University at Albany Center for Public Health Preparedness

Grand Rounds Series

Avian Influenza: State, National and Worldwide Response

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Speakers

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Evaluation

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Avian Influenza: Where Are We Now ?



Topics

- Influenza and Public Health
- Avian Influenza, pandemic influenza
- Pandemic Response Components
  - Surveillance
  - Vaccination
  - Antiviral drug use
  - Public health interventions

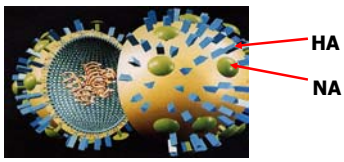
Influenza

- Acute, febrile respiratory illness affecting nose, throat, bronchial tubes and lungs
- Epidemics caused by influenza viruses A and B (Type C uncommon in people, no outbreaks)
- Occurs worldwide, causing considerable morbidity and mortality each year

Influenza A Viruses

- Subtyped based on surface glycoproteins:
  - 16 hemagglutinins (HA) and
  - 9 neuraminidases (NA)

  Current human subtypes:
  - H1N1, H3N2, H1N2



Symptoms

- Fever, muscle aches, headache, lack of energy, dry cough, sore throat, possibly runny nose
- Fever and body aches for 3-5 days
- Cough and lack of energy- 2 weeks
- Symptoms similar to adenovirus, RSV, rhinovirus, parainfluenza, legionellosis, etc,

Transmission

- Typical incubation: 2 days
  Range: 1-4 days
- Viral shedding
  - Can begin 1 day before symptom onset
  - Peak shedding first 3 days of illness
    - Correlates with temperature
  - Subsides usually by 5-7th day in adults
    - can be 10+ days in children

Transmission

- Limited studies, varying interpretations
- Contact, droplet, and droplet nuclei (airborne) transmission may all occur
  - Relative contribution of each unclear
  - Droplet thought most important
    - Generated via coughing, sneezing, talking

Public Health Importance of Influenza

- Annual epidemics and potential for pandemics
- >36,000 deaths in US per epidemic (MVA - 40,000 deaths yearly)
- Over 85% of mortality is in persons aged 65 and older
- Attack rates of 5-20% in general population
- Nursing home attack rates of 60%

Pandemics

- Result from the emergence of a new virus to which the overall population possesses no immunity
- Most severe occur with changes in both surface proteins
- Asia the source of many outbreaks
  - Viruses can be isolated at any time of year
  - Swine, birds and humans live under the same roof, providing opportunity for admixing

How Influenza Viruses Change

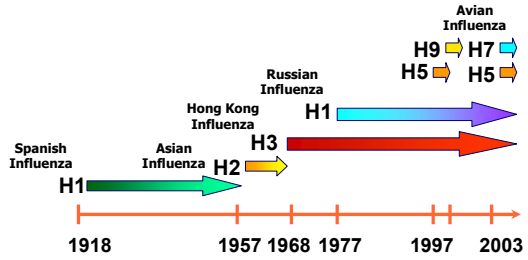
- Antigenic Drift:
  - Small changes in virus over time
  - New strains appear and replace older strains
  - May not be recognized by antibodies to older strains
- Antigenic Shift:
  - Abrupt, major change (re-assortment)
  - Results in novel strain or new subtype
  - Can cause pandemic influenza

Influenza Pandemics 20th Century

Flu Pandemics: A Comparison

YEAR	1918	2000
World Population	1.8 Billion	5.9 Billion
Primary Mode of Transportation	Troopships, Railroad	Jet Aircraft, automobile
Time for Virus to Circle the Globe	4 months	4 days
Estimated Dead Worldwide	20+Million	60 Million?

