across Canada.

Figure 23: Percent of Population Immunized for the Pandemic (H1N1) 2009 Virus, by Province/Territory, Canada, as of End of Wave 2



Source: Public Health Agency of Canada
 Note: Data from Ontario and Saskatchewan were not available.

Since the beginning of the pH1N1 immunization campaign, various providers administered the pH1N1 vaccine within Alberta. Up to May 31, Alberta Health Services had administered almost 1.3 million doses of the pH1N1 vaccine, while other providers, which include Corrections Services Canada, community pharmacists, and First Nations and Inuit Health, had administered approximately 65,000 doses (see **Table 11** and **Figure 24**).

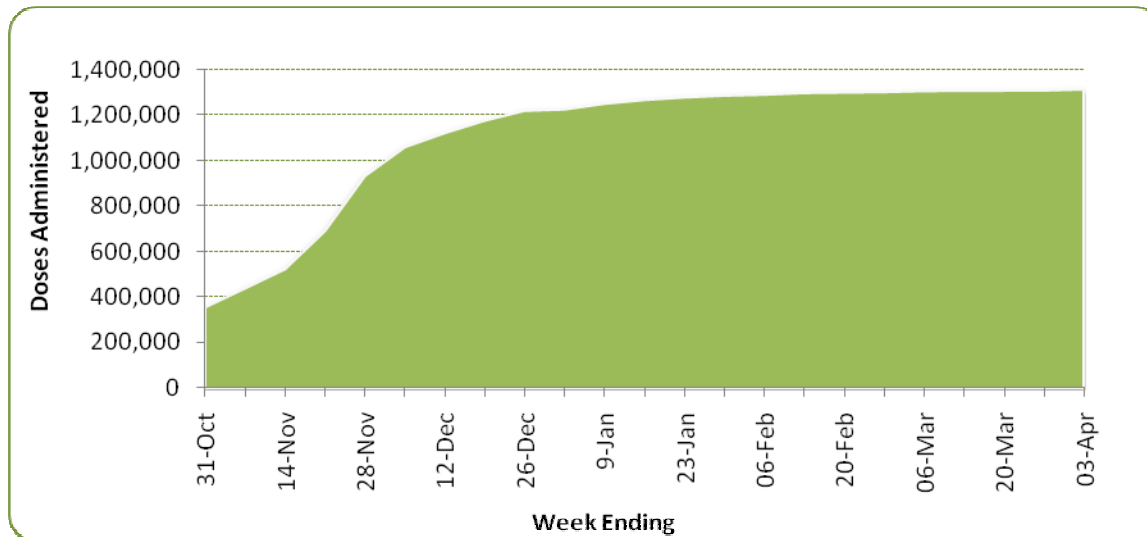
Table 11: Number of Doses Administered, by Administration Group

Administration Group	Total Doses Administered
Alberta Health Services*	1,289,432
Corrections Services Canada	526
First Nations Inuit Health	44,061
Community Pharmacists	20,151
Total	1,354,180

Source: Alberta Health and Wellness pH1N1 Vaccine Database.
 * Includes doses administered by Alberta Health Services, Continuing Care Centres, physicians, and other external providers

Community Pharmacists began providing both pH1N1 immunizations and seasonal influenza immunizations on December 10, 2009. As of May 31, 2010 they had administered 20,151 pH1N1 immunizations. Physicians also began immunizing with both influenza vaccines around the same time.

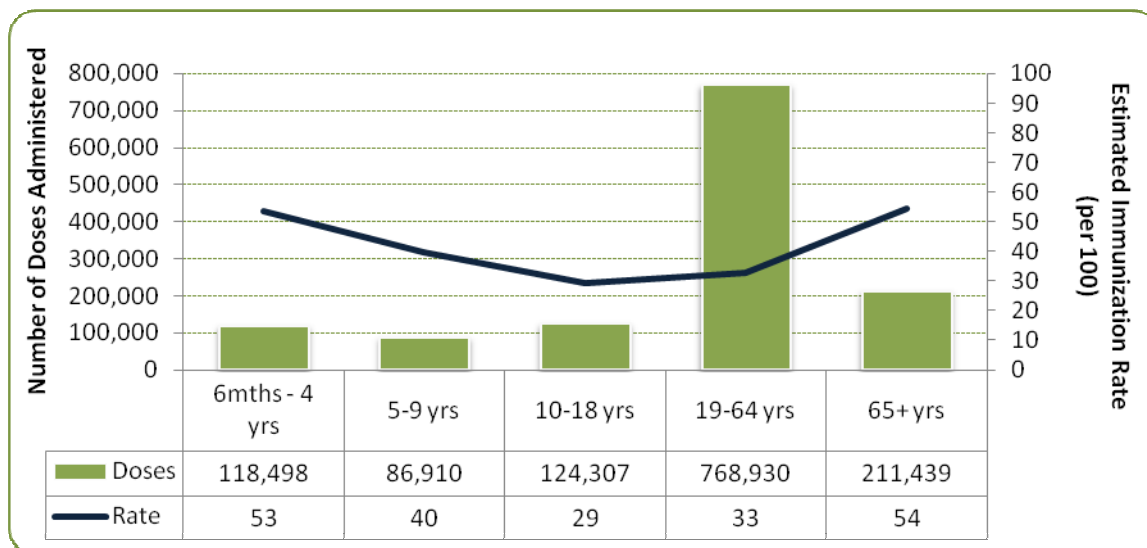
Figure 24: Cumulative Doses of pH1N1 Vaccine Administered (both Adjuvant and Non-Adjuvant), by Week



Source: Alberta Health and Wellness pH1N1 Vaccine Database
 Data for the months of April and May were reported monthly, not week. As such, they are not included in this graph.

