

# **SARS and Avian Influenza: Public Health Priorities**

**Scott F. Dowell, MD, MPH**

**International Emerging Infections Program**

**Thailand Ministry of Public Health - US CDC Collaboration**



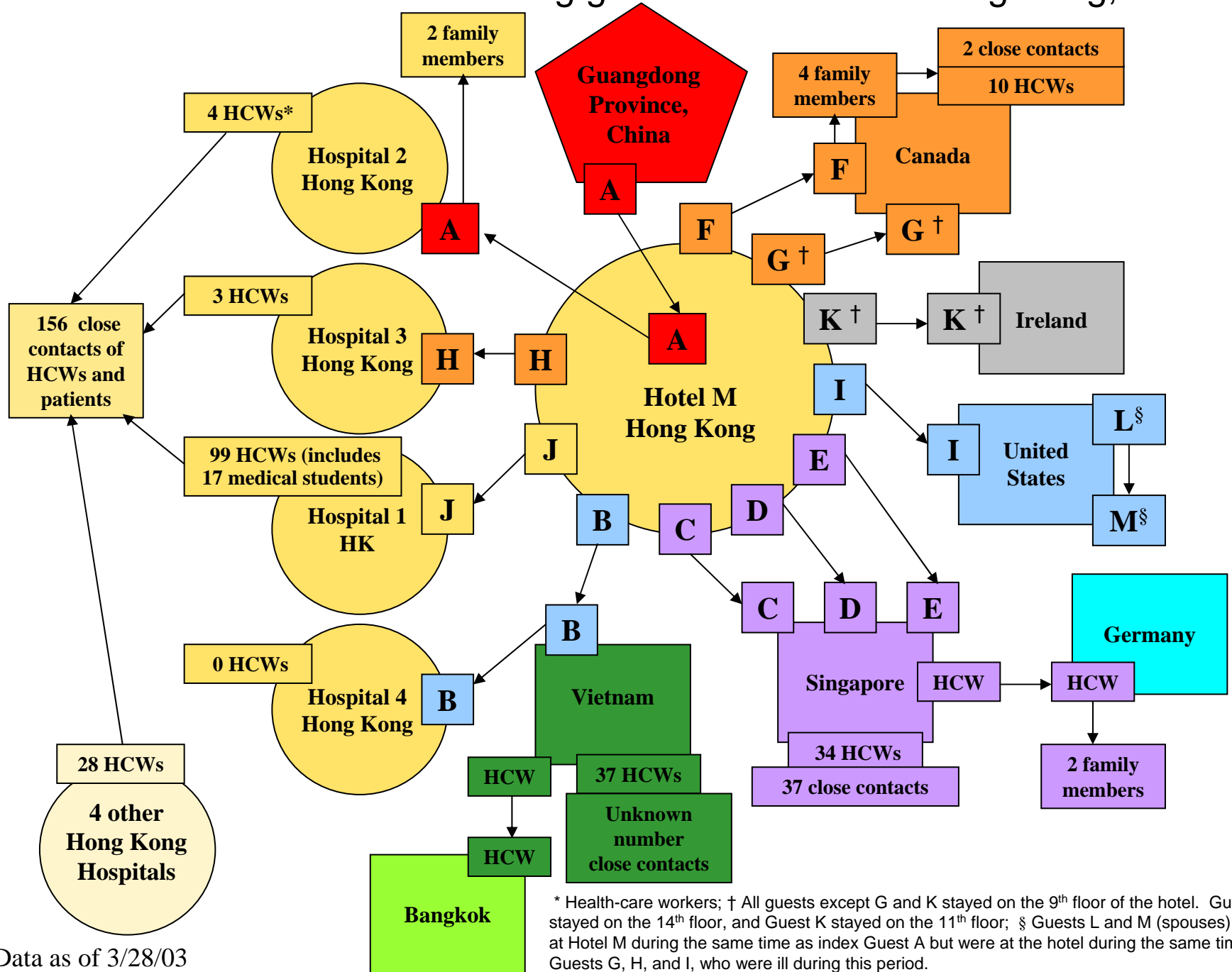
# Chest Xray, Day 2



# Dr. Carlo Urbani



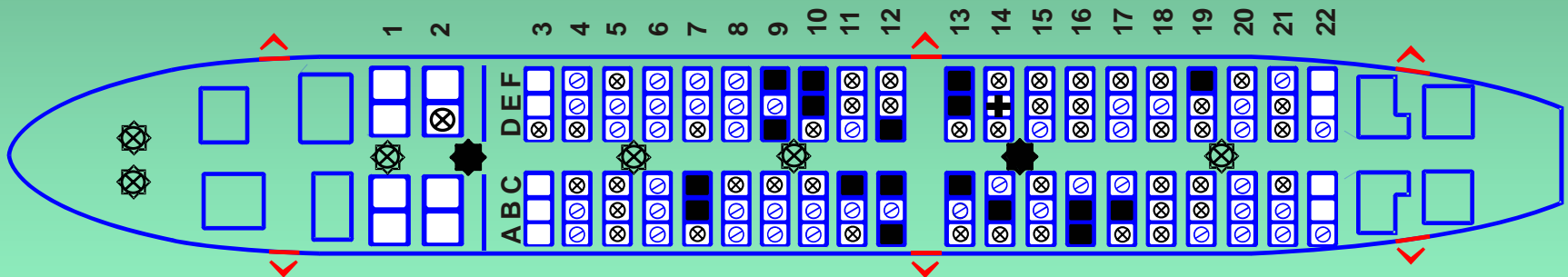
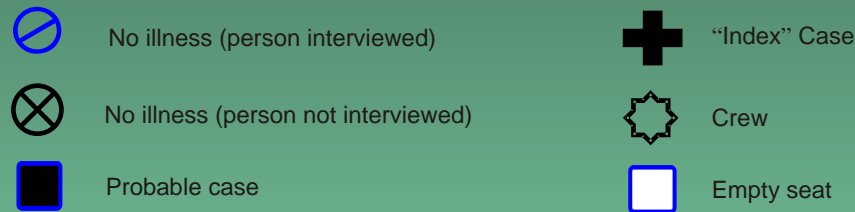
# Chain of transmission among guests at Hotel M—Hong Kong, 2003



Data as of 3/28/03

