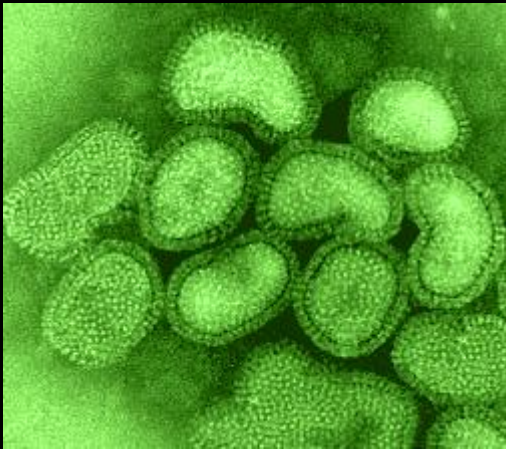


Pandemic Influenza Issues and Consequences



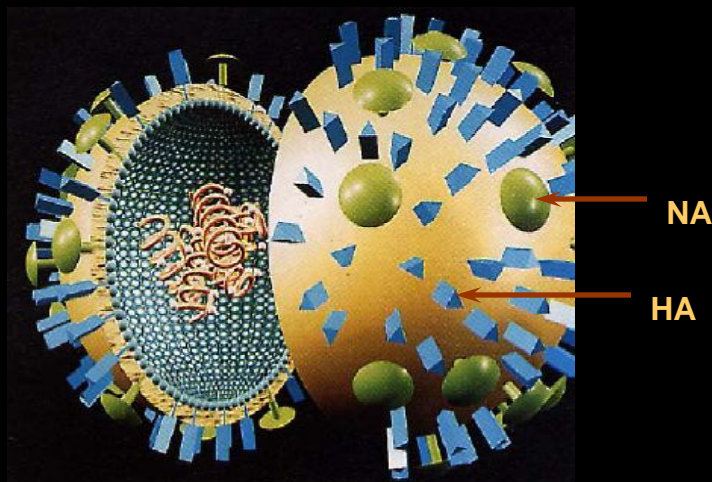
Laura M. Kelley
Associate, National Intelligence Council
MIT August 2006

Introduction to Pandemic Issues

Influenza Virus Primer

Three Types: A, B, C - Types A and B cause substantial morbidity and mortality among humans and are cause of annual influenza outbreaks (H1N1, H1N2, H3N2)

Avian Influenza: Subgroup of Type A, usually circulates in birds



Surface Proteins:

- **Hemagglutinin (HA):** Site of attachment to host
- **Neuraminidase (NA):** Helps to release virions from cells

There are currently sixteen H subtypes and nine N subtypes

Influenza Virus Primer II

Molecular structure *drifts* or changes slightly but frequently over time. This process results in the appearance of the different epidemic strains that circulate each year.

In some years, the influenza-A virus *shifts* or changes dramatically and unexpectedly. Shift can result in the appearance of a new influenza virus to which few (if any) people are immune by acquisition of a new H or H+N configuration.



H5N1 Pandemic is Not Imminent

- **Virus not efficiently transmissible among humans: Transmission to healthcare workers is rare. Only 3.7% in 1997 outbreak based on seroconversion**
 - Idiopathic cases often interpreted as evidence of human transmissibility but may be from ingestion, environmental exposure, or primary aerosol
- **Asymptomatic case rate believed low: Only 10% H5N1 antibody seroprevalence in poultry workers. Role of asymptomatic cases in spreading the disease is unknown.**

H5N1 is currently a veterinary health threat.

There is no way to determine if it will ever become a widespread human health threat

