

Pandemic Preparedness

Breakfast with the Chiefs

October 2, 2009

8:00 - 9:30 a.m.

Please visit our website at www.oahpp.ca

What we do:

1. Better information for better public health decisions and actions

GOALS



2. Generate and accelerate application of knowledge for better public health decisions and actions
3. Support the Ontario public health system in its daily business and enhance capacity in emergencies



Surveillance and epidemiology of 2009 pandemic H1N1

Natasha S. Crowcroft
Director, Surveillance and Epidemiology

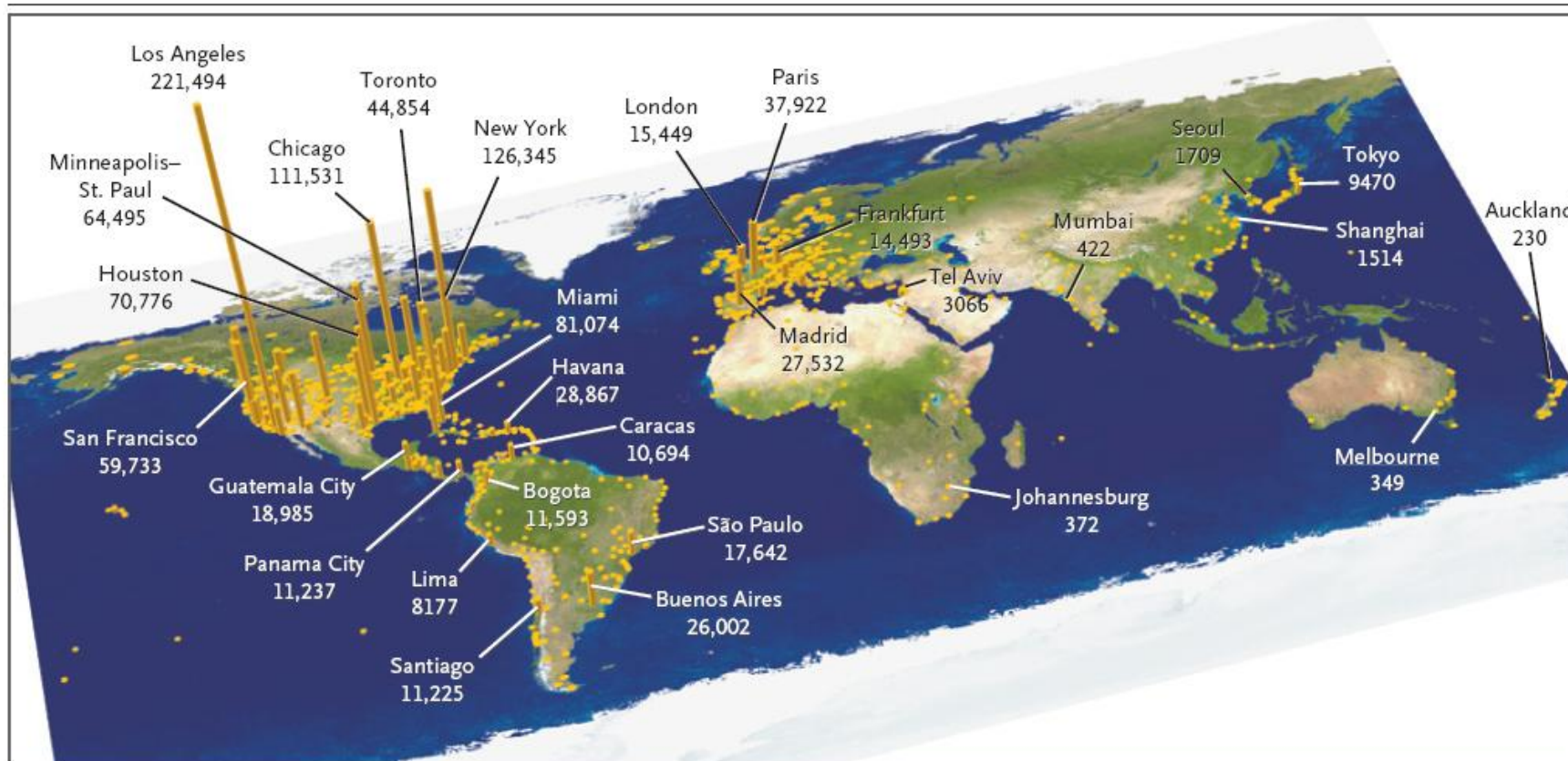


Figure 1. Destination Cities and Corresponding Volumes of International Passengers Arriving from Mexico between March 1 and April 30, 2008.

News

Ontario has first swine flu cases

By ANTONELLA ARTUSO, QUEEN'S PARK BUREAU CHIEF

Last Updated: 28th April 2009, 3:36pm

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Dr. David Williams, Ontario's Associate chief medical officer of health, says Ontario has been hit by four cases of swine flu.

Ontario has four confirmed cases of swine flu.

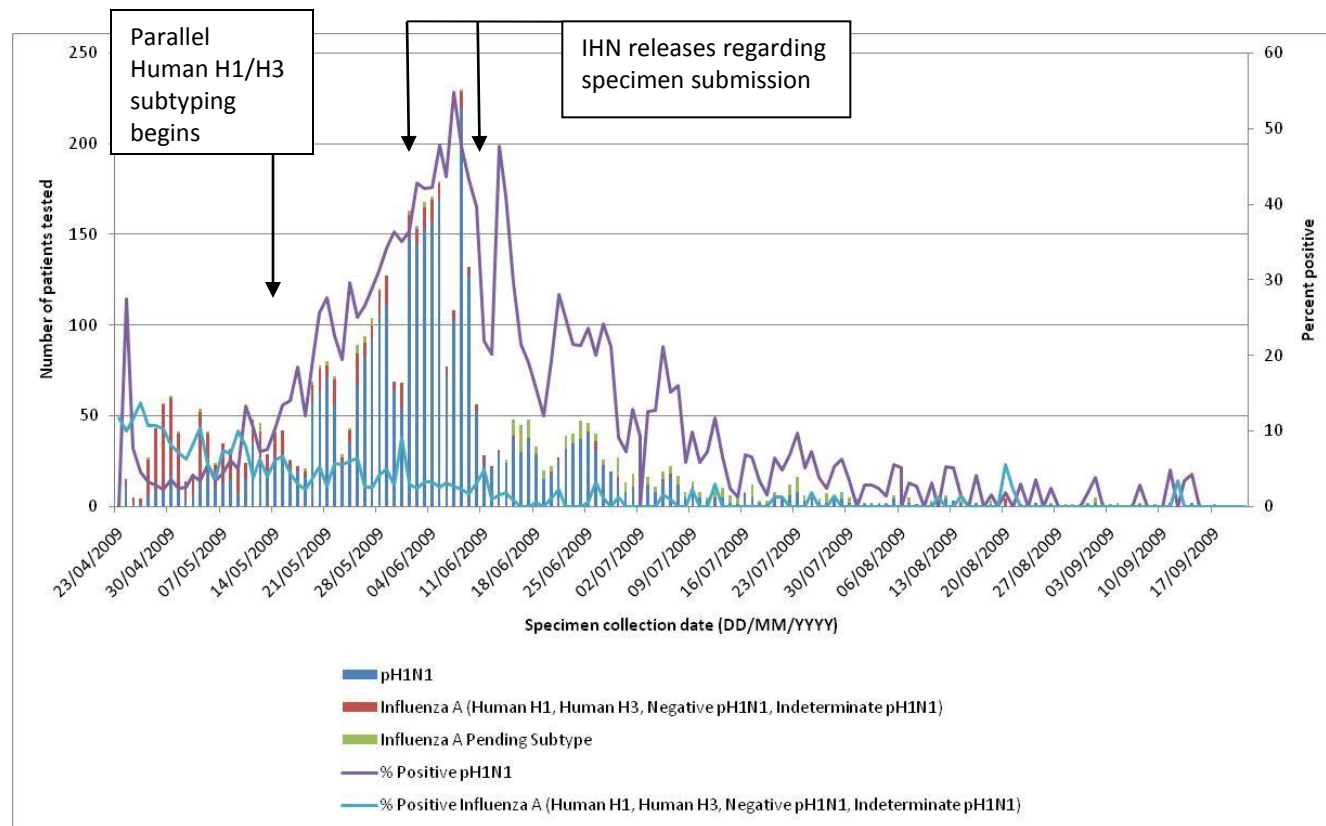
Three cases are in Durham and one is in York Region.

"These are mild cases," said Dr. David Williams, Ontario's Associate chief medical officer of health.