Figure 25 includes both first and second doses of pH1N1 vaccine administered in Alberta, thus the number of doses administered exceeds the number of people who have been immunized. Some children under the age of ten require two doses. Approximately 44,000 children under the age of ten years were given two half doses (suggested pediatric dose for those receiving an influenza vaccine for the first time) as of May 31.

Figure 25: Doses Administered and Immunization Rate of pH1N1 Vaccine (both Adjuvant and Non-Adjuvant), by Age Group



Source: Alberta Health and Wellness pH1N1 Vaccine Database
 Note: The above graph only includes first doses administered in Alberta

The age group with the highest estimated immunization rate was those 65 years of age and older (54%) (see **Table 12**). Children between 6 months and 4 years also had a high estimated rate of immunization (53%).

Table 12: Number of Doses Administered of pH1N1 Vaccine (both Adjuvant and Non-Adjuvant), People Immunized, and Estimated Immunization Percentage (coverage), by Age Group

Age Group	Population	Number of Doses Administered	Number of People Immunized	Estimated Population Immunized Percentage (coverage)
6 mos - 4 yrs	221,567	156,300	118,498	53%
5-9 yrs	218,401	93,203	86,910	40%
10-18 yrs	422,841	124,307	124,307	29%
19-64 yrs	2,346,007	768,930	768,930	33%
65+ yrs	388,245	211,439	211,439	54%
Total	3,597,061	1,354,180	1,310,085	36%

Source: Alberta Health and Wellness pH1N1 vaccine database

Note: Estimated immunization percentage calculation is based on the number of persons who have received at least one age appropriate dose of the pH1N1 vaccine.

Various groups were targeted throughout the pH1N1 vaccine campaign, which includes those under 65 years of age at high risk, children six months to four years of age, health care workers, pregnant women, and those living on-reserve (see **Figure 13**).

Table 13: Target groups of pH1N1 Immunization Campaign, by Influenza Report Week

Week	Target Group
43	Clinics open to public on October 26 . Target group recommended, but public health clinics open to all. Clinics suspended on October 31 . Suspension was necessary due to vaccine shortage
44	November 4 - Targeted clinics re-open for health care workers. November 5 -Targeted clinics re-open to public for health care workers, those living in remote and isolated communities, pregnant women, and children six months to four years of age.
45	November 10 - target groups expanded to include children under ten years of age with chronic conditions and parents (or one parent and one caregiver) of infants under six months of age. November 12 - target groups expanded to include people with chronic conditions aged 55 to 64 years and people with chronic health conditions aged ten to 17 years. November 13 - target groups expanded to include people with chronic conditions aged 45 to 54 years. November 14 - target groups expanded to include people 18 to 44 years with chronic conditions as well as a household contact of individuals who cannot be immunized.
46	November 17 - target groups expanded to include all seniors over 75 years of age as well as their spouses or partners of any age. November 19 - target groups expanded to include seniors 65 years and older as well as their spouses or partners of any age. November 20 - target groups expanded to include all children under 18 years of age as well as their immediate family members and caregivers living in the same household.
47 +	November 23 - immunization program expanded to include all members of the public.
49	December 10 - External providers immunizing those over nine years of age with pH1N1 vaccine.

In the first week of the immunization campaign (October 25 to 31) approximately half of those immunized were part of a target group. First Nations and Inuit Health received 40,000 doses of pH1N1 vaccine initially and were able to immunize 27,299 people in the first week of the immunization campaign.

In the second week of the campaign (November 1 to 7) only those living in remote areas, health care workers, pregnant women and children under five years of age were immunized. During the third week (November 8 to 14) the program expanded to include those under sixty-five years of age with chronic conditions, parents with infants under six months of age, and those living with someone who could not be immunized. The fourth week (November 15 to 21) included those under 65 years of age with chronic conditions and children under 18 years of age as well as their immediate family members or caregivers. Finally, during the fifth week (November 22 to 28) the public health immunization clinics were open to the entire public. The estimated immunization rates of the initial target groups⁸ are listed below (see **Table 14**).

Table 14: Estimated Percentage Immunized with pH1N1 Vaccine in Alberta, by Target Group

Target Group	Estimated Percentage Immunized
Under 65 years at high risk	32%
6 months to 4 years	53%
Health Care Workers	52%
Pregnant Women	35%
Those Living On-Reserve	66%

*Source: Alberta Health and Wellness pH1N1 vaccine database
 Note: Estimated immunization percentage calculation is based on the number of persons who have received at least one age appropriate dose of the pH1N1 vaccine.*

Those living on-reserve had the highest estimated rate of pH1N1 immunization in the province.

Health care workers and children six months to four years of age both had approximately half of the population immunized. Just over one-third of pregnant women and those with chronic health conditions under sixty-five years of age were immunized.