Many Avian Influenza Strains Infect Humans

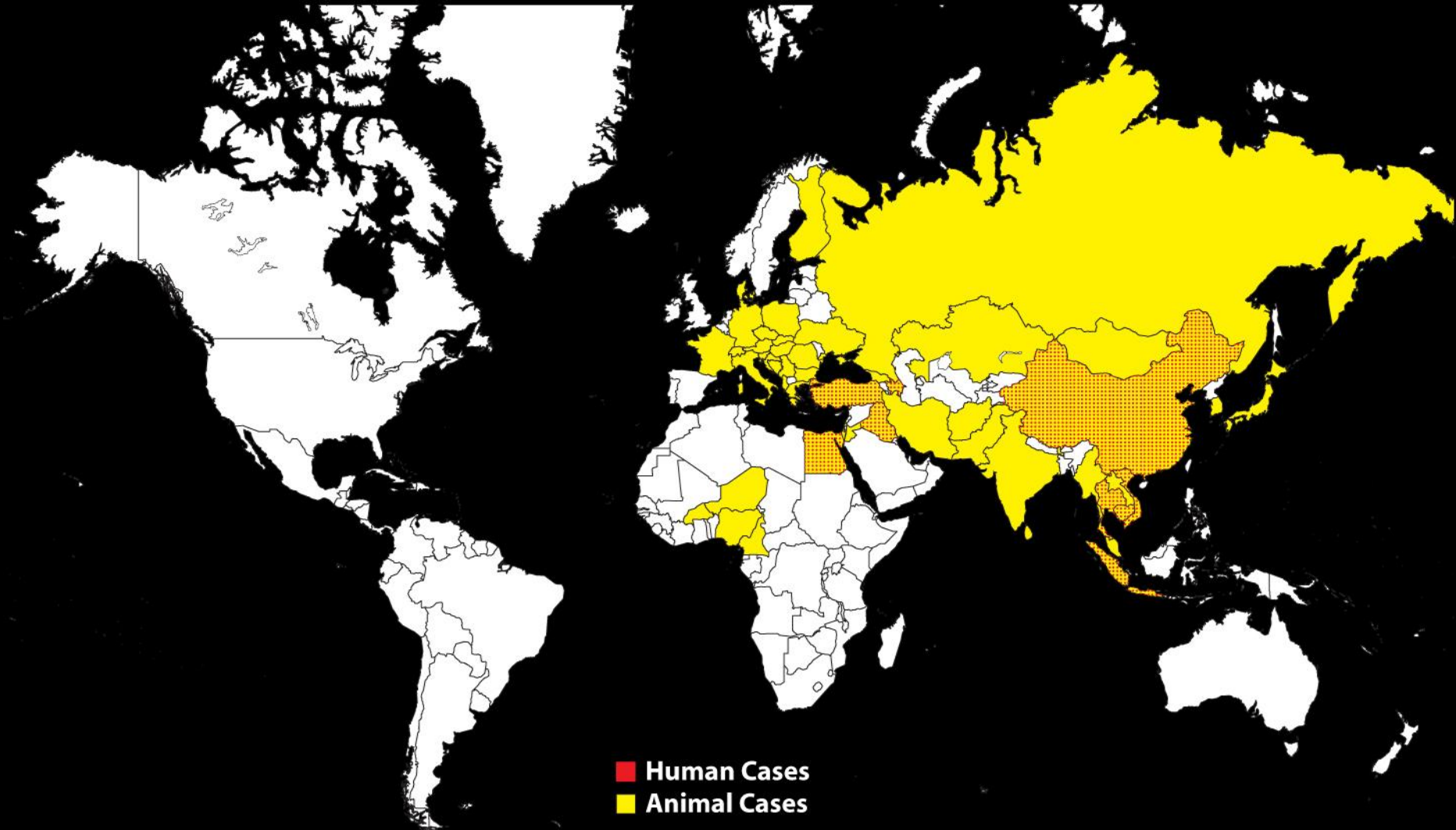
HPAI

- **H7N7:** Causes conjunctivitis or respiratory illness. Transmissible between people. Outbreaks in the Netherlands in 2003 resulted in 500 human illnesses and one death.
- **H7N3:** Causes conjunctivitis or mild respiratory illness. Transmissible between people. Outbreak in Canada in 2004.