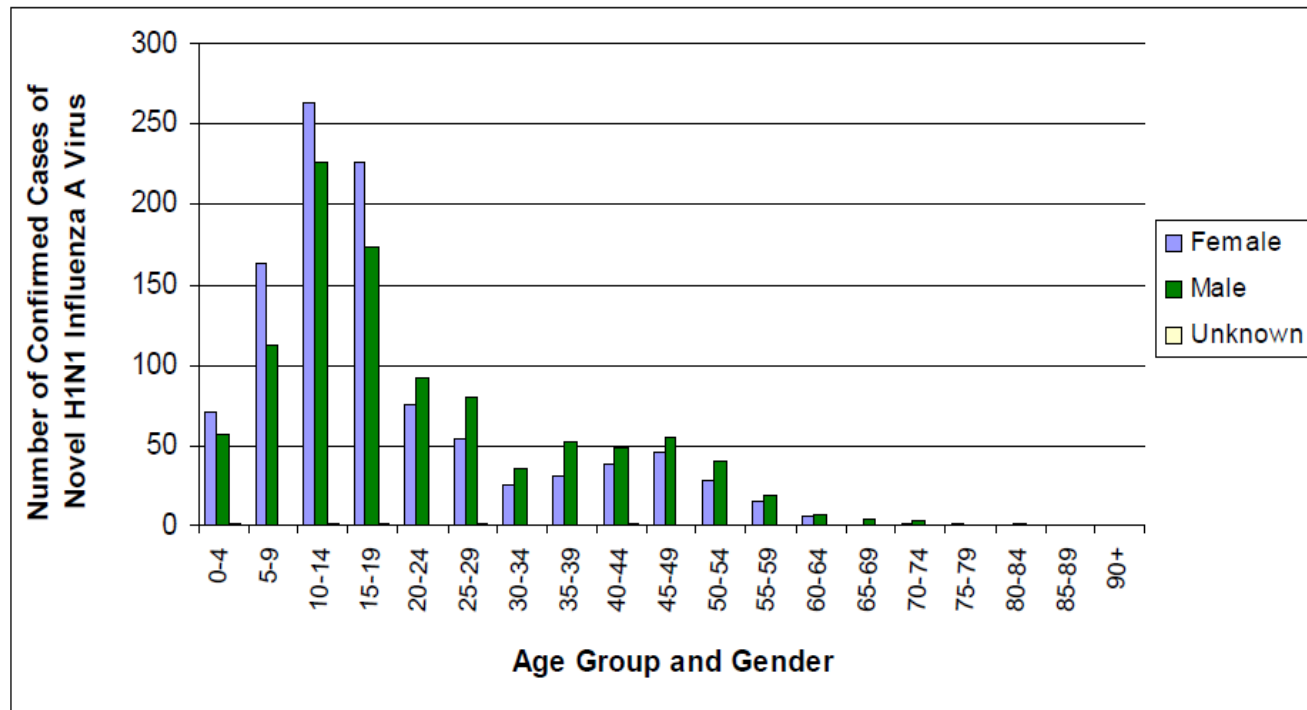
In all four cases, travel to Mexico was involved.

The individuals, who were not immediately identified, are recovering at home.

Percent positive of the number of patients tested for pH1N1, by specimen collection date, April 23 - September 29, 2009

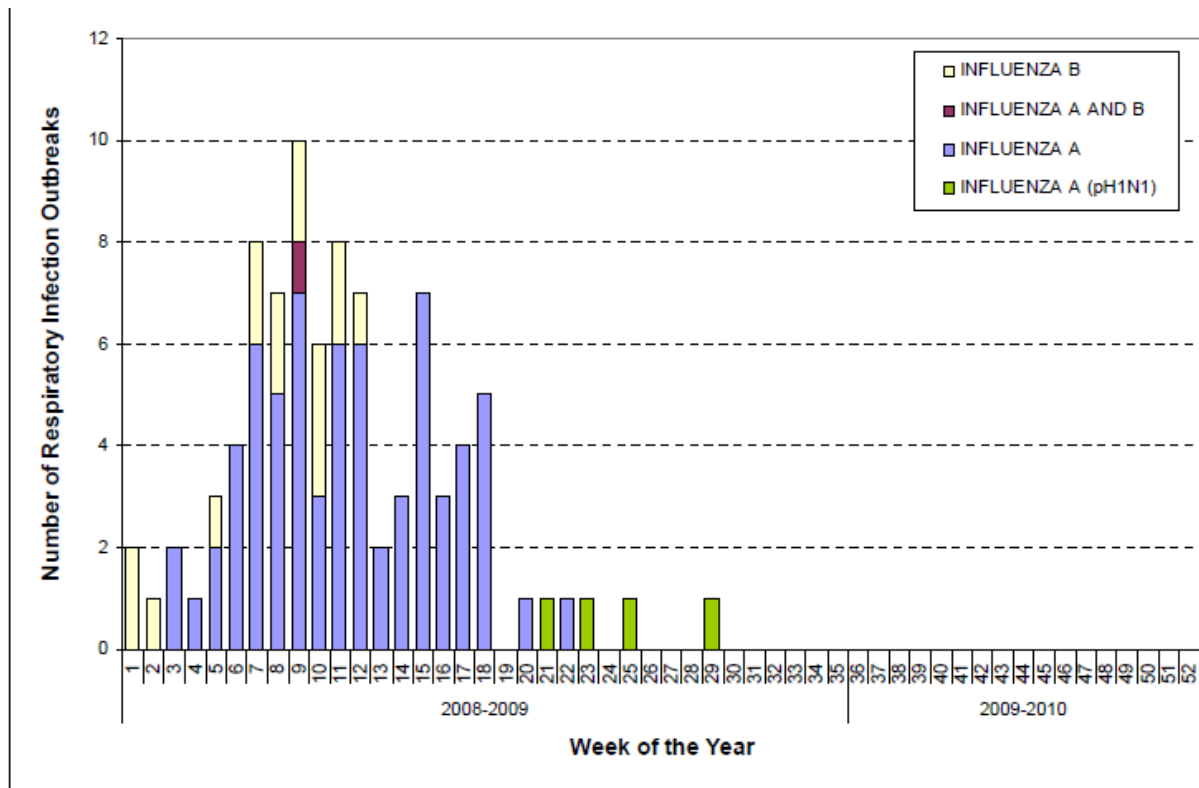


Confirmed pandemic H1N1 virus cases in Ontario by age group and gender, April 13th to June 15th

