

Influenza – Pandemic on the Doorstep

Presented by Dr. Theresa Tam

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Influenza - Pandemic on the Doorstep

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Objectives

Participants will achieve a basic understanding of:

- The biological properties of the influenza virus and why it has the potential to cause pandemics
- What a pandemic is, why it is a global health emergency, what happened in the past and why advanced planning is necessary now

Participants will gain an awareness of:

- What preparedness and planning activities are occurring at international, national, regional and local levels
- What components should be considered in a comprehensive plan
- Strategies that have been used in preparation activities and the development of pandemic plans in Canada
- Lessons learned from the SARS experience in Canada

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Influenza virus

The Pandemic “Agent”

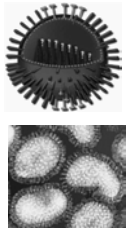
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Influenza Virus: *orthomyxoviridae*




- RNA virus, 8 segments mutate or recombine resulting in new viral strains
- Lipid membrane contains –two spike glycoproteins: haemagglutinin & neuraminidase

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ABC of Influenza Virus

- *Influenza A* (avian, humans, swine, equine, marine mammals)
 - 15 hemagglutinin subtypes
 - current human strains
 - H1N1 (H1N2)
 - H3N2
- *Influenza B* (humans)
- *Influenza C* (humans, swine)



The natural hosts of influenza A

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Antigenic Shift and Drift

Antigenic drift: a gradual change in the hemagglutinin and/or the neuraminidase proteins when the virus goes through a series of minor mutations and evolves over time (Influenza A & B)

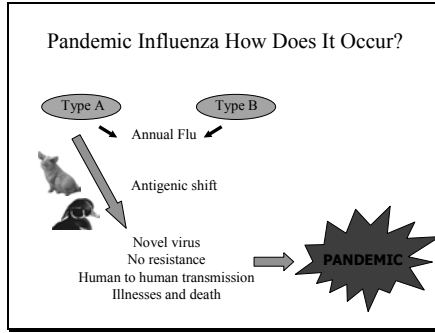
Antigenic shift: an abrupt and major change in the hemagglutinin and/or the neuraminidase proteins resulting in the sudden appearance of a new influenza virus subtype (Influenza A)

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Pandemic Influenza

What is it?

Why plan for it?

What can be done to prepare for it?

The New York Times Magazine

FLU PANDEMIC

A Once and Future Menace

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What is an Influenza Pandemic?

- A sudden, widespread outbreak of a new strain of influenza
- Virtually no one is immune
- Virus is capable of efficient human to human transmission, resulting in large amount of illness and death

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Pandemic Influenza History

- Spanish Flu 1918
- Asian Flu 1957
- Hong Kong Flu 1968

Pandemic scares:

- Swine Flu 1976
- Hong Kong Avian Flu 1997 and 2003




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Each Pandemic is Different

| Year | Interval(yrs) | Subtype | Severity |
|------|---------------|---------|----------|
| 1889 | -- | H3N2 | moderate |
| 1918 | 29 | H1N1 | severe |
| 1957 | 39 | H2N2 | severe |
| 1968 | 11 | H3N2 | moderate |
| 1977 | 9 | H1N1 | mild |


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“Spanish Flu” A(H1N1) 1918-19



- Spring & Fall 1918
- 20 to 40 million deaths

Life Expectancy in US:



Source: The Institute of the World Bank. "The Spanish Flu, Pandemic Influenza and other pandemics, were deadly waves of the pandemic. When they returned home, they carried with them the germ of the disease which spread rapidly among other populations. (Photo courtesy Public Health Canada 2001) 1918-1919"

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Pandemic Influenza
What We Know and the Uncertainties

- Another influenza pandemic is INEVITABLE
- Timing and epidemiology UNPREDICTABLE
- SHORT LEAD TIME
 - presence in Canada within 3 months
 - 1st peak in illness within 5-7 months
- Outbreaks will occur SIMULTANEOUSLY in multiple locations, in multiple waves

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Worldwide Spread of Asian Influenza Pandemic


February 1957



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Worldwide Spread of Asian Influenza Pandemic