LPAI

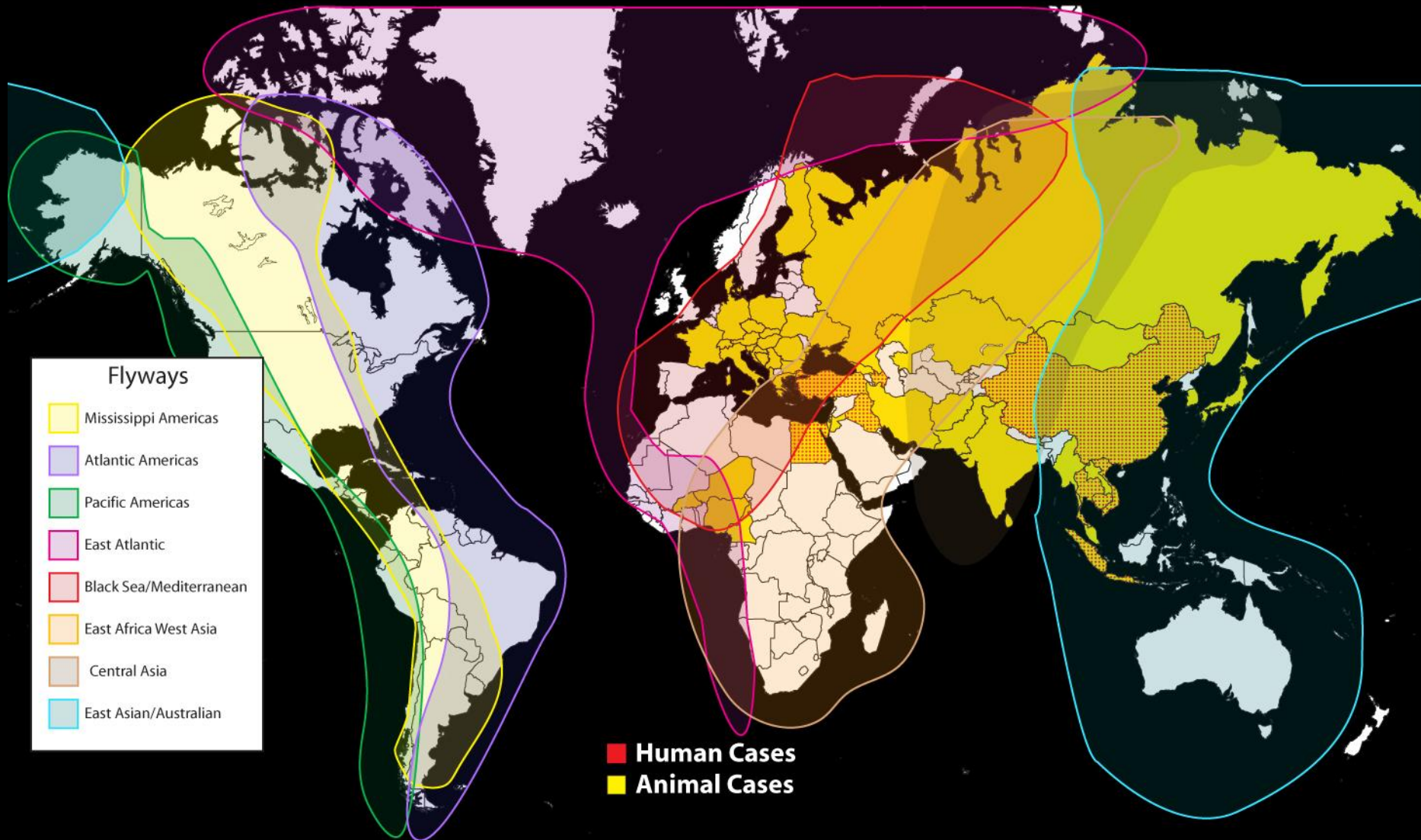
- **H9N2:** Causes mild respiratory illness; known to occur in China and Hong Kong since 1999. Binds to the same receptor as human influenza viruses, and has been detected in pigs. Endemic in commercial and non-commercial poultry in Eurasia.
- **H7N2:** Causes mild respiratory illness. Cases in the US in 2002.
- **H5N2:** Causes mild respiratory illness in humans. Most recent outbreaks in Taiwan in 2005 and Japan 2005-2006.