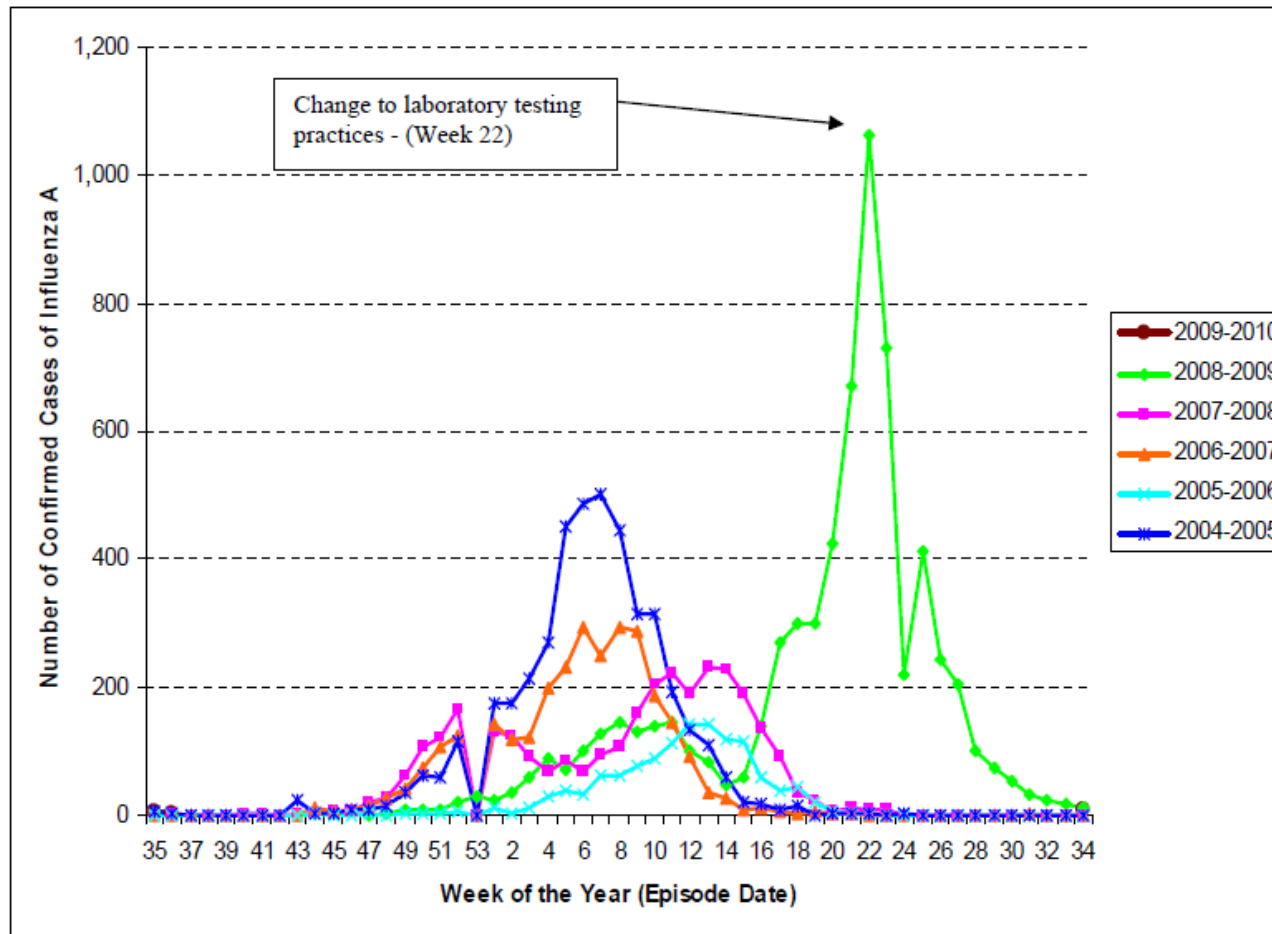


Source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted at 8:30 am [15/06/2009]

Institutional influenza outbreaks in Ontario by onset of illness in the first case: Total Outbreaks up to and including Week 36 by subtype



Source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [16/09/2009]



SOURCE: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [16/09/2009].
 † Episode Date for a case corresponds to the earliest date on record for the case according to the iPHIS hierarchy (Symptom Date > Clinical Diagnosis Date > Specimen Collection Date > Lab Test Date > Reported Date)

Incidence of hospitalization and death due to pandemic H1N1 2009 in Ontario, April 13 – September 23, 2009

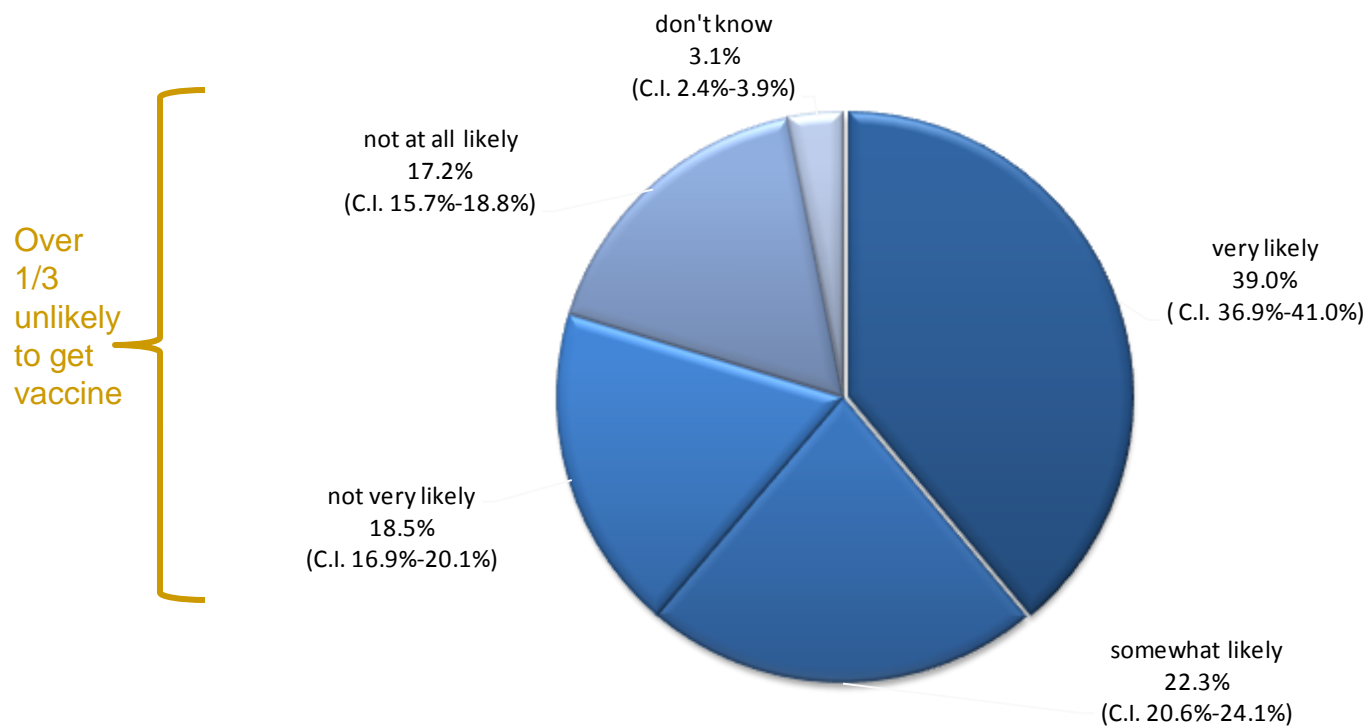
Age Group	Hospitalizations	Rate/100,000	Deaths	Rate/100,000
<1	20	14.93	0	0.00
1-4	51	9.34	0	0.00
5-19	108	4.47	3	0.12
20-49	109	1.91	4	0.07
50-64	51	2.12	10	0.42
65+	34	1.97	7	0.41
TOTAL	373	2.89	24	0.19

Source (incidence): Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted at 8:30 am [23/09/2009]

Source (incidence): Ontario population projections for 2008: Ontario Ministry of Health and Long-Term Care, Public Health Planning Database (PHPDB), extracted [12/02/2009]

<http://www.health.gov.on.ca/>

RRFSS – Novel H1N1 Vaccination Likelihood among adults aware of pandemic H1N1 outbreak in May 2009

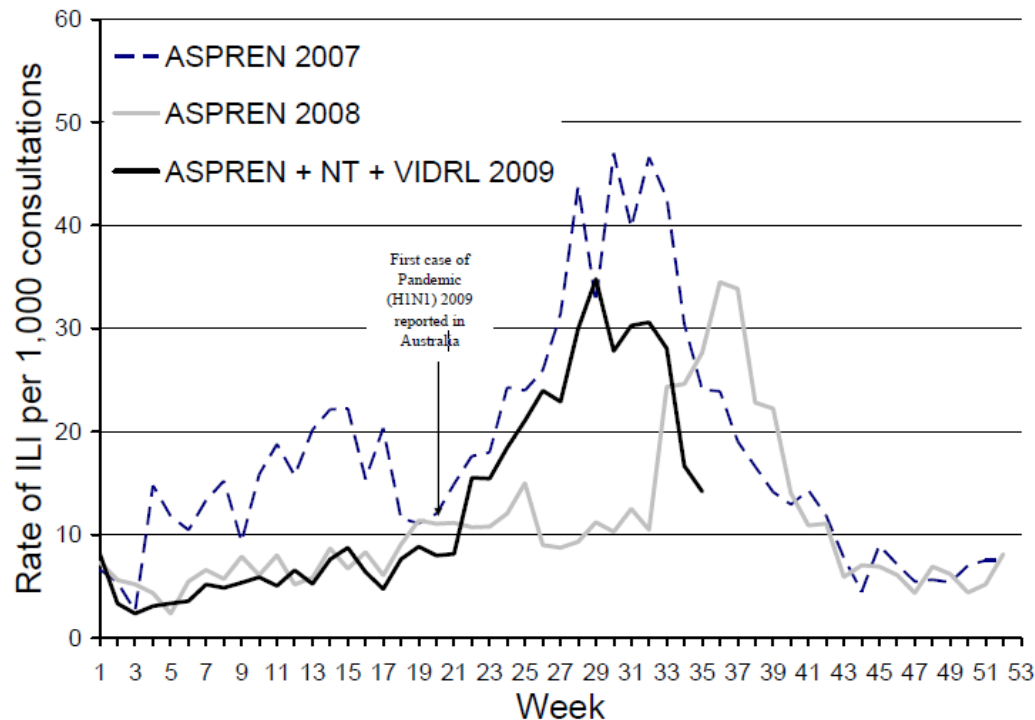


Australia

- Data for September 18th bulletin
- Most cases mild
 - 36,237 confirmed cases of pandemic (H1N1) 2009
 - 4,698 Hospitalized
 - 56 /303 (18%) currently hospitalized are in ICU
 - 172 Deaths (8 per million)
- Aboriginal population at 8 fold increased risk
- Australian pandemic plan assumed a 20% clinical attack rate: estimated 80,000 hospitalizations and 6,000 deaths