AHW Target Group Definitions:

Health Care Workers are:

Those who provide direct patient care as well as those who support the provision of healthcare services;

Includes:

- full-time staff,
- part-time staff,
- students,
- regular visitors and volunteers;

Settings include:

- acute care,
- chronic care,
- ambulatory/ community care,
- emergency medical services,
- laboratory,
- public health departments,
- pharmacies,
- physician offices etc;
- Canadian Blood Services
- vaccine manufacturers

Under 65 years at High Risk are:

Adults and children with the following health conditions or situations:

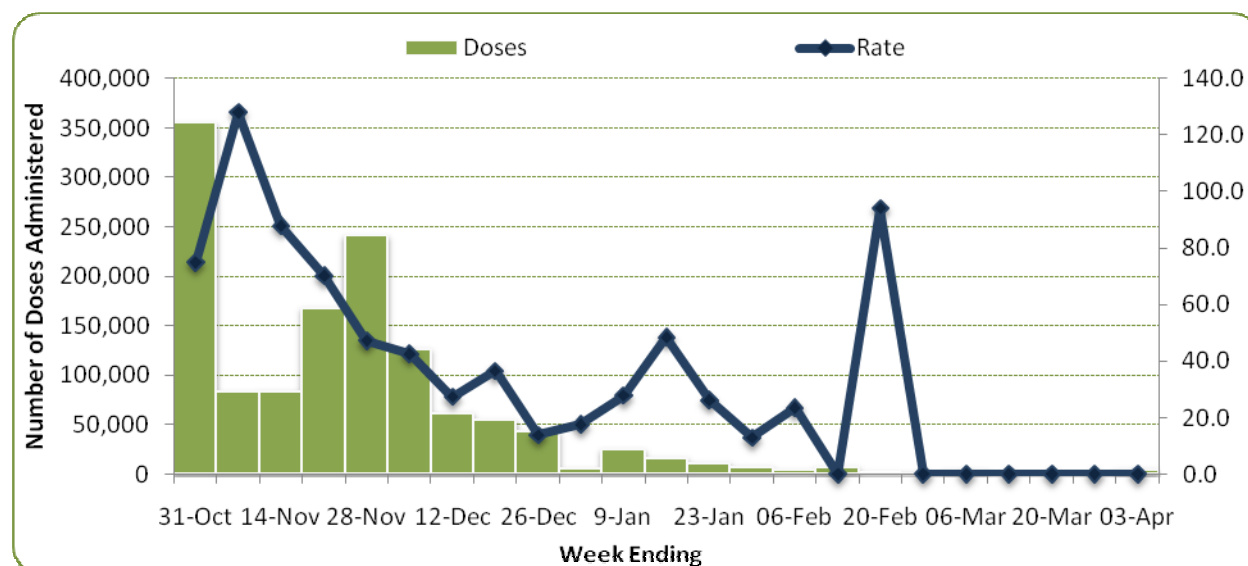
- Cardiac or pulmonary disorders;
- Diabetes mellitus and other metabolic diseases;
- Cancer;
- Immunodeficiency and immunosuppression ;
- Renal disease;
- Anemia or hemoglobinopathy;
- Conditions that compromise the management of respiratory secretions and are associated with an increased risk of aspiration;
- Children and adolescents with conditions treated for long periods with acetylsalicylic acid;
- Individuals living in chronically disadvantaged situations.

⁸ Appendix B – Q2-Q3: provides additional details for determining immunization rates in these target groups.

Adverse Events Following Immunization (AEFI)

There have been 798 AEFI reports received by AHW, most with one adverse event, but some with multiple events. There have been 945 events reported as of August 31. The week with the highest number of adverse events was the week ending November 7 (128 events per 100,000 doses administered in that week) - see Figure 26. This was also one of the weeks where the immunization campaign targeted both pregnant women and small children. The rate of adverse events continued to drop over time.

Figure 26: Number of Doses Administered of pH1N1 Vaccine and Rate of AEFI Events, by Week Ending, for Waves 1 and 2



Source: Alberta Health and Wellness pH1N1 vaccine database and AEFI submissions
 Note: This figure uses doses administered, not the number of people immunized.

Alberta Health and Wellness received adverse event reports from all pH1N1 vaccine providers in Alberta. The adverse event reports were compiled and sent to PHAC weekly to inform the national surveillance of the pH1N1 vaccine.

Table 15: AEFI Type and Rate

AEFI Type	Rate of Events Reported per 100,000 doses administered
Other Non-Serious	69.6
Serious	1.4

As of August 31, 2010, the total number of events which have been reported is 945 (see Table 15). One possible explanation is that due to this being a new vaccine and the initial concern over safety, people are being more diligent in reporting (both health care staff and the public). The vast majority of reactions have been mild and self-limiting. All AEFI's will be reviewed more closely to ensure they meet the reporting criteria.

Source: AEFI submissions to AHW

The adverse events reporting system in Alberta is meant to detect events that are temporally associated to immunization, rather than inferring causality. As of August 31, 2010, there were 19 serious AEFI's reported that were temporally associated to pH1N1 immunization (including anaphylaxis and Barré Syndrome and hospitalizations for: convulsion/seizure, encephalopathy, encephalitis, leukocytic vasculitis, severe headache; idiopathic thrombocytopenic purpura; and a death associated with idiopathic thrombocytopenic purpura) reported to Alberta Health and Wellness (rate of 1.3 per 100,000 doses administered) – see Table 16. Serious

adverse events following immunization are rare. In any immunization campaign the reported rate of serious adverse events is on average about 1 case for every 100,000 doses administered.

The main adverse events reported under the other unusual category include: tingling in the extremities, mostly in the hands and feet; and red eyes with and without respiratory symptoms. These adverse events are similar to what has been reported across Canada.