Animal and Human Cases of H5N1



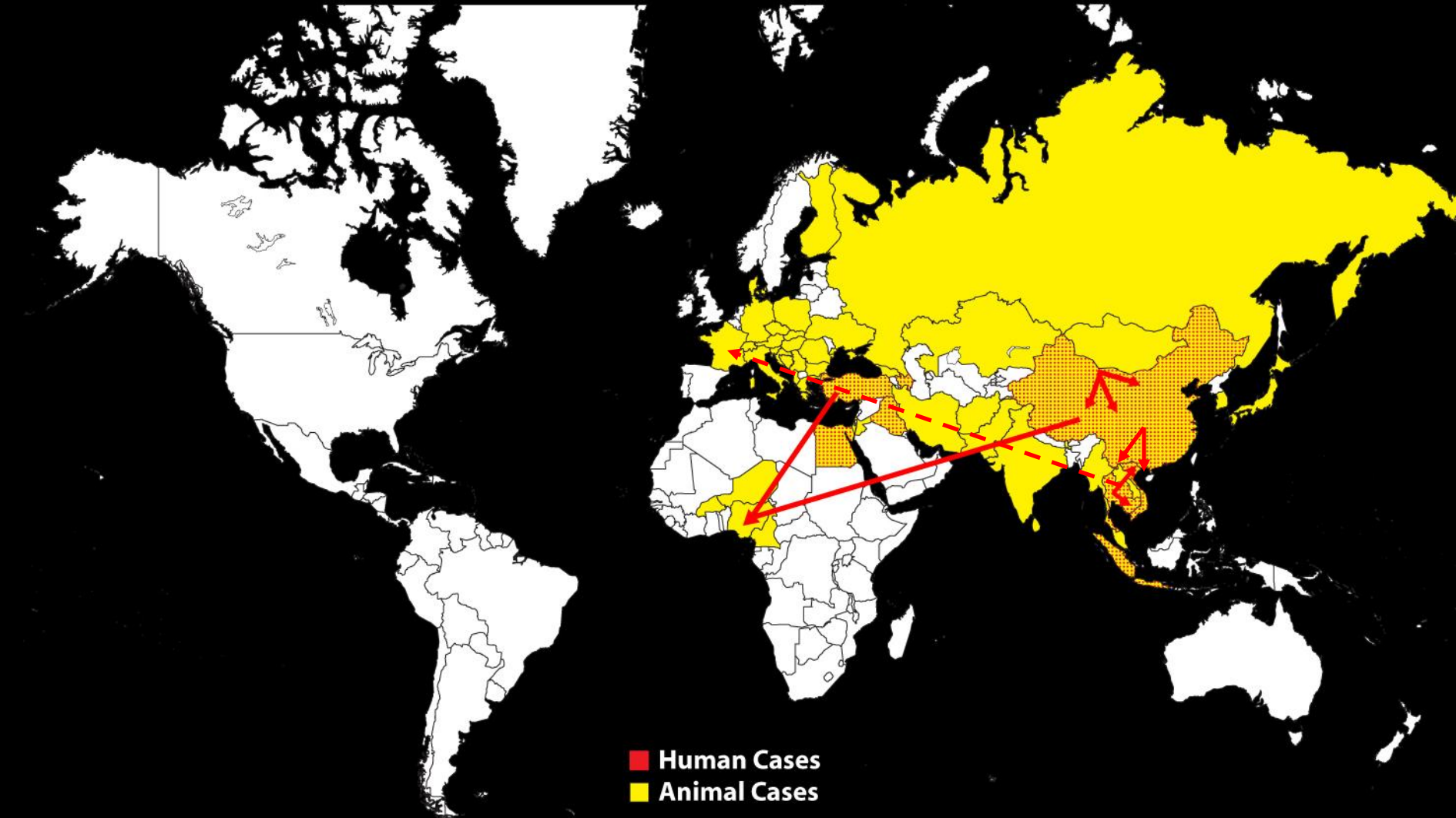
As of May 1, 2006

Flyways of Migratory Birds



Flyways Source: Wetlands International

Importation of Infected Poultry



Asian Poultry Agribusiness



Charoen Pokphand
Kitchen of the World
A member of Thailand's SET 50

Thailand, Cambodia, Vietnam,
Indonesia, China, Turkey Arbor
Acres, Ross Breeders . . .