<http://www.healthemergency.gov.au/internet/healthemergency/publishing.nsf/Content/bulletins-14-20Sep>

Rate of ILI reported from GP ILI surveillance systems from 2007 to 30 August 2009 by week



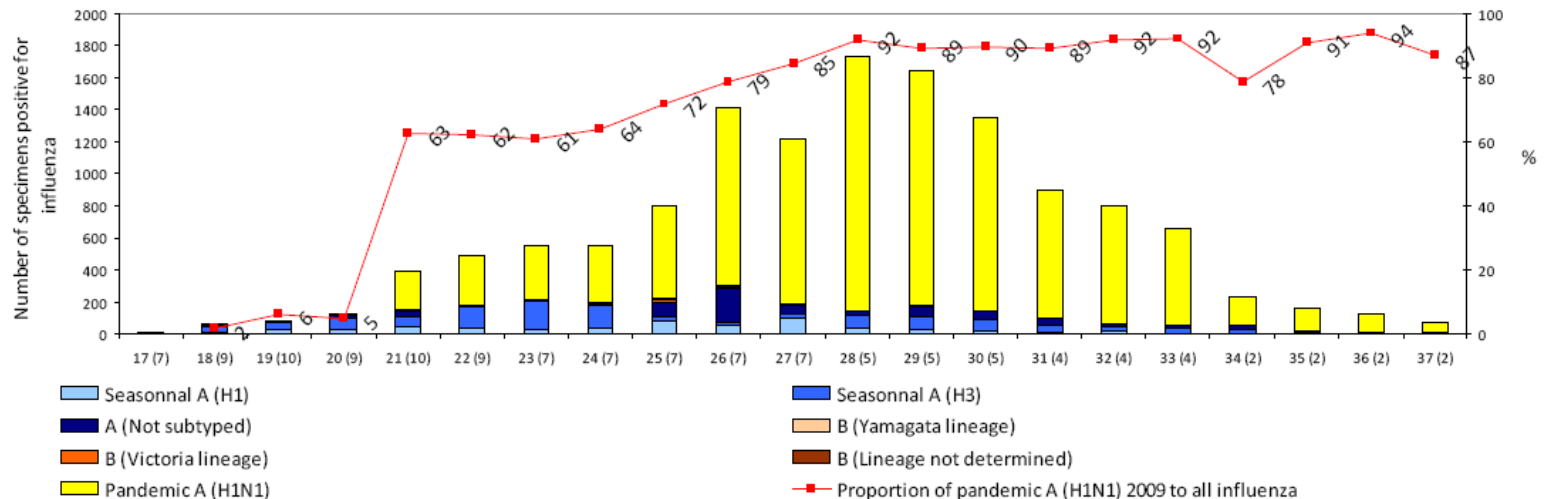
* Delays in the reporting of data may cause data to change retrospectively. As data from the NT and the VIDRL surveillance systems are combined with ASPREN data, rates may not be directly comparable across 2007, 2008 and 2009.

Global summary – what do we know?

- 2009 Pandemic H1N1 has established itself as the dominant influenza strain globally
- Strains have remained identical, and resistance is also rare
- Most cases of infection are mild
- Large numbers of people remain susceptible
- Age distribution is much younger than seasonal influenza
- Risk groups globally include those with obesity, asthma, diabetes, pregnant women and indigenous peoples,
- Severe respiratory disease (direct lung infection) including in young healthy people requires highly specialized and prolonged intensive care
 - Impact on ICU in the coming season is likely to be significant

Southern hemisphere (week 17-37)

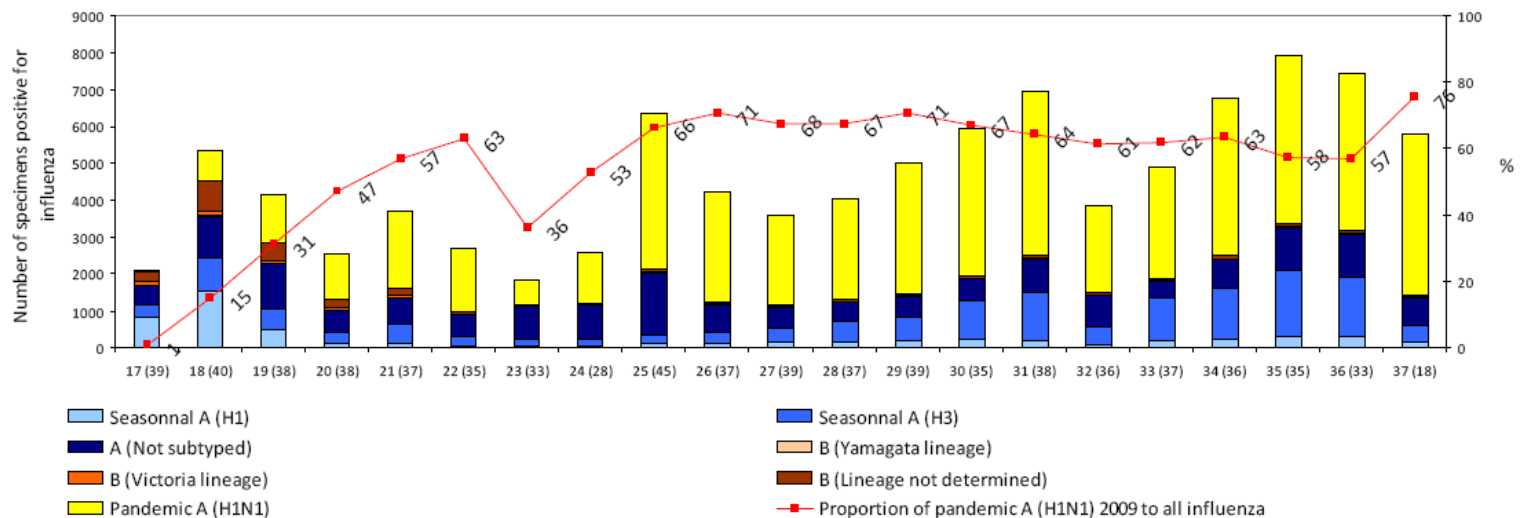
Number of specimens positive for influenza by subtypes (from 19 April to 12 September)



Virological data reported to FluNet by GISN NICs from countries in the southern hemisphere (week 17-37). Bars represent the number of specimens reported positive for influenza viruses during the reporting week represented in the X-axis. The X-axis also shows the number of countries that reported to FluNet during the respective week. Example: 17 (7) means that in week 17, 7 countries reported. The right side Y-axis shows the proportion (%) and the left Y-axis shows the absolute number of specimens reported positive for influenza viruses (influenza A subtypes, pandemic H1N1 and influenza B).

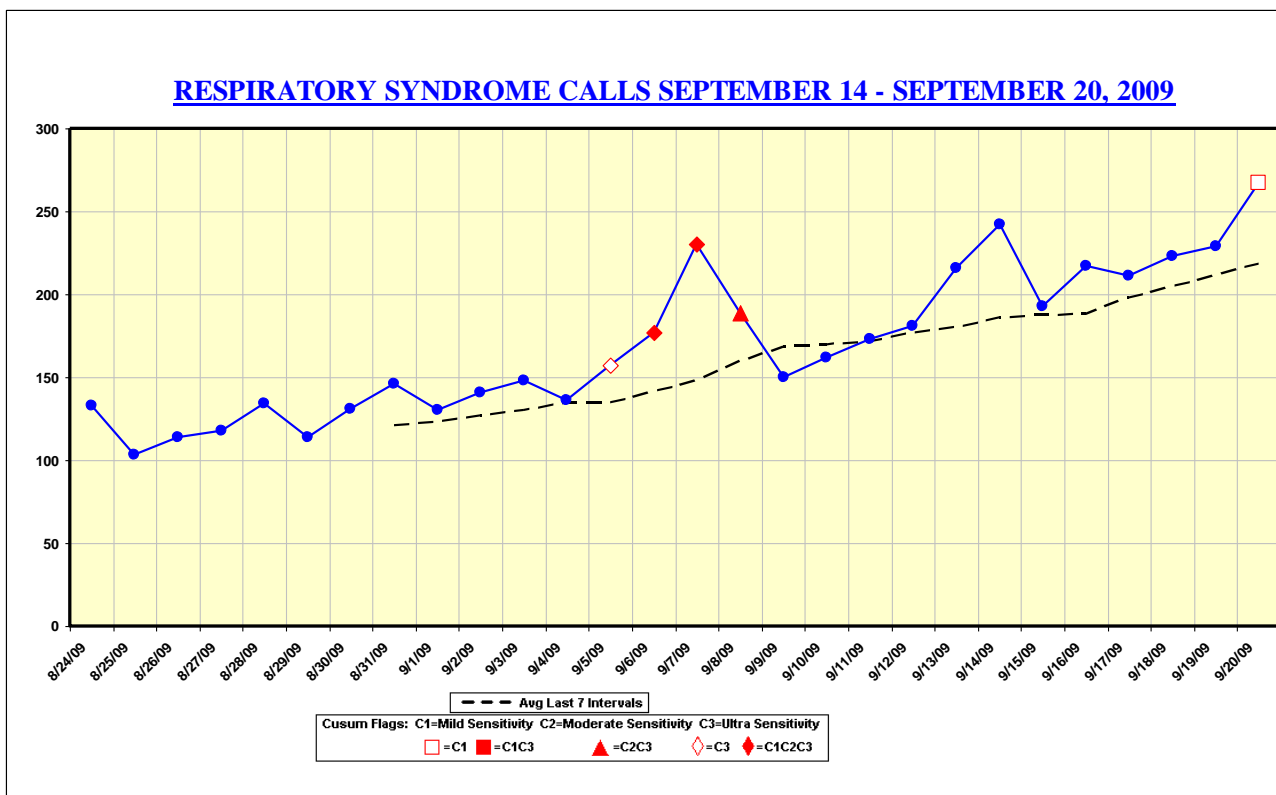
Northern hemisphere (week 17-37)