Timeline of Emergence of Influenza A Viruses in Humans



Current H5N1 Outbreak, Dec 03 – August 05

- Thailand, Vietnam, Cambodia, Malaysia, Indonesia, China, Russia, prob. others
- Endemic infection of poultry in Asian countries
- Wild waterfowl and poultry/bird exposure
- No sustained person-to-person transmission identified
- No influenza A viruses with human and avian genes have been detected

H5N1 Cases and Deaths, Dec. 26, 2003, to August 8, 2005

Country	H5N1 Cases	Deaths	Case Fatality
Indonesia	1	1	100%
Thailand	17	12	71%
Vietnam	90	40	44%
Cambodia	4	4	100%
Total	112	57	51%

WHO Pandemic Preparedness Plan

- 2005 WHO global influenza preparedness plan:

  www.who.int/csr/resources/publications/influenza/en/WHO_CDS_CSR_GIP_2005_5.pdf

- Recognition of endemic animal infection with an influenza virus subtype that has repeatedly caused disease in humans
- SARS experience highlights opportunity if not to contain a pandemic, potentially to "buy time"

New WHO Pandemic Phases

Interpandemic period	Phase 1: No new influenza virus subtypes in human; subtype that has caused human infection may be present in animals
	Phase 2: As above, but circulating animal subtype poses substantial risk of human disease
Pandemic alert period	Phase 3: Human infection w/ new subtype, no human-to-human (HTH) spread, or rare spread to close contact
	Phase 4: Small clusters w/ limited HTH transmission, highly localized spread, suggesting virus not well adapted to human
	Phase 5: Larger clusters, but HTH spread still localized, virus increasingly better adapted to humans, but not yet fully transmissible
Pandemic period	Increased and sustained transmission in general population

DHHS Pandemic Influenza Preparedness and Response Plan

- Description of Federal level activities
  - Coordination (command and control)
  - Actions of HHS agencies
- Legal authorities for pandemic response actions

DHHS Pandemic Influenza Preparedness and Response Plan

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- Description of current infrastructures & technologies
- Guidance on strategies for response actions and supporting rationales
- Table of specific Federal actions by pandemic phase

New York State Pandemic Planning

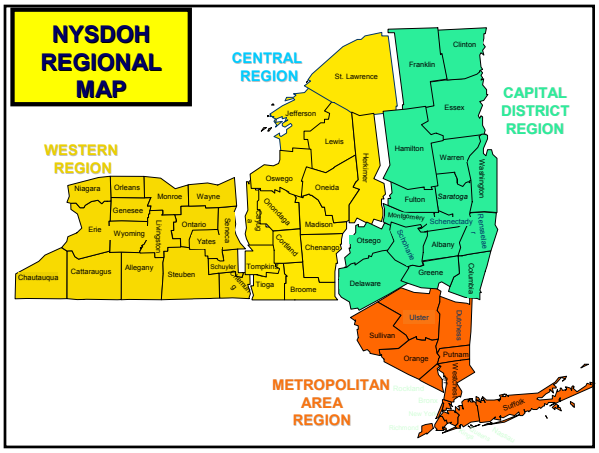
- Major Sections of State Plan (in draft)
  - Command and Control Procedures
  - Surveillance and Laboratory Testing
  - Vaccine and Antiviral Delivery
  - Emergency Response
  - Communications

New York State Pandemic Planning

- Activities by phases of a flu pandemic, for state DOH, LHDs, and providers
- Once draft completed, provide to local health departments, and providers for comments

Command and Control

- Outline roles, command structure, and decision-making process
- Ensure incorporation of pandemic plan with Department's overall emergency response plan
- Ensure legal issues are identified and addressed
- Ensure key stakeholders are informed about necessary infrastructure and resources needed to respond