Table 16: AEFI Type, Number, and Rate per 100,000 Doses Administered

AEFI Type	Total Events Reported	Rate per 100,000 Doses Administered
Adenopathy	13	1.0
Allergic Reaction	234	17.3
Anaphylaxis	6	0.4
Anesthesia	2	0.1
Arthralgia	2	0.1
Convulsion/Seizure	9	0.7
GBS	3	0.2
Encephalopathy	1	0.1
Fever	80	5.9
High pitched unusual crying	5	0.4
Hypotonic/Hyporesponsive Episode	0	0
Infected Abscess	0	0
Idiopathic Thrombocytopenia Purpura	2	0.1
Meningitis/Encephalitis	1	0.1
Other Rash	60	4.4
Other severe or unusual events	261	19.3
Severe Local Reaction (pain and/or swelling)	167	12.3
Severe Vomiting/ Diarrhea	95	7.0
Sterile Abscess	4	0.3
Total Events	945	69.8

Source: AEFI submissions to AHW

The shoebox lot that had the highest rate of adverse event reports was A80CA013A, with 82 adverse event reports per 100,000 doses distributed. Of these, one was serious (anaphylaxis). Shoebox Lots A80CA003A, A80CA005A, A80CA007A A80CA008A, A80CA013A, A80CA029A, and A80CA019A all had rates of adverse event reports of over 50 per 100,000 doses distributed. Approximately 41 final reports have been received which do not have Lot Numbers or do not have complete Lot Numbers. They were not included in adverse event report rates per Lot Number.

Shoebox Lot A80CA007A was quarantined due to rates of anaphylaxis above that reported in some provinces/territories within Canada. In Alberta, only seven adverse event reports were received related to this Lot Number and none of them were serious. AEFIs continue to be monitored and assessed in Alberta by medical officers of health and the AHW immunization team.

SEASONAL INFLUENZA

Alberta's influenza season typically begins during Week 40 (late September/early October). The influenza strains expected during an influenza season are usually the strain dominant in the southern hemisphere during our summer months, or a continuation of the last season's strain. In 2009-10, Alberta saw influenza pH1N1 isolates throughout the summer, a time when influenza is typically dormant. Seasonal influenza also tends to affect seniors, especially those living in closed facilities such as long term care centres or seniors' lodges.

SEASONAL INFLUENZA SURVEILLANCE

AHW conducts year-round surveillance on influenza in Alberta. In order to monitor and report on influenza in the community, AHW works closely with various stakeholders:

- ❖ AHS (regional influenza nurse contacts)
 - Outbreaks of all respiratory viruses + case reports for hospitalized pH1N1 cases
- ❖ Provincial Laboratory for Public Health
 - Lab confirmation of Influenza A or B from community and outbreaks
- ❖ TARRANT sentinel physicians
 - Year-round swabbing of patients appearing with Influenza Like Illness
- ❖ FluWatch (Public Health Agency of Canada)
 - Report our data for National Surveillance

Table 17: Number of Deaths and Hospitalizations Directly Related to Influenza (Seasonal) in Alberta, 2002 to 2008

Year	Deaths	Hospitalized
2002	28	535
2003	11	784
2004	7	357
2005	29	451
2006	15	440
2007	13	260
2008	18	321

Each year, hundreds of Albertans are hospitalized due to complications from influenza. Since 2002, there have been between 260 to 784 people admitted to hospital annually, and seven to 29 deaths due to influenza and its complications each year – see **Table 17**. This pattern has occurred during a period of steady population growth.

Source: Alberta Vital Statistics; Hospital Admissions file

SURVEILLANCE DATA

The first wave of Pandemic (H1N1) 2009 caught AHS and AHW in the middle of a restructuring process; respective roles and responsibilities within and between the organizations had not been determined. Existing regional surveillance systems had not been integrated and while a general understanding of the kind of surveillance information required by decision makers was present the specific needs and exact purposes for which this information was needed was unclear. These problems resulted in surveillance with significant gaps and sometimes inconsistent values being provided to decision makers. Surveillance was provided by a combined team from AHW and AHS using existing databases and surveillance systems to provide the best and most current information possible within the limitations mentioned above. Fortunately the first wave was moderate in spread and severity so the impact of not having comprehensive information was limited.

SOURCES OF SURVEILLANCE DATA

Alberta Health Services Data Sources

- ARTSSN-Emergency Department data –EDIS and REDIS
- ARTSSN-Health Link Alberta - SharpFocus
- ARTSSN-School data: Edmonton Public Schools and Edmonton Catholic Schools
- Alberta Influenza Assessment Centres
- ARTSSN Data Repository – Edmonton ADT data and Calgary Clinibase
- Alberta Critical Care Network Reports
- Alberta Health Services Human Resources
- CNPHI-Alberta (Data Integration for Alberta Laboratories (DIAL) & Alberta Influenza Case Management Tool) – respiratory virus laboratory data from Provincial Public Health Laboratory (ProvLab)

Alberta Health and Wellness Data Sources

- AHW pH1N1 Influenza Dataset
- Physician Claims File
- Alberta Vital Statistics – Death File
- AHW pH1N1 Immunization Dataset
- Immunization and Adverse Reaction from Immunization provincial database (ImmARI)
- AHW Human Resources Branch
- TARRANT Weekly Data Reports
- CNPHI-Alberta (Data Integration for Alberta Laboratories (DIAL) & Alberta Influenza Case Management Tool) – respiratory virus laboratory data from Provincial Public Health Laboratory (ProvLab)

Notifiable Disease Reporting

Through the *Public Health Act*, AHW receives individual lab results on all notifiable diseases from the Provincial Laboratory of Public Health (ProvLab). Due to the pandemic level and novel disease, confirmed pH1N1 lab results were notifiable and sent to AHW and stored in a secure database. Cases from out of province were counted in Alberta if they were tested here while visiting or working here, but if hospitalized

these cases were counted in their province of residence. Also through the *Public Health Act*, AHW receives case report forms from AHS on individual Albertan who are hospitalized or deceased and were confirmed to be positive for pH1N1.