Number of specimens positive for influenza by subtypes (from 19 April to 12 September)

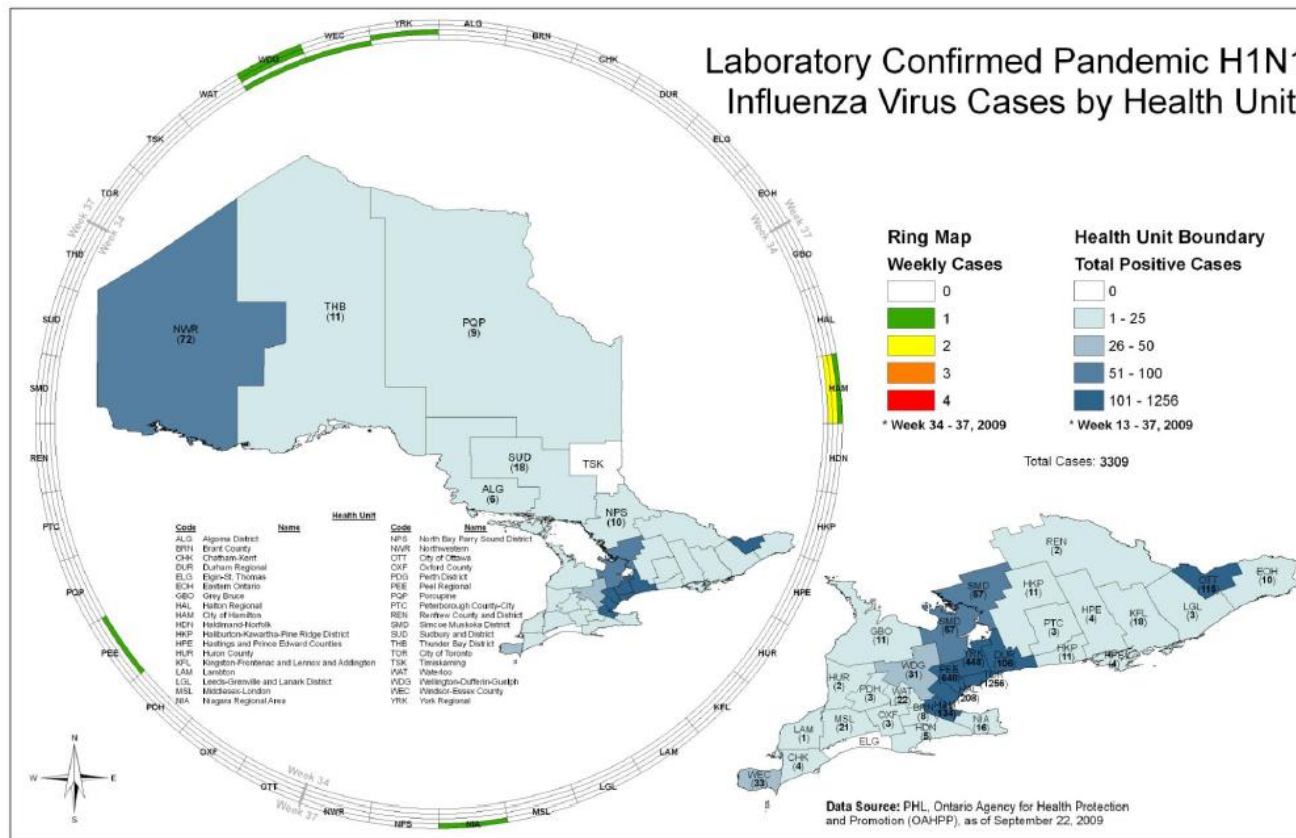


Virological data reported to FluNet by GISN NICs from countries in the northern hemisphere (week 17-37). Bars represent the number of specimens reported positive for influenza viruses during the reporting week represented in the X-axis. The X-axis also shows the number of countries that reported to FluNet during the respective week. Example: 17 (38) means that in week 17, 38 countries reported. The right side Y-axis shows the proportion (%) and the left Y-axis shows the absolute number of specimens reported positive for influenza viruses (influenza A subtypes, pandemic H1N1 and influenza B).

MOHLTC Telehealth Syndromic Surveillance Report Monday September 14, 2009 – Sunday September 20, 2009



Map of the laboratory confirmed pH1N1 cases by PHU- September 22, 2009. Weekly cases are represented in the ring map, and the total number of positive pH1N1 cases is represented in brackets in the map of Ontario



Pandemic Influenza A (H1N1) 2009

Laboratory Perspective

**Jonathan Gubbay
Medical Microbiologist
Public Health Laboratory**

Structure of Influenza A Viruses

8 Segments

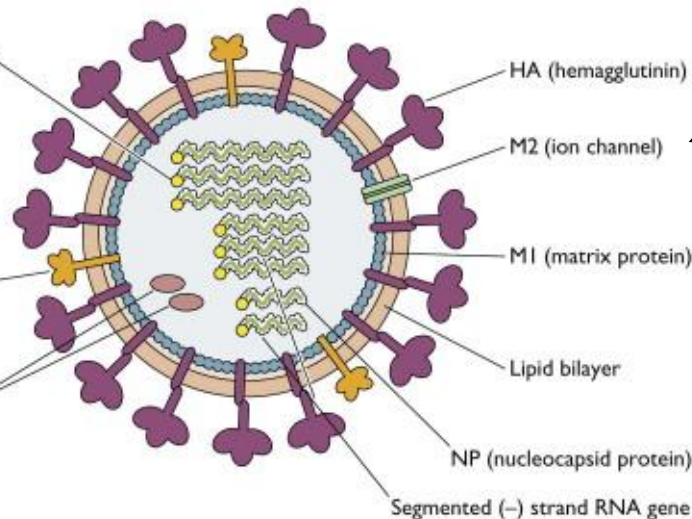
1. PA
2. PB1
3. PB2
4. HA
5. NP
6. NA
7. M
8. NS

Neuraminidase Inhibitors

PB1, PB2, PA
(RNA polymerase)

NA (neuraminidase)