May 1957

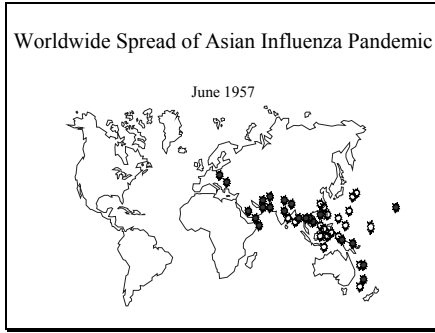


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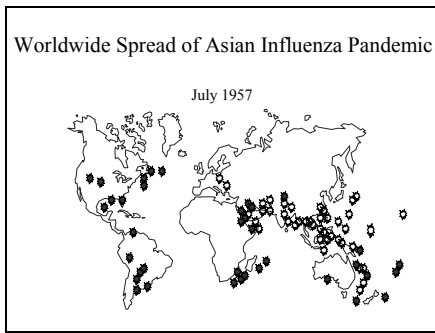
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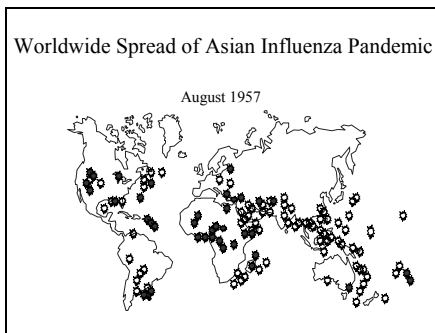
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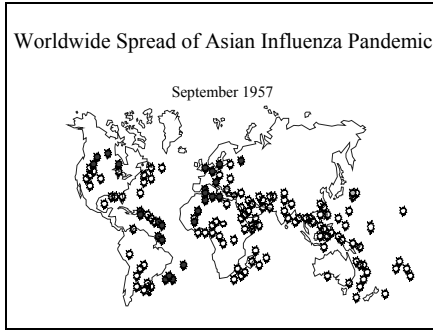


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Influenza Pandemic: Then and Now

- Increase in world population and changing demographics (e.g. immunocompromised hosts)
- Jets may spread the disease very rapidly in hours or days
- In developed countries
 - Improved medical care, antibiotics for secondary infections
 - Vaccines and antivirals for prophylaxis
 - Antiviral drugs for treatment

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Recent Experience with Avian Influenza

- 1997 H5N1 in Hong Kong
 - 18 cases and 6 deaths
 - Mass culling of poultry
 - International demand for antiviral drugs
- 2003
 - H5N1 in China/Hong Kong
 - Two confirmed human infections with one fatality
 - H7N7 in the Netherlands
 - One death and more than 80 cases of mild disease (mainly conjunctivitis) in humans associated with affected poultry farms
 - Family members of ill poultry workers also had mild respiratory disease suggesting possible human to human spread

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Pandemic Influenza
Estimating the Impact

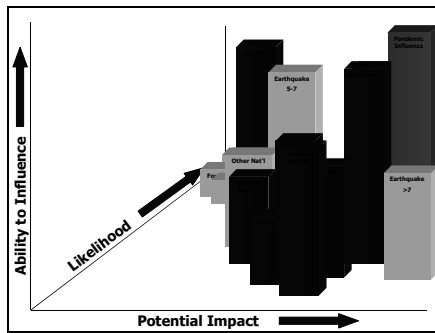
In Canada, if vaccine is unavailable,
EXPECT:

- 11,000 to 58,000 deaths
- 34,000 to 138,000 hospitalizations
- 2 to 5 million outpatients
- economic costs
 - health care: \$330M to \$1.4B
 - societal: \$5B to \$38B

Health Resource Scarcity

Societal Disruption

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Pandemic Influenza

Planning & preparing
to better manage
tomorrow's pandemic
consequences ...
today

The Flu Hunters

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Preparedness Activities:
International

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Global Agenda for Influenza Surveillance and Control (WHO)

- Major Themes
 1. Improvement in the quality and coverage of virological and epidemiological influenza surveillance
 2. Improvement in the understanding of health and economic burden of influenza, including benefits from epidemic control and pandemic preparedness
 3. Expansion in the use of existing vaccines, particularly in developing countries and in high-risk groups and acceleration in the introduction of new vaccines
 4. Increase in national and global epidemic and pandemic preparedness, including vaccine and pharmaceutical supplies

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Global Influenza Surveillance Network

- Virological surveillance
 - 110 national influenza laboratories
 - 1 lab/country
 - >1 lab/country
 - 4 regional reference centres



❖ WHO, Global Agenda: *May 2002*
to expand the existing laboratory surveillance network and increase disease surveillance for influenza control and pandemic preparedness.

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Rationale for strengthening international influenza surveillance

- Surveillance of human, wild and domestic animal populations in high risk areas is key to:
 - vaccine development
 - development of an early warning system for viruses with pandemic potential



areas where birds, pigs and humans live in close proximity are high risk environments for antigenic drift and shift.