Outbreak Reporting

Disease outbreaks are reportable to AHW, with all influenza outbreaks also reported to the Public Health Agency of Canada through FluWatch. AHS at the region/zone level collects the data on outbreaks from closed facilities through their internal processes (sentinel sites or reporting protocol). Workload and lab protocols precluded the swabbing of students and staff with ILI for school outbreaks. Even though these outbreaks may not be confirmed as H1N1, the treatment and prevention of H1N1 is the same as other ILI.

LIMITATIONS OF SURVEILLANCE DATA⁹

Under the *Health Information Act*, non-identifiable data can be reported. Identifiable information will not be released to the public or the media. There are various aggregate reports where data can be found on pH1N1 activity.

A major limitation to pH1N1 data is the timeliness of collection and delivery to AHW. Adverse event forms and hospitalized case reports on individuals are filled out by either infection prevention and control staff or regional public health staff and then sent to AHW. Completion time and rates varied by zone. Physician claims data has a lag time of approximately two weeks. ARTSSN is close to real time surveillance but was limited to emergency departments in Edmonton.

Another data limitation is due to some data coming as individual files and others are aggregate figures. There is meaning in both data types, but the sources are not compatible in terms of comparison. For example, immunization data is collected via paper forms, with aggregate numbers sent to AHW. Without nominal immunization data collection, it was difficult to determine immunization status for those pH1N1 cases who were hospitalized or died.

⁹ Appendix B – Q5: provides addition details regarding the limitations of the surveillance data.

ASSESSMENT AND IMPLICATIONS

PROVISIONAL ASSESSMENT

The magnitude of the affect for this epidemic was similar to that of a moderately serious seasonal influenza but with the context that the virus was significantly different from previous strains.

These differences included:

1. unusual porcine and avian sequences in addition to the usual human sequences and an increased risk of unusual virulence;
2. the unusual seasonality including a first wave very late in the usual influenza season (immediately following a normal seasonal influenza) followed very rapidly by second wave (very early in the subsequent season);
3. an unusual age distribution of serious illness and death where the overall mortality was similar to a moderate influenza year but with much reduced mortality in the elderly and a corresponding increase in mortality in adults; and
4. adults who became ill, tended to have seriously compromised respiratory systems.

The health system response was also unusual for the following reasons.

1. Public health had to mount three separate and very different influenza campaigns in a time frame where it would usually only do one or at most two and the campaigns would be very similar.
2. Public health delivered vastly more influenza immunizations in a shorter period of time than ever before and achieved record level coverage levels in many populations including high risk and aboriginal populations.
3. The Provincial Laboratory for Public Health and the acute care system, including Health Link Alberta, physician offices, emergency departments, hospital beds and ICU beds experienced significant stress as the large number of seriously ill adults threatened to overwhelm human and institutional capacity.
4. Surveillance systems provided decision makers with timely and detailed situation reports that while not ideal were used for the first time to inform decisions makers and trigger interventions. Actions included the opening of the mass assessment centers, mass immunization clinics, proactively increased emergency and hospital staffing, and release of antiviral medications. To measure the effect of these interventions as well as tracking the epidemic curve in real-time, multiple systems were engaged.
5. To handle the increased public health and acute care demands in an operational system with very limited surge capacity, operations had to displace some routine and potentially important activities. Public health postponed routine immunizations, the provincial laboratory prioritized or restricted some testing, infection control activities were reduced to aid in influenza control activities, and elective surgeries and family practitioner visits for needed but not acute reasons were delayed.
6. A new more effective vaccine was developed, approved, delivered, used, and monitored for adverse events in real-time and more rapidly than ever before.

The provincial response was unusual for the following reasons:

1. Agencies from federal, provincial and regional jurisdictions cooperated in an unprecedented fashion to share information and act to prevent disease and mitigate damage. AHS, AHW, AEMA, PHAC, FNIH, shared personnel, vaccine, antivirals, and expertise to ensure that Albertans were protected even with unresolved issues of jurisdiction and protocol.
2. The restructuring of AHW and AHS immediately previous to the first wave meant that the professionalism and dedication of staff was required to overcome the lack of clarity of institutional roles and responsibilities.

VALUE OF SURVEILLANCE

Significant effort went into developing a more comprehensive set of indicators and identifying the systems that could be used to report on those indicators in the short time between the first wave and the predicted return of the second wave. Ad hoc systems were quickly developed for reporting on many of the indicators, but some information gaps remained. The surveillance information provided during Wave 2 did provide essential and useful situational awareness and surveillance to support decision making. The surveillance allowed the rapid detection of the second wave, tracking of its impact on the population and health care systems and aided decision makers in allocating resources, preparing responses and prioritizing activities. Now is the time to build on these successes and to prepare for a new pandemic with more virulent effects.

APPENDIX A

Timeline

April 12: Outbreak of ILI in Veracruz, Mexico, reported to WHO

April 17: PHAC becomes aware of SRI clusters in Mexico and confirmed cases in the USA.

April 21: (CDC) Detection of 2 children with swine influenza in California

April 23: (CDC) Detection of additional cases in California (5) and Texas (3) – one was hospitalized, and all had recovered.