NEP



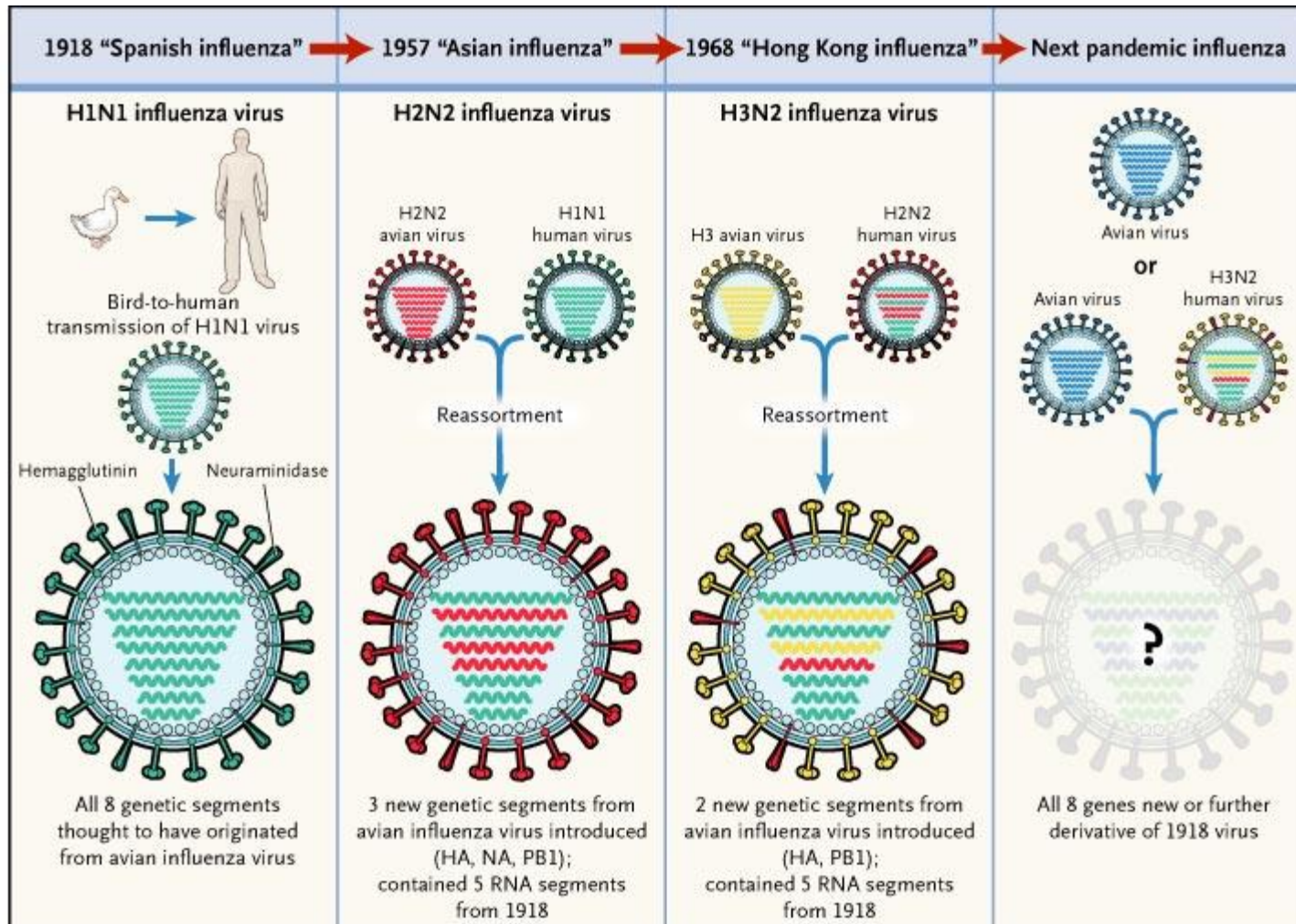
Amantadanes

<http://www.virology.ws/2009/04/30/structure-of-influenza-virus/>

Genetic Drift and Shift

- Genetic Drift
 - **Mutations in nucleotides result in amino acid alterations.**
- Genetic Shift (Reassortment)
 - **Coinfection of cells with two different influenza A viruses that swap segments**
 - **Can theoretically result in 256 different genotypes (2^8)**

Antigenic Shift



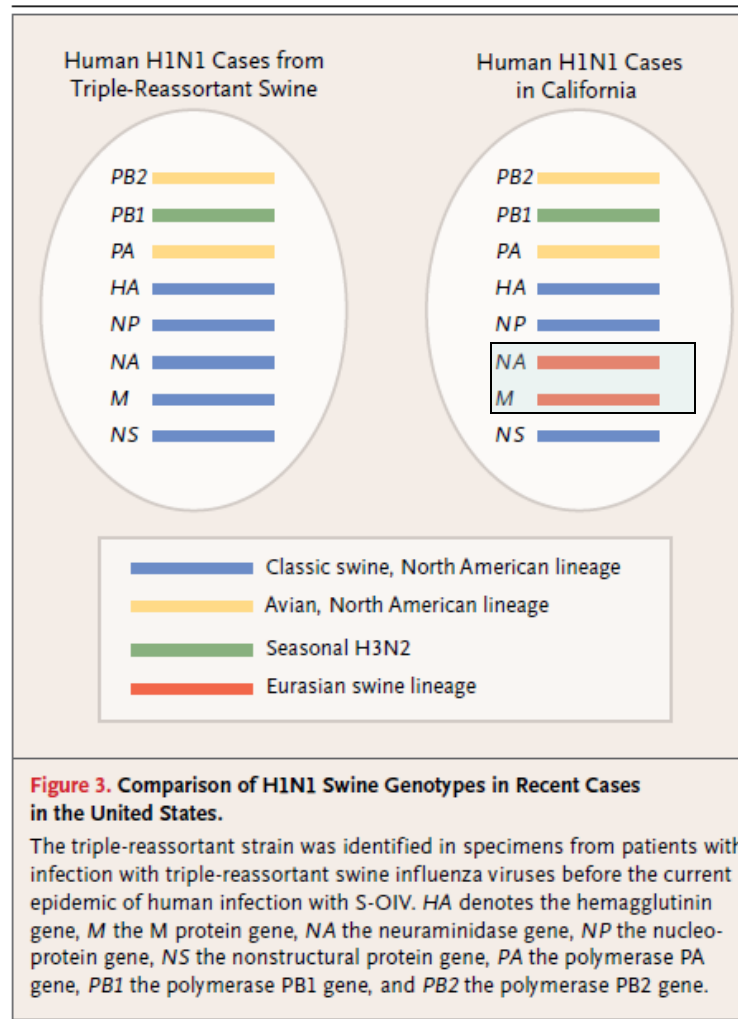
Novel Influenza A (H1N1): Evolution

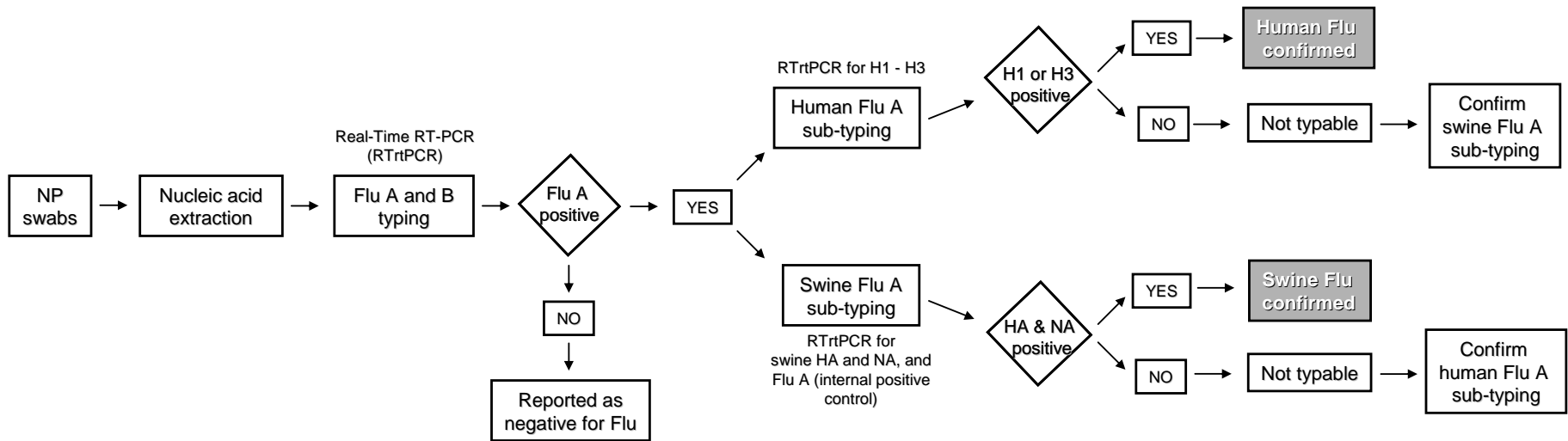
- Triple reassortant influenza viruses from humans, pigs, and birds
 - **Triple reassortant swine influenza (H1) viruses**
 - **Have circulated in pigs for >10 years.**

- Novel swine origin Influenza A (H1N1)
 - **A recent reassortant of triple reassortant swine influenza A and a Eurasian swine influenza.**