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World Health Organization (WHO) Pandemic Phases

- Phase 0, Level 0 - Inter-Pandemic period
- Phase 0, Level 1 - Novel virus identification in a human
- Phase 0, Level 2 - Human infection confirmed
- Phase 0, Level 3 - Human-to-Human Transmission Confirmed
- Phase 1 - Pandemic confirmed
- Phase 2 - Outbreaks in multiple geographic areas
- Phase 3 - End of first wave
- Phase 4 - Second or later waves
- Phase 5 - Post-Pandemic / Recovery

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Preparedness Activities:

National

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National Level Activities

- Development of pandemic plans
 - Approximately 30 countries worldwide now have a plan for pandemic influenza
 - Use of the WHO Pandemic Phases improves communication and consistency
 - Requires national coordination and agreement on goals of pandemic preparedness and response
- National surveillance for influenza-like illness and influenza viruses
- Vaccine strategies
- Development of Stockpiles / Antiviral strategy

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Pandemic Planning Activities In Canada

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Overall Goal of Pandemic Preparedness and Response

First, to minimize serious illness and overall deaths, and second to minimize societal societal disruption among Canadians as a result of an influenza pandemic.

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Pandemic Preparedness Milestones

- 1988 - 1st draft plan
- 1996 - 2nd draft plan
- 1997 - lessons learnt from Hong Kong "Bird flu"
- 1998 to 2002
 - Federal/Provincial/Territorial Working Agreement (Mar. 2001)
 - Established security of vaccine supply with pandemic vaccine contract (Sep. 2001)
 - Pandemic Influenza Committee (PIC) established (Mar. 2002)
- 2003 - Canadian Pandemic Influenza Plan, to be realigned with other public health emergency plans and revised in light of SARS experience

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Pandemic Influenza Committee Working Groups

- Surveillance and Laboratory Testing
- Vaccines
- Antivirals
- Health Services
 - Resource Management
 - Non-Traditional Sites and Workers
 - Mass fatalities
 - Clinical Care
 - Infection Control
- Public Health Measures
- Communication

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Canadian Pandemic Influenza Plan

| | | |
|--------------|----------|----------|
| Introduction | | |
| Background | | |
| Preparedness | Response | Recovery |
| Guidelines | | |

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Organization of the Canadian Pandemic Influenza Plan

- Use of WHO pandemic phases terminology
- Preparedness and response activities organized by pandemic phase and components
- Components of the Plan:
 - Surveillance
 - Vaccine Programs
 - Antivirals
 - Health Services
 - Emergency Services
 - Public Health Measures
 - Communications
- Working groups to address each component and to develop specific guidelines/protocols

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Surveillance 

- Strengthen current *FluWatch* surveillance system
- Strengthen national laboratory capacity
 - national laboratory standards, training workshop
 - detection of all influenza subtypes
 - antivirals resistance monitoring
- Collaboration in international surveillance
 - WHO Global Agenda
 - http://www.who.int/emc/diseases/flu/global_agenda_report/introduction.htm

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Vaccine Strategy

- Vaccine strategy options and security of supply
 - provide vaccines to all Canadians (75% uptake)
 - domestic capacity and multiple suppliers
- Guidelines on use in short supply
- Strategies for delivery and administration in mass campaigns
- Monitoring of distribution, uptake, wastage
- Vaccine adverse events surveillance
- Vaccine clinical trials protocols
 - amount of antigen required, need for adjuvants
 - 2 dose

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Antiviral Strategy

- The only public health intervention prior to effective vaccine becoming available
- Options for use and stockpiling
 - Amantadine for prophylaxis
 - Neuraminidase inhibitors for treatment
- Guidelines on use of antivirals in short supply
- Clinical guidelines
- Monitoring for adverse events and resistance

Further needs

- No national stockpile at this time
- Strategies for delivery, administration
- Monitoring of distribution, uptake, wastage

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Infection Control Guidelines

- Infection control in different settings
 - hospitals
 - triage sites (clinics and others)
 - non-traditional health care sites (temporary hospitals or clinics)
 - self care
 - corpse management

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Clinical Guidelines

- Patient assessment & management in different settings
 - triage of adult and paediatric patients with or without influenza-like illness
 - long term care facilities - self sufficiency
 - self care
- Management in event of extreme shortage of resources - ethics