\* Health-care workers; † All guests except G and K stayed on the 9<sup>th</sup> floor of the hotel. Guest G stayed on the 14<sup>th</sup> floor, and Guest K stayed on the 11<sup>th</sup> floor; § Guests L and M (spouses) were not at Hotel M during the same time as index Guest A but were at the hotel during the same times as Guests G, H, and I, who were ill during this period.

# Airline Transmission of SARS



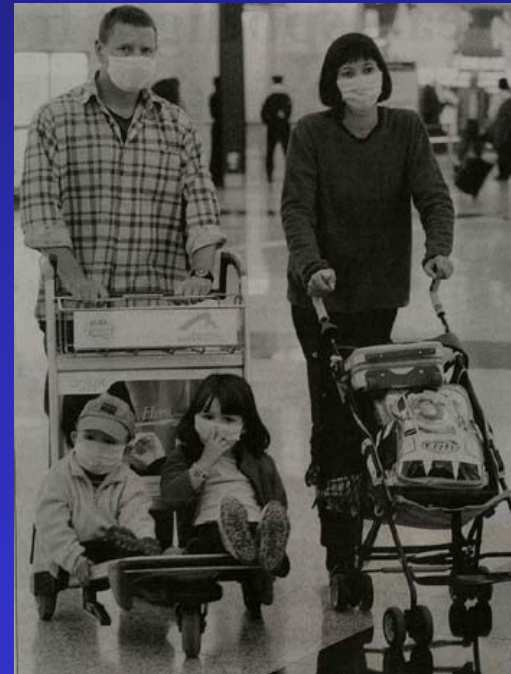
Olsen et al. NEJM 2003;349:2414

# Measures to Reduce Airline Transmission of SARS

## Aircraft Decontamination