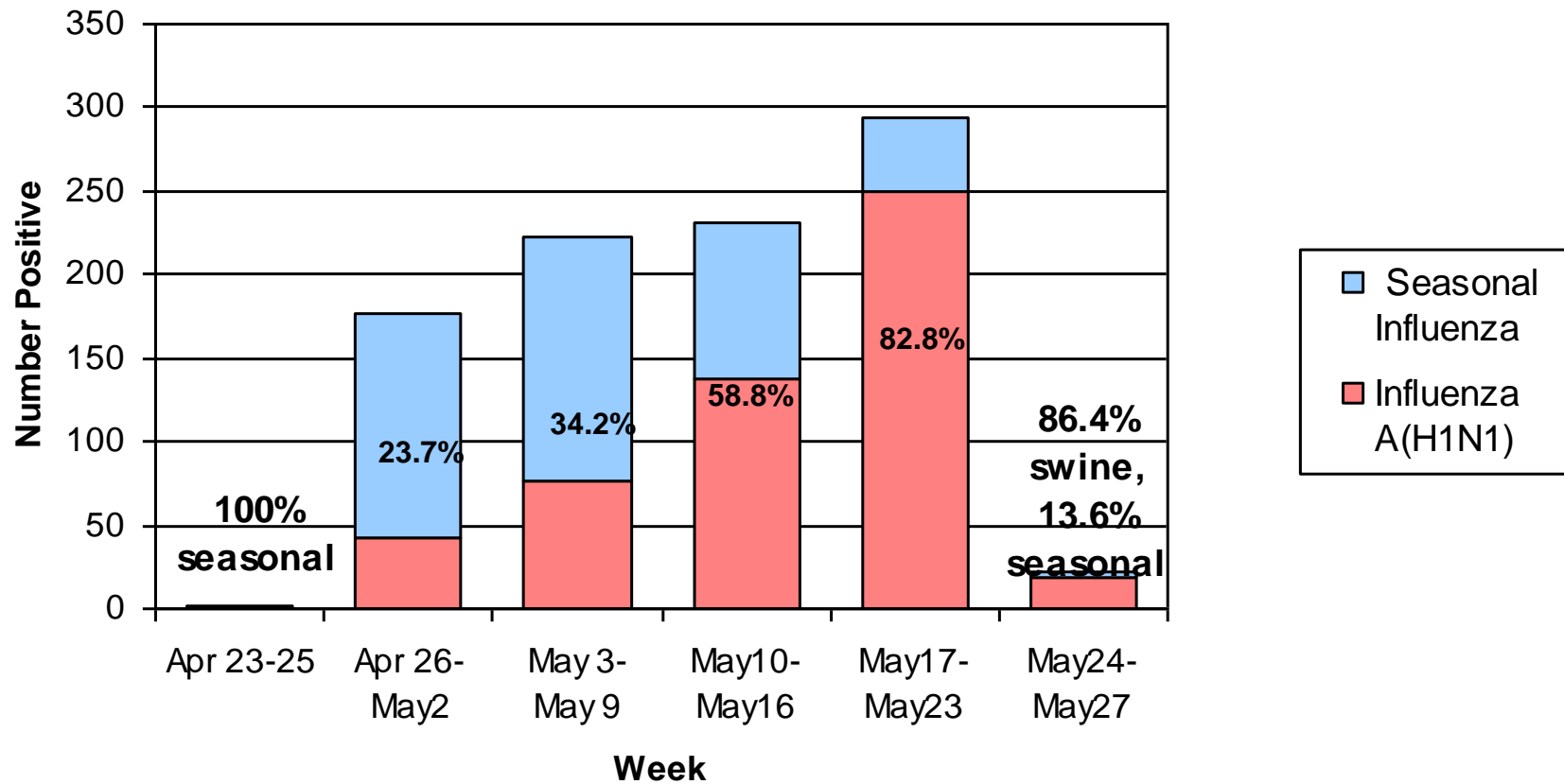
Emergence of a Novel Swine-Origin Influenza A (H1N1) Virus in Humans

Novel Swine-Origin Influenza A (H1N1) Virus Investigation Team*





Subtyping Breakdown of Influenza A Positive Samples



As of September 24, 19806 patients with specimens submitted to OPHL

- **Flu A positive = 4186**
- Flu A Negative = 15228
- Indeterminate = 116
- Flu testing in progress = 276

- **Swine flu positive (confirmed) = 3329**
- Human H3 = 253
- Human H1 = 45
- Subtype pending = 78

Important Health Notice

Information for Healthcare Professionals
H₁N₁ UPDATE

August 18th, 2009
Volume 6, Issue 17
Page 1 of 3

Laboratory Testing:

Currently testing is only recommended for persons admitted to hospital and those ambulatory patients at higher risk of complications (e.g., persons with pre-existing medical conditions, pregnant, persons under the age of 2 years and over 65 years of age) with ILI.

Persons seen in emergency departments and discharged home should not be tested.

Laboratory requisitions should be clearly labelled to identify the patient as "Hospitalized" or "High-Risk" to allow appropriate triage of specimens for testing.

Evaluation of Rapid Influenza Diagnostic Tests for Detection of Novel Influenza A (H1N1) Virus – United States, 2009

MMWR

August 7, 2009 / Vol. 58 / No. 30

- Sensitivity of RIDTs 40-69%; as low as 10% in some studies.
- “Treatment should not await laboratory confirmation because laboratory testing can sometimes delay treatment and because a negative rapid test does not rule out influenza.”

Updated Interim Recommendations for the Use of Antiviral
Medications in the Treatment and Prevention of Influenza for the
2009-2010 Season

September 8, 2009 2:00 PM ET;

<http://www.cdc.gov/h1n1flu/recommendations.htm>

Research at OPHL/OAHPP

- Many initiatives underway
 - Evaluation of diagnostic tests
 - Monitoring of genetic mutations over time/passage/within clusters.
 - Seroepidemiology studies
 - Collaboration looking at monoclonal antibody therapy
 - Point of care test development

Antiviral Resistance Testing

- Novel H1N1 are almost all oseltamivir susceptible, amantadane resistant.



MMWR Dispatch
Vol. 58 / August 14, 2009

**Oseltamivir-Resistant Novel Influenza A (H1N1) Virus Infection in Two
Immunosuppressed Patients – Seattle, Washington, 2009**

Morbidity and Mortality Weekly Report
www.cdc.gov/mmwr

Weekly

September 11, 2009 / Vol. 58 / No. 35

**Oseltamivir-Resistant 2009 Pandemic Influenza A (H1N1) Virus Infection
in Two Summer Campers Receiving Prophylaxis – North Carolina, 2009**

Whole Genome Sequencing

- Monitor for genetic drift and shift.
 - **Make sure current molecular diagnostic test is still working**
 - **Vaccine efficacy**
 - **Identify mutations that increase virulence.**
- Epidemiological tool
 - **Outbreak identification and tracking.**
 - **Early detection system for future pandemics**

You can't please all the people all the time.....

4 - Reason for Test

diagnostic immune status
 needle stick follow-up
 prenatal
 other - (specify) *close exposure*

Date Collected: *7/27/11*

Onset Date: *7/27/11*

Clinical Information

fever gastroenteritis respiratory symptoms
 STI ~~headache~~/stiff neck vesicular rash
 pregnant encephalitis/meningitis maculopapular rash
 jaundice
 other - (specify) *Head cough blood*

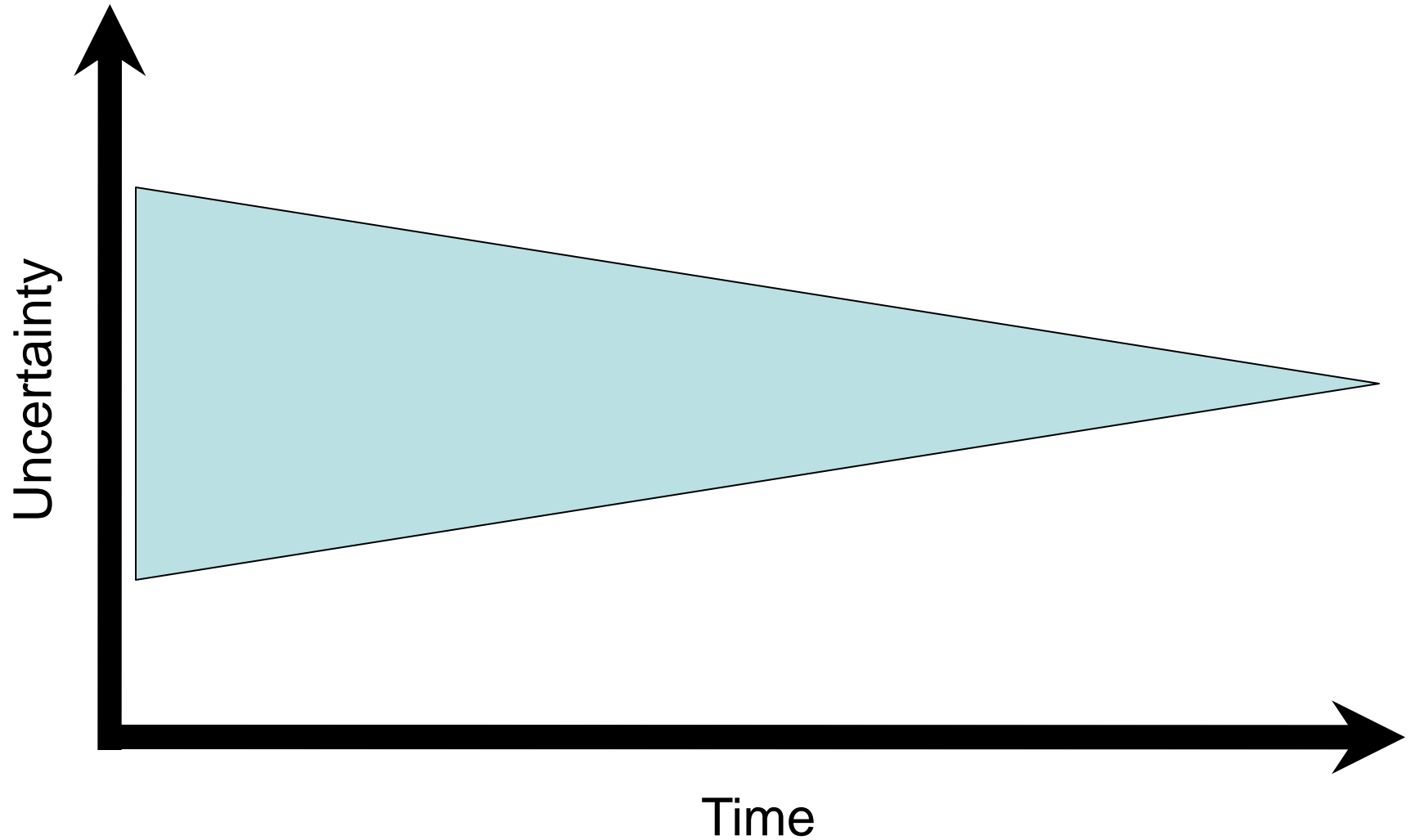
recent travel - (specify) *contact w. her sister 5 days*