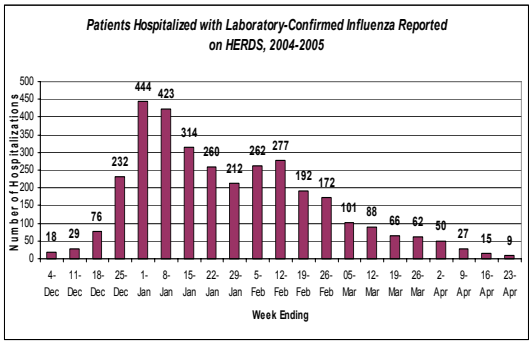


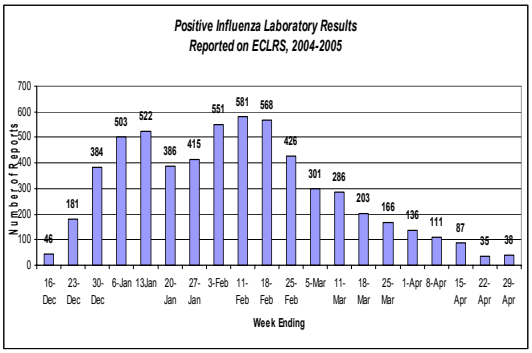
Surveillance and Laboratory Testing

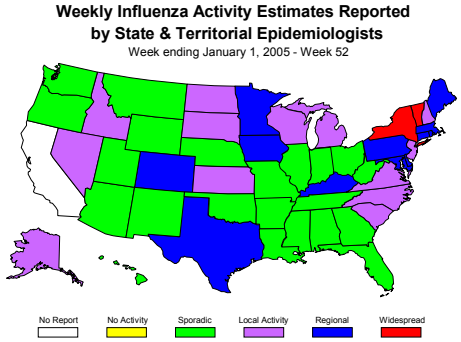
- Update surveillance guidelines for local health departments
- Develop plans for isolation, quarantine and contact tracing
- Address and plan for epidemiologic surge capacity
- Address and plan for laboratory surge capacity
- Develop laboratory testing algorithms

Enhanced Surveillance Activities in New York State, 2004-05

- Emergency influenza reporting regulations implemented in December 2004:
  - Hospitalized patients diagnosed with laboratory-confirmed influenza
  - Laboratory-confirmed influenza
  - Influenza-associated pediatric deaths







Vaccine and Antiviral Delivery

- Outline process for prioritization of vaccine and/or antivirals
- Outline process for vaccine and antiviral acquisition and delivery
- Develop data management system to track supplies, distribution and use
- Develop plan for conducting mass vaccination clinics
- Develop system for tracking adverse events to vaccination

Vaccine Planning

- When will vaccine first become available?
- Who will own and distribute it?
- What type of guidance will there be regarding how to use it?

Pandemic Vaccine Supply

- Assumptions
  - Imported vaccine will not be available
  - Two doses (15 ug) will be needed for protection
  - 4-8 months until first vaccine doses available
- U.S. manufacturing capacity
  - Only Sanofi has a completely domestic supply chain
  - Estimated production sufficient to deliver ~5 million monovalent doses/week
- Implication – less than 1% of the population may be protected per week

Priority Groups for Pandemic Vaccine

- Base definition of priority groups on pandemic response goals
  - Reduce health impacts – Maintain quality healthcare system and protect those at highest risk
  - Reduce social and economic impacts – Maintain essential community services
- Role of national plan in defining priority groups
  - Need for national guidance vs state-by-state decisions re: target groups generally and specific priorities within groups

Draft Priority Groups for Vaccine
NVAC / ACIP Meeting, July 19, 2005

Element and Tier	Personnel (1,000's)	Cumulative total (1,000's)
1A. Health care involved in direct patient contact + essential support	9,000	9,000
Vaccine and antivirals manufacturing personnel	40	9,040
1B. Highest risk group	25,840	34,880
1C. Household contacts children <6 months and Severely immune compromised, and pregnant women	10,700	45,580
1D. Key government leaders +critical public health pandemic responders	*151*	45,731
2. Rest of high risk	59,100	104,831
Most CI and other PH emergency responders	8,500	113,331
3. Other key government health decision makers + mortuary services	*500*	113,831
4. Healthy 2-64 years not in other groups	179,260	293,091

Antiviral Planning

- Will any public sector supply be available and if so, how much?
- What guidance is there regarding how best to use it?