正大集团
CHIA TAI GROUP

500 billion chicks

12 million breeders

1 million tons of meat

200 million eggs

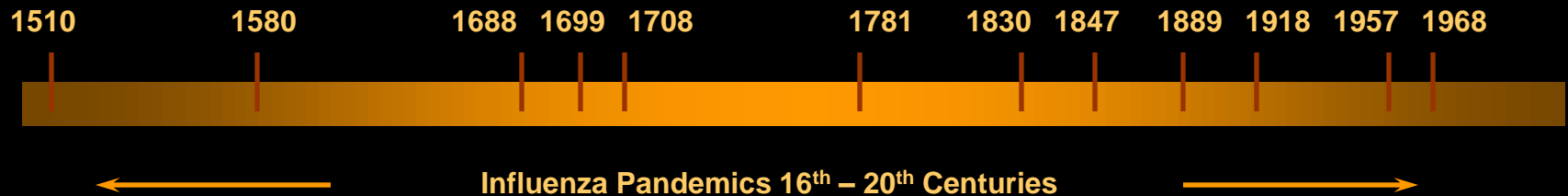


雏鸡 CHICKS



Influenza Pandemics Not Periodic

- Records of pandemics probably caused by influenza go back to the 16th Century and reveal no periodicity between outbreaks.
- The longest interval between probable pandemics was 108 years between the 1580 and 1688 outbreaks and the shortest was nine years between the 1699 and 1708 pandemics.



1918 Not a Model for Future Pandemics

- **More virulent and pathogenic than other influenza viruses**
- **National and international disease surveillance networks**
- **Worldwide health-system capacity better**
- **High speed information and communications networks**
- **Pandemic preparedness plans being readied or in place**
- **Antibiotic and antiviral medications available**
- **International cooperation to understand and control disease**

Antiviral Drugs Are Not Magic Bullets

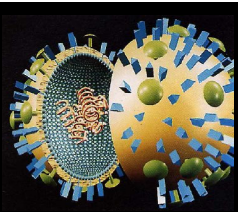
- **Very little clinical data available on Tamiflu disease reduction for H5N1. May reduce duration of illness by 1 day**
- **Development of Tamiflu resistant H5N1 strains documented**
 - Resistance developed after 4 days into preventative course
 - Resistant isolates fit (high titer, good receptor binding)
 - Infection with resistant isolates treatable with Relenza
 - Development of resistance much higher in children than adults
- **Stockpiles and prescription guidelines should include wide variety of drugs to discourage the formation and circulation of resistant strains. Implement DOT when possible.**

Media Saturation & Hyperbole

Both quantity and quality of reporting on influenza has changed markedly in the mass media.



In 1957-1958, *Time* magazine published two articles on influenza; reporting was brief and clinical.



By contrast, *Time* published 7 articles on avian influenza in 2005; articles were longer (1 cover) and emphasized the threat of the coming pandemic.



Years of sensationalist reporting about pandemic death and destruction will create the perception of the threat in the minds of the public.

Potential Consequences of an Influenza Pandemic

Social Disruption

- Children absent from school or schools closed. Can distance learning be implemented successfully?
- Business closed or workers told to report or loose jobs. Can telecommuting help correct poor attendance?
- Voluntary or involuntary bans on public gatherings.

May Day, 2002 (no SARS)



May Day, 2003 (SARS)



International Issues

- **National borders will begin to close at the first sign of human disease – inability to get to jobs for people who work in neighboring countries.**
- **Need for humanitarian aid for poor countries.**
- **Drug stocks in US Embassies will not be shared with foreign nationals working there or US citizens in foreign countries.**
- **Countries may divert products and protect domestic industries if the grip of the pandemic moves from weeks to months. May exercise eminent domain.**
- **Potential for food security issues in the winter for countries that rely heavily on food imports (i.e. China, Russia).**

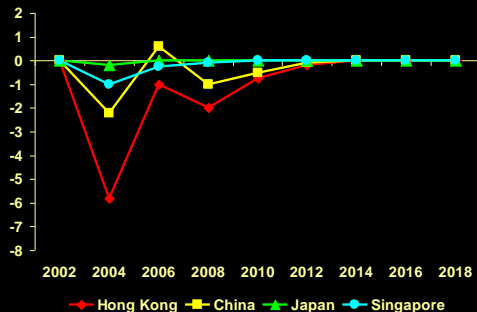
Disruption of Global Trade and Travel



- Major ports will have work slowdowns, prioritization of cargo processing. Disruption of just-in-time production networks; buildup in pipelines.
- Shippers may delay launch until ships are nearly full to protect profits. Potential quarantining of shipments and crews. Restoration of product supplies may take months after pandemic.
- Screening for infection in passengers increases delays prior to traveling. Passengers may be barred from traveling if they only appear ill.
- Infected travelers may be deported or barred from leaving countries after borders close.