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Resource Management

- Guidelines for acute care facilities
 - beds: capacity, tracking, maximizing, prioritization
 - supplies: meds, equipment & supplies management
 - health care workers - staff & volunteers
 - definitions
 - deployment & recruitment, training
 - “conscription”, compensation, liability insurance, licensing
 - counseling and support
- Guidelines for corpse management

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Non-Traditional Sites and Workers

Identification & use of alternative care sites

- administrative options e.g. linked with acute care setting
- type of patient care delivery
- criteria for appropriate site
- resource requirements and insurance
- tools: equipment & medical supplies checklists

Identification, training & protection of non-traditional workers

- roles and responsibilities and skill sets
- sources of labour, recruitment, screening
- insurance of employed and volunteer staff
- tools: job descriptions and redeployment checklist, educational resources, training guidelines

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Public Health Measures

- Facilitating a consistent public health response to the management of pandemic influenza
- Guideline document in development addressing:
 - Public Health management of cases and contacts
 - Use of quarantine and isolation
 - Contact tracing for special circumstance e.g. Airplanes
 - Travel advice and recommended restrictions
 - Recommendations for control through limitation/cancellation of large gatherings

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Emergency Response

Support Health Services Response and Maintain Essential Community Services


- pandemics are different from other emergencies
 - communities must respond without outside assistance
 - slower onset, prolonged course
 - highly infectious disease
 - reduction in human resources
- ensure close collaboration between public health and emergency responders at all levels
- build on existing emergency response frameworks
- exercise the response plans

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Communication Strategy

Consistent and uniform messaging

- framework
- tools & vehicles
- implementation plan
- education
- Canadian Coalition for Influenza Immunization - annual campaign



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Preparedness Activities:
Regional and Local Levels

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Strategies for Regional and Local Planning

- Get all stakeholders involved
- Agree upon goals and objectives
- Divide and conquer
 - Use existing expertise to develop documents relevant to their setting
- Consolidate and re-assess
- Incorporate lessons learned from other experiences that have “challenged” the system or facility
- Test and evaluate plan and revise as necessary
- Ongoing education of stakeholders, potential partners and public

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Within Canada...

- Most Provinces and Territories have developed plans for pandemic influenza
- Some provinces and territories are at the stage where they are testing their plans
- Local level planning is occurring
- Post-SARS high level of recognition for need for plans to mitigate the impact of pandemic influenza

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Lessons Learned from the SARS Experience in Canada

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Lessons Learned: General

- Team work is essential
 - Plan for dedicated team leadership that will not be pulled away to deal with other arising issues
 - Plan staffing to allow for time off but for continuity of response activities (e.g. rotating shifts)
- Strengthen human resource planning and surge capacity in emergency plans
- Plan to support your staff/responders
 - Meals, off-hours transportation, family responsibilities

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Lessons Learned: General

- Need to strengthen communicable disease emergency response plans and use common approaches for different infectious agents
- Need to have a “think tank” team that is not directly involved in the minute by minute response
- Response team components
 - Coordination and Operations (with international liaison)
 - Technical (surveillance, epidemiology, public health guidelines etc.)
 - Logistics
 - Communications
 - Think Tank

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Lessons Learned: Disease Control

- Quarantine/isolation generally acceptable to the public as in controlling SARS but need for support systems
- Cancellation of public gatherings will happen regardless of public health recommendations
- Involve partners in implementation of public health measures (education, information dissemination)
- Blood and border issues will arise quickly

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Lessons Learned: Surveillance

- Strengthen and coordinate hospital and public health surveillance systems to detect emerging respiratory infections of significance
- Establish case definition early with rationale and be consistent with highest level organization if at all possible
- Establish minimum dataset and data sharing agreements at the outset for emerging infectious diseases
- Establish mechanism and processes for alerting public health and health care providers in real time

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Lessons Learned: Communication

- Pre-established internal and national networks worked; need to strengthen international networks
- Establish communication systems that permit optimal use of all participants time
 - decide who needs to know everything immediately and who does not
- Human resources to translate science (particularly epidemiology) into public information
- Real-time, evidence-based communications practice
 - be pro-active rather than reactive
- Perception IS reality

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Lessons Learned: Infection Surveillance and Control in Acute Care Settings

- Lack of trained personnel especially in non-tertiary care settings
- Varying capacity for surveillance and need to coordinate with public health
- Impact of intensive SARS infection control measures for prolonged periods:
 - Health care worker well-being
 - Increase in other nosocomial infections e.g. MRSA

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Questions ?

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References

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