Key Points

- Ambulatory patients should only be tested if at high risk of complications.
- Oseltamivir resistance is currently very rare in Pandemic Influenza A (H1N1) 2009.
- Therapeutic decisions should be made on clinical grounds without waiting for laboratory testing.
- Point of care tests should not be used in individual patients due to poor sensitivity.
- Bacterial coinfection should be considered and screened for in persons with severe pandemic (H1N1) 2009 infection.

Are we prepared?

Michael Gardam
Director, Infectious Diseases
OAHPP



What did we plan for?

- Planning assumptions based on a 1957 (moderate) pandemic
 - Most affected groups (similar to seasonal flu)
 - Attack rate, hospitalization and mortality rates
 - Does not take into account possible effectiveness of public health, social distancing measures
 - Does not take into account antibiotic use, intensive care units...modern medical care
 - Assumes all hospital beds are staffed

Table 3.2: Number of People Affected as a Percentage of the Population (based on a 35% attack rate)

	No. of People	% of People who are Clinically Ill (#2 in Table 3.1)	% of Total Population (#1 in Table 3.1)
People who can be managed through self care	2,043,345	45.2%	15.8%
People who will require an outpatient visit	2,411,308	53.3%	18.7%
People who will be hospitalized and recover	54,572	1.2%	0.4%
Fatal cases (70% in hospital)	12,635	0.3%	0.1%
Hospitalizations (recoveries + 70% of fatal cases)	63,417	1.4%	0.5%

OHPIP 2008

Canadian Assumptions

- Assumed 165 thousand hospitalizations
 - We have seen 0.6% so far
- Assumed 33 thousand deaths
 - We have seen 0.2% so far
- Assumed 1 in 5 of hospitalized would die
 - We have seen 1 in 21 of hospitalized die

Likely system stress points

- Intensive care units
- Emergency Departments
- Medical inpatient units
- Occupational Health and Safety

General work place guidance

- General education
- Provision of appropriate PPE if healthcare workers
- Hand hygiene
- Cough etiquette
- Loosening of sick time management programs
- Explore ability to work from home
- Provision of influenza vaccine when available

Pregnant/immunocompromised staff

- Assumed similar risk of infection as general public
- At modest increased risk of more severe disease
- Possible work reassignment but not exclusion
- Advise on risks, preparedness
 - Vaccination
 - antivirals

Infection Control Guidance

- Ontario is different from other provinces
- Requirement for fit-tested respirators within 2 metres
- Physical barriers
- Stockpiling for facilities, physician's offices

Antivirals

- Resistance has not yet been an issue
- Stockpiled enough drug to treat 25% of Ontario's population
- Unlikely to see widespread use
 - OHPIP plan versus current plan
 - All patients versus those at high risk for complications
- No plan for prophylaxis
- Reliance on existing distribution networks (pharmacies)

Pandemic H1N1 2009: The Health Care System

*Brian Schwartz, Director
Emergency Management Support, OAHPP
Scientific Advisor, Emergency Management Branch
Public Health Division, MOHLTC*

What we expected

- Started in Southeast Asia
- Time to prepare
- High morbidity & mortality
- Predilection for risk groups (including elderly and young)
- High societal disruption

What we got

- Started in North America
- No time to prepare
- Low morbidity and mortality (so far)
- Predilection for young risk groups (including pregnant women)
- High media profile

So why are we concerned?

Some populations are harder hit than others:

- **Children < 5 (especially <2)**
- **Co-morbid illness**
- **Aboriginal**
- **Pregnancy**

Severe outcomes in some populations

- Children < 5 years of age have the highest ICU admission rate
- Mortality rate highest in > 65 years (0.42 per 100,000), followed by the cases between 45 and 64 years (0.27 per 100,000)
- Some cases required prolonged ventilation
- What happens if the virus mutates or becomes resistant to antivirals?

Seasonal versus pH1N1 Vaccine

- pH1N1 seen as primary influenza strain this fall
- However older people less vulnerable to pH1N1 (residual immunity) but still vulnerable to seasonal strains
- Extent of seasonal 'flu penetration not clear
- Seasonal vaccine available now, pH1N1 in about a month
- Ontario's Plan:
 1. Seasonal program to ≥ 65 and LTCH residents
 2. pH1N1 immunization campaign (1st & 2nd tiers)
 3. Seasonal catch-up if indicated

pH1N1 Vaccine Sequencing

Tier 1

- <65 with chronic health conditions
- Pregnant women
- Children 6 months – 5 years
- Residents of remote/isolated communities
- Health care workers
- Household contacts of infants < 6 months and immunocompromised

Tier 2 (everyone else)

- Children 5-18
- First responders
- Poultry and swine workers
- Adults 19-64
- Adults ≥ 65

Health System Issues

- a) Primary care**
- b) Alternative assessment, treatment and referral**
- c) Acute care**
- d) Critical care**

Primary Care

- **During spring wave felt unprepared to comply with some infection prevention and control guidelines**
- **OHPIP primary care chapter useful in guidance re maintaining primary care services**
- **Variable response in primary care settings**

Primary Care strategies

- **Self assessment algorithms**
- **Telehealth**
- **IPC and clinical guidance for ambulatory care settings**
- **Provider education and support**
- **Maintaining services: cohorting patients, group coverage, phone assessments**

Alternative Assessment, Treatment and Referral Strategies (e.g. flu centres)

- **Local contingency plans should address circumstance where local primary care system is unable to meet demand for assessment, treatment and referral**
- **Local plan to be flexible and address strengths and constraints of local health care delivery system**
- **Health care providers to work with local public health unit to put plan in place**

Alternative Assessment, Treatment and Referral Strategies: examples:

- **“Flu Centre” – ad hoc health facilities performing assessment, treatment and referral services**
- **Augmented hours of primary care operation, staff resources of existing primary care centres**
- **Out-patient hospital clinic**
- **Mixed approach including some or all of the above**

Acute Care

- **20-25% of hospitalizations have been ICU admissions**
- **Due to “polarity” of illness, non-ICU care may not be as stressed as Critical Care**
- **Exception may be in children <5: asthma, croup, bronchiolitis**

Critical Care Surge Planning

- **pH1N1 critical care surge strategy currently in development by Emergency Management Branch and the Critical Care Secretariat**
- **Goal is to optimize existing critical care surge resources through the LHIN-based Surge Capacity Management Program and to provide for contingencies should existing resources become overwhelmed**

Critical Care Surge Planning

- **On-going monitoring and analysis of critical care resource utilization**
- **Application of principles and approaches of the provincial Surge Capacity Management Program: hospital-based and LHIN-based**
- **Encourage local planning, using strategies outlined in OHPIP**
- **Clinical guidance for critical care (in development)**
- **Provincial support for additional ventilator capacity**

Summary: Clinical lessons

- **Mild in many, severe in some**
- **Early treatment important: Access to antiviral medication**
- **Recommending antivirals for children, elderly, pregnant women, morbid obesity, underlying illness**
- **Watch out for those who get sick**

Health System Issues

- Primary care settings: infection prevention and control concerns for office staff & patients, maintaining services
- Linkages between public health and primary care
- Role of 'flu assessment & treatment centres
- Anticipate stress on primary care, acute paediatrics and adult critical care