Economic Consequences

- Few MNCs have plans for continuity of operations during epidemics of infectious disease.
- If the pandemic begins in Europe or the US, the impact on significant economies will be greater than if it begins in Asia.
- Possible slowdown in financial corps as disease moves through major trading hubs.
- Price of oil could rise precipitously; possibly affect plastics production, price and sales.



SARS

- Uptick in need for lab work, social services, legal, health care, protective services, first responders, food services, sanitation services, and personal care sales.

Economic Impact on Poultry Sales



- As of 2005, the estimated the impact of the Asian H5N1 Agricultural outbreak to have cost over \$15.5B.
- Compensation for culled poultry is supposed to be 50% of the market value, but rarely amounts to 30%.
- Since the February 2006 outbreak of H5N1 in the south of France losses to the poultry sector total nearly €300M.
- German poultry farmers have seen sales plummet over 25% since the French agricultural outbreak. Losses estimated at over €200M.

Military Preparedness

Ludendorff attributed the Allied victory over Germany in Spring Offensive of 1918 to influenza in his troops.



- In-theatre activities could be disrupted by the spread of disease. Decisions must be made about who gets treated first: troops or C&C?
- Other types of military operations: evacuation, humanitarian, stabilization and peacekeeping efforts could also be affected.
- Most NBC units trained to work in epidemics are reserve members, not part of active duty forces.
- Military to military transfers within strategic defense partners may be needed.

Psychological Effects

- **Psychological impact in the worried well.**
 - **Impact of 9/11 and anthrax letters both acute and chronic**
 - **Dutch study on impact to farmers of avian influenza outbreaks in 2003**
 - **UN work on health impacts of Chernobyl**
 - **Lost productivity from illness or fatigue.**
 - **Direct and indirect impact of deaths of family and friends.**



The Poverty Problem



- Influenza is not a “socially-neutral” disease. Economic impact at the household level and social impact is greater in poorer communities than in wealthy ones.
- Katrina-response debacle has demonstrated our lack of ability to provide services to poor communities in crisis.
- Providing healthcare for the uninsured or poorly insured will be a challenge for hospitals and physicians watching the economic bottom line.

The Aftermath

- The 1918 pandemic had profound long-term impacts on the delivery of health and social services to people in need.
- If the media is seen as irresponsible in their reporting of the pandemic, there could be a change in the relationship between the government and the media. Restrictions could be placed on the media in some circumstances.
- If government fails to meet the public's service delivery expectations, the party in power may be voted out. Could contribute to the growing distrust in government.



Summary and Conclusions

Response Planning Over-medicalized



- **Number of courses of antiviral medications and hospital capacity centerpieces of response strategy**
- **Must address economic consequences: prioritization of production and shipments; disruption of just-in-time manufacturing; risk of small businesses folding; employee layoffs; possible need for subsidies and increased and unemployment insurance**
- **Need to address social dislocation issues: inability to gather in public places; loss of school and work days**
- **Psychological impact on worried well: impact on farmers in 2003 agricultural outbreak significant; both acute and long-term needs**

Government Response

- **Must provide a broad spectrum of services - QUICKLY**
- **Near-normal supplies of critical commodities and services: basic foodstuffs, energy, transportation & telecommunications.**
- **Public safety and other response providers must be marshaled to administer influenza-specific services.**
- **Federal response must be prepared to provide services that states and localities cannot deliver.**
- **Unemployment benefits and guarantees of job security. Subsidies for small businesses that may fold.**

Risk Communication Key to Minimizing Impact



- **Facts Not Fear Needed to Guide Actions:** Important to communicate facts and mitigation strategies to general public as well as to policymakers
- **Need to encourage more cross-cutting communication between groups - different backgrounds, different needs**
- **Media Strategies Needed:** To increase the communication of facts while reducing potential public panic

It's not the virus, It's the perception of the threat that matters