April 24: (Mexico) Minister of Health confirmed cases of swine influenza, possibly including a few deaths.

April 24: WHO declares a Public Health Emergency of International Concern (PHEIC)

April 24: (CDC) First situation update, of a very long series... that quickly became daily occurrences

April 27: Alberta Health and Wellness (AHW) opens Emergency Outbreak Center (EOC) for strategic planning, monitoring and surveillance of the pH1N1 virus.

April 27: USA = 40 confirmed cases, no death. Mexico = 26 confirmed cases, 7 deaths. Canada = 6 cases, no deaths. Spain = 1 case, no deaths.

April 27: WHO moves to pandemic alert phase 4 (sustained community transmission in Mexico)

April 28: Alberta reports its first case of pH1N1

April 29: WHO moves to pandemic alert phase 5 (2 countries affected)

May 4: Alberta Health Services Emergency Command Centre (ECC) established

May 5: Alberta Health Services Regional Emergency Operation Centres (EOC) opens

May 8: First death associated with pH1N1 reported

June 11: WHO declares a pandemic (phase 6: spread to 2 WHO regions)

June 23: Alberta issues notice that recommended laboratory testing be limited to severe cases

Oct 22: ECC and Zone EOC open

Oct 22: Public Health Laboratory (ProvLab) discontinues EI numbers 236, 238, and 307 used for prioritizing respiratory virus testing in first wave of Pandemic. Prioritization of respiratory virus testing for ICU patients, hospitalized patients, patients pending admission, patients associated with an outbreak investigation with a specific EI number.

Oct 26: Mass pH1N1 immunization clinics open

Oct 27: Health Link Alberta incorporates a paper process to triage all influenza symptom calls

Oct 30: The first two Influenza Assessment Centres (IACs) open in Alberta: Edmonton and Calgary)

Oct 30: Laboratory testing for influenza and other respiratory viruses not preformed for specimens submitted from community settings for patients with no indication of pending hospitalization on the requisitions

Oct 31: Mass pH1N1 immunization clinics suspended

Nov 4: pH1N1 vaccination resumes for health care workers (Phase 1)

Nov 5: Mass pH1N1 vaccine clinics available for children aged 6 months to under 5 years

Nov 5: IACs open in the South Zone

Nov 6: Mass pH1N1 vaccine clinics available for pregnant women and people with chronic conditions under the age of 10

Nov 10: Mass pH1N1 vaccine clinics available for both parents or one parent and one caregiver of infants under 6 months of age and for children under 10 with chronic health conditions

Nov 12: Mass pH1N1 vaccine clinics available for people with chronic conditions aged 55 to 64

Nov 13: Mass pH1N1 vaccine clinics available for people with chronic conditions aged 45 to 54

Nov 14: Mass pH1N1 vaccine clinics available for individuals 18 to 44 who have chronic conditions, for household contacts of those who can not be immunized and for frontline health care workers

Nov 16: All health care workers, First Responders (police, firefighters), Provincial Corrections inmates, Provincial peace officers, and essential service workers (municipal or provincial) eligible to receive pH1N1 vaccine

Nov 17: Mass pH1N1 vaccine clinics available for seniors over age 75 as well as their spouses or partners of any age

Nov 19: Mass pH1N1 vaccine clinics available for seniors over age 65 as well as their spouses or partners of any age

Nov 20: Mass pH1N1 vaccine clinics available for all children under 18 years of age and their immediate family members and caregivers living in the same household.

Nov 23: Mass pH1N1 vaccine clinics available for all members of the public

Nov 23: All IACs close.

APPENDIX B

PANDEMIC (H1N1) 2009: THE ALBERTA EXPERIENCE – Q&A

Q1: For the indicators where Alberta's data were compared to the other provinces/territories, how standardized are the data to each other?

In the *Pandemic (H1N1) 2009: The Alberta Experience* report, the only indicator that compared Alberta data to the other provinces was for pH1N1 immunizations.

The Public Health Agency of Canada (PHAC) required the provinces and territories to report immunization data using a common reporting tool. The data presented in the *Pandemic (H1N1) 2009: The Alberta Experience* report came from a national group that utilized the data collected from PHAC, with a similar methodology to determine population estimates. As such, the immunization rates for Alberta should be comparable to the other provinces/territories.

Q2: How do we know the risk factors of the people immunized during the first week of the Pandemic (H1N1) 2009 immunization campaign?

During the entire Pandemic (H1N1) 2009 immunization campaign, the standard of practice was to collect risk factor information on each person being immunized. The information collected for each client included:

- Name
- Personal Health Number
- Date of Birth
- Gender
- Aboriginal status
- Phone number
- Address (if out of province)
- Status (new to Alberta or visitor)
- Target codes for the following groups: pregnant, health care worker, a person considered at high risk, a person of a household contact considered at high risk, persons aged 65 and over, and healthy persons
- Age groupings
- Vaccine details: type (adjuvanted, non-adjuvanted), lot numbers, dose given, site, dose number (1 of 1, 1 of 2, 2 of 2), date given, immunizer's name and signature

This information was collected on paper forms and manually counted according to primary target codes. For an individual, the primary target code was assigned based on the following hierarchy:

1. Pregnant
2. Health Care Worker
3. High risk
4. Household contact
5. Age 65 and over
6. Healthy

Because only one target group could be assigned to an individual, the reported data for immunized target groups underestimate the true proportion immunized in any one target group, other than “pregnant”.