Pandemic Antiviral Supply

- Antivirals in the Strategic National Stockpile
  - Oseltamivir (~2 million courses)
  - Rimantadine (~5 million courses)
- Antivirals in the private sector
  - ~1-1.5 million oseltamivir courses, pre-influenza season
  - Amantadine and rimantadine widely available
- Oseltamivir production
  - Currently from single facility in Switzerland
  - U.S. supply chain being established

NVAC Meeting, July 19, 2005 Recommendations

- Oseltamivir should be the primary drug stockpiled.
- Zanamavir should also be included because it is effective against most oseltamivir resistant viruses and to support ongoing production and protect against disruption of supply.
- M2 inhibitors (amantadine / rimantadine), beyond the 5 million courses currently in the SNS should not be stockpiled due to the likelihood of resistance.

Overview of Antiviral Drug Strategies

- With limited antiviral supply, treatment is the best strategy to prevent adverse health outcomes – especially if delivered early
- Ability to maintain essential services with a treatment strategy is unclear
  - Effectiveness related to pandemic severity, ability to implement early, and ability to tolerate some work loss
- Prophylaxis reasonable in defined settings
  - Small high risk or critical service groups
  - Institutional settings – post-exposure prophylaxis

Proposed Priority Target Groups

Target Group	Estimated Population (millions)	Strategy	# Courses (in millions)	
			Target group	Cumulative
Patients admitted to hospital	10.0	T	8.0	8.0
HCWs with direct patient contact	9.2	T	2.4	10.4
Highest risk outpatients	2.5	T	0.7	11.1
Pandemic health responders, pub safety & key gov decision makers	3.3	T	0.9	12.0
Increased risk outpatients	85.5	T	22.4	34.4
Outbreak response	NA	PEP	2.0	36.4
HCWs in ER, ICU, EMS, dialysis	1.2	P	4.8	41.2
Pandemic societal responders & other HCWs	10.2	T	2.7	43.9
Other outpatients	180	T	47.3	91.2
Highest risk outpatients	2.5	P	10.0	101.2
Other HCWs w/ patient contact	8.0	P	32.0	133.2

Health Care and Emergency Response

- Address hospital surge capacity issues
- Address roles of triage centers, volunteers, home care
- Develop hospital employee health guidance
- Develop infection control guidelines
- Address mass mortality issues
- Develop system for tracking hospital resources

Medical Care during an Influenza Pandemic

- Surge capacity of the hospital system is limited
- Challenges:
  - Magnitude and duration
  - Staff shortages
  - Limited ability to call in external resources

Results: Worst Case Scenario

- At the peak of the most drastic scenario of a pandemic influenza outbreak (i.e. 35% attack rate, 6 week duration), New York State (excluding New York City) can expect a maximum of:
  - 14,916 influenza-related hospital admissions per week
  - 3,728 influenza-related deaths per week
    - 2,609 deaths in the hospital
- Influenza patients will most likely utilize:
  - 63% of hospital bed capacity
  - 125% of intensive care capacity
  - 65% of hospital ventilator capacity.

Results: "Least Worst" Case Scenario

- At the peak of the least dramatic scenario of a pandemic influenza outbreak (i.e. 15% attack rate, 12 week duration), New York State (excluding New York City) can expect a minimum of:
  - 1,395 influenza-related hospital admissions per week
  - 409 influenza-related deaths per week
    - 286 deaths in the hospital per week
- Influenza patients will most likely utilize:
  - 19% of hospital bed capacity
  - 38% of intensive care capacity
  - 20% of hospital ventilator capacity.

Interventions Other Than Vaccine or Antiviral Drugs

- Slow spread of virus between countries
  - Travel recommendations
- Reduce infectious and susceptible individuals in populations
  - Isolation of ill persons
  - Quarantine of exposed persons
  - Contact tracing
  - Cancellation of events (school, meetings etc)
- Steps to reduce individual exposure to virus
  - Masks
  - Hand washing

Communications

- During the pre-pandemic phase, develop social marketing strategies for risk reduction behaviors (e.g., handwashing, respiratory etiquette)
- Develop pre-pandemic communications products to expedite delivery of information during a pandemic
- Develop communications plan with "one-voice response" key messages
- Develop communication strategies that will address the "worried well"
- Identify spokesperson(s)
- Produce scripts and Q&A's for a public call center

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Evaluation

http://www.ualbanycphp.org/eval/cphpeval.cfm?ID=37