In addition to being a part of the paper-based process, there was delayed entry of Pandemic (H1N1) 2009 immunizations for children, aged six months to nine years, into an electronic database. In the *Pandemic (H1N1) 2009: The Alberta Experience* report, immunization data for this age group were based on the paper-based process.

Q3: How were the immunization rates for the target groups determined?

Information was collected from clients immunized with the pH1N1 vaccine using a paper form; including details related to target groups for immunization. The forms were then manually counted according to primary target codes. For an individual, the primary target code was assigned based on the following hierarchy:

1. Pregnant
2. Health Care Worker
3. High risk
4. Household contact
5. Age 65 and over
6. Healthy

Because only one target group could be assigned to an individual, the reported data for immunized target groups underestimate the true proportion immunized in any one target group, other than “pregnant”.

Denominator data were used to estimate the percentage of people immunized within each target group. Most denominator estimates were based on the H1N1 Rapid Response Survey conducted by Alberta Health and Wellness. Pregnant women were overrepresented in the survey and the survey estimate was adjusted to match projections of births and pregnancies in Alberta based on demographic trends.

Q4: How does Alberta's pH1N1 death rate compare to other provinces/territories?

Upon contacting the Public Health Agency of Canada, the following crude rates were obtained (April 12, 2009 to March 6, 2010).

Province/Territory	Crude pH1N1 death rate (per 100,000)
Yukon	8.9
Newfoundland	3.5
Nunavut	3.1
Northwest Territories	2.3
Alberta	1.9
Saskatchewan	1.5
Quebec	1.4
British Columbia	1.3
New Brunswick	1.1
Ontario	1.0
Manitoba	0.9
Nova Scotia	0.7
Prince Edward Island	0.0
Total	1.3

**Public Health Agency of Canada
 terms of use for the death data:**

Please note data presented here are for official use only, not for further dissemination.

To date, the Public Health Agency of Canada has not produced age-standardized death rates for the provinces/territories; they are the only organization with a sufficient level of detail on each Canadian pH1N1 death to be able to produce these rates.

The differences among the provinces and territories may be due to a combination of true and artifactual factors, including: different attack rates, variation in high-risk populations and different clinical and laboratory practices across the nation. With respect to the latter difference, a person sheds the pH1N1 virus during a specific window of time; therefore, the ability to detect the virus is reduced if a laboratory specimen is not collected within this window.

Q5: How complete are the data provided in the *Pandemic (H1N1) 2009: The Alberta Experience* report?

Data	Data Source(s)	Data Coverage			Limitations
		<i>Person</i>	<i>Place</i>	<i>Time</i>	
Respiratory Virus Testing	Provincial Public Health Laboratory (DIAL)	Residents of Alberta	Alberta	Apr 19, 2009 to May 31, 2010	<p>Excludes pH1N1 cases that did not have a laboratory specimen collected and/or tested for pH1N1 virus.</p> <p>During Wave 2, the Provincial Public Health Laboratory (ProvLab) was inundated with respiratory specimens. As a result, on Oct 30, 2009, the ProvLab prioritized respiratory virus testing for hospitalized patients with severe Influenza Like Illness (ILI) and non-school outbreak specimens.</p>
pH1N1 Hospitalized Cases	AHS-Zones	Residents of Alberta	Alberta	Apr 19, 2009 to May 31, 2010	<p>Hospitalized cases may not have been reported to AHW if the case was not found to be in the hospital when AHS was notified of a pH1N1 positive laboratory result.</p> <p>Data does not capture hospitalized pH1N1 cases that resided in other provinces/territories but were treated in an AHS facility.</p> <p>Data includes pH1N1 cases who were already hospitalized for other reasons</p> <p>The timing of laboratory specimen collection is important in detecting the pH1N1 virus. If laboratory specimens are collected after a person stops shedding the virus, the ability to detect the pH1N1 virus is compromised.</p>

Data	Data Source(s)	Data Coverage			Limitations
		<i>Person</i>	<i>Place</i>	<i>Time</i>	
	Edmonton VAX, Calgary Clinibase, South Zone Meditech databases	Confirmed pH1N1 cases admitted to a Edmonton or Calgary hospital	Alberta	Apr 19, 2009 to Jul 25, 2009 Oct 11, 2009 to Dec 5, 2009	Length of hospital stay information was only obtainable on 743 (60%) of the pH1N1 hospitalized cases during Wave 1 and Wave 2. This was due to limited access to provincial level hospital data.
pH1N1 Deaths	AHS-Zones and Medical Examiner's Office	Residents of Alberta	Alberta	Apr 19, 2009 to May 31, 2010	Deaths associated with pH1N1 may not have been captured if they occurred outside of a hospital and did not result in an autopsy. Not all reported deaths were caused by pH1N1. Some cases died from other health conditions unrelated to the pH1N1 virus.
ILI Screening	Emergency Departments and Urgency Care Centres (ARTSSN)	Residents of Alberta	Edmonton and Calgary Rural Hospitals: Fort McMurray, Red Deer, Lethbridge, Medicine Hat, Calgary	Oct 11, 2009 to May 31, 2010 Dec 18, 2009 to May 31, 2010	Data represent the number of visits, not the number of people seen. A person can be represented more than once if they had multiple visits to an emergency department and/or urgent care centre. Compliance rates for screening of emergency department and urgent care centre visits varied between facilities and over time. This may have underestimated the true magnitude of ILI.

Data	Data Source(s)	Data Coverage			Limitations
		<i>Person</i>	<i>Place</i>	<i>Time</i>	
	TARRANT Sentinel Physicians	Clients of sentinel physicians	Alberta	Oct 11, 2009 to May 31, 2010	<p>Sentinel physicians are not evenly distributed throughout the province.</p> <p>The clients seen in a sentinel physician's office may not represent the demographics or health status of the population from which they come.</p>
	Physician Claims	General practitioners clientele	Alberta	Oct 4, 2007 to Dec 26, 2009	Includes only general practitioner's clients associated with physician billing claims.
	Health Link Alberta (ARTSSN)	Callers to Health Link Alberta	Alberta	Apr 19, 2009 to May 31, 2010	<p>Data reflects calls from people reporting coughs and/or ILI symptoms.</p> <p>In mid-October, Health Link Alberta (HLA) was inundated with calls related to pH1N1. As a result, on Oct 27, 2009, HLA enhanced their capacity to respond to the surge by implementing a paper-based triage system. Data from Oct 27 to Jan 3, 2010 excludes information captured in the paper-based system (this represents approximately 13,000 calls).</p>
Health Care Worker Absenteeism	AHS Human Resources	Staff	Former Capital, Calgary, Aspen and David Thompson Health Regions	Oct 21, 2009 to Nov 27, 2009	<p>Data reflect the number of employees absent from work due to illness (not specific to ILI or pH1N1).</p> <p>Data do not reflect the number of hours absent.</p> <p>Data do not provide the total number of employees working in a given day; as such a rate of absenteeism could not be calculated.</p> <p>The utility of the data during a pandemic event was not</p>

Data	Data Source(s)	Data Coverage			Limitations
		<i>Person</i>	<i>Place</i>	<i>Time</i>	
					ideal. Alberta Health Services did not have a single work place absenteeism reporting system. Of the systems that existed, the quality of data was variable and not timely.
	AHW Human Resources	Staff	Alberta	Oct 28, 2009 to Nov 25, 2009	Data reflect the average daily rate of absenteeism due to illness or family illness.
School absenteeism	Edmonton Public School Board and Edmonton Catholic School Board (ARTSSN)	Children in Kindergarten to Grade Six	Edmonton	Apr 5, 2009 to May 31, 2010	Children can be absent from school for many reasons, illness being only one of them. School absenteeism data varied in the level of detail provided; some schools code absenteeism by reason codes (i.e. absent due to illness, absent due to respiratory illness), while others simply code an absence.
Facility Outbreaks	AHS-Zones	Closed facility residents and staff	Alberta	Apr 19, 2009 to Jul 25, 2009 Oct 11, 2009 to Dec 5, 2009	Dependent on a closed facility to recognize outbreak and report it to AHS. In Wave 1, school outbreaks only reflect the outbreaks that were assigned an Exposure Investigation (EI) number. The outbreak reporting requirement changed during Wave 2. In Wave 2, school outbreak data included both pH1N1 laboratory confirmed and presumed pH1N1 outbreaks (not laboratory confirmed), regardless of whether or not an EI was assigned.

Data	Data Source(s)	Data Coverage			Limitations
		<i>Person</i>	<i>Place</i>	<i>Time</i>	
Influenza Assessment Centres	Edmonton ADT data and Calgary Clinibase	Clients assessed	Edmonton Zone Calgary Zone South Zone	Oct 30, 2009 to Nov 23, 2009	Data represent the number of assessments, not the number of people seen. A person can be represented more than once, if they had multiple visits to an influenza assessment centre. Detailed data on the outcome of assessment is not available. The algorithms implemented did not produce meaningful data; they were too sensitive and not specific enough to distinguish between mild and severe cases.
Critical Care Beds	Alberta Critical Care Network	Confirmed or suspect pH1N1 patients in critical care beds	Alberta hospitals	Oct 11, 2009 to Jan 3, 2010	The number of functional critical care beds varied over time. Functional beds translate into the number of patients who can be cared for at any given time in light of the available funding for beds.
Ventilators	Alberta Critical Care Network	Critical care unit patients	Alberta hospitals	Oct 11, 2009 to Jan 3, 2010	The number of ventilators varied over time. On November 4, 2009, 56 ventilators were added to the health care system to address the increased need for ventilation of patients in critical care units.
Antivirals	Alberta Blue Cross	Alberta residents	Alberta	Oct 23, 2009 to Jan 2, 2010	Includes only data for antivirals dispensed by community pharmacies. Antivirals were also dispensed by influenza assessment centres and hospitals, but are not reflected in the report. The data does not differentiate between treatment and prophylaxis use. Does not reflect the number of antivirals taken by patients or compliance rates.

Data	Data Source(s)	Data Coverage			Limitations
		<i>Person</i>	<i>Place</i>	<i>Time</i>	
pH1N1 Immunizations	AHS – Zones, Corrections Services Canada, First Nations and Inuit Health	Alberta	Alberta	Oct 26, 2009 to May 31, 2010	<p>Data reflect the number of doses administered, not the number of people immunized (unless otherwise stated). Some individuals required and received more than one dose of the vaccine.</p> <p>Data were collected using a paper form, stacked into piles according to primary target group, counted and then reported in an aggregated format.</p> <p>In addition to the paper counting process, pH1N1 immunization data on children ages six months to nine years, were entered into an electronic database at a later date.</p>
Adverse Events Following Immunization (AEFI)	pH1N1 vaccine providers	People immunized with pH1N1 vaccine	Alberta	Oct 26, 2009 to May 31, 2010	Minor AEFIs may not be reported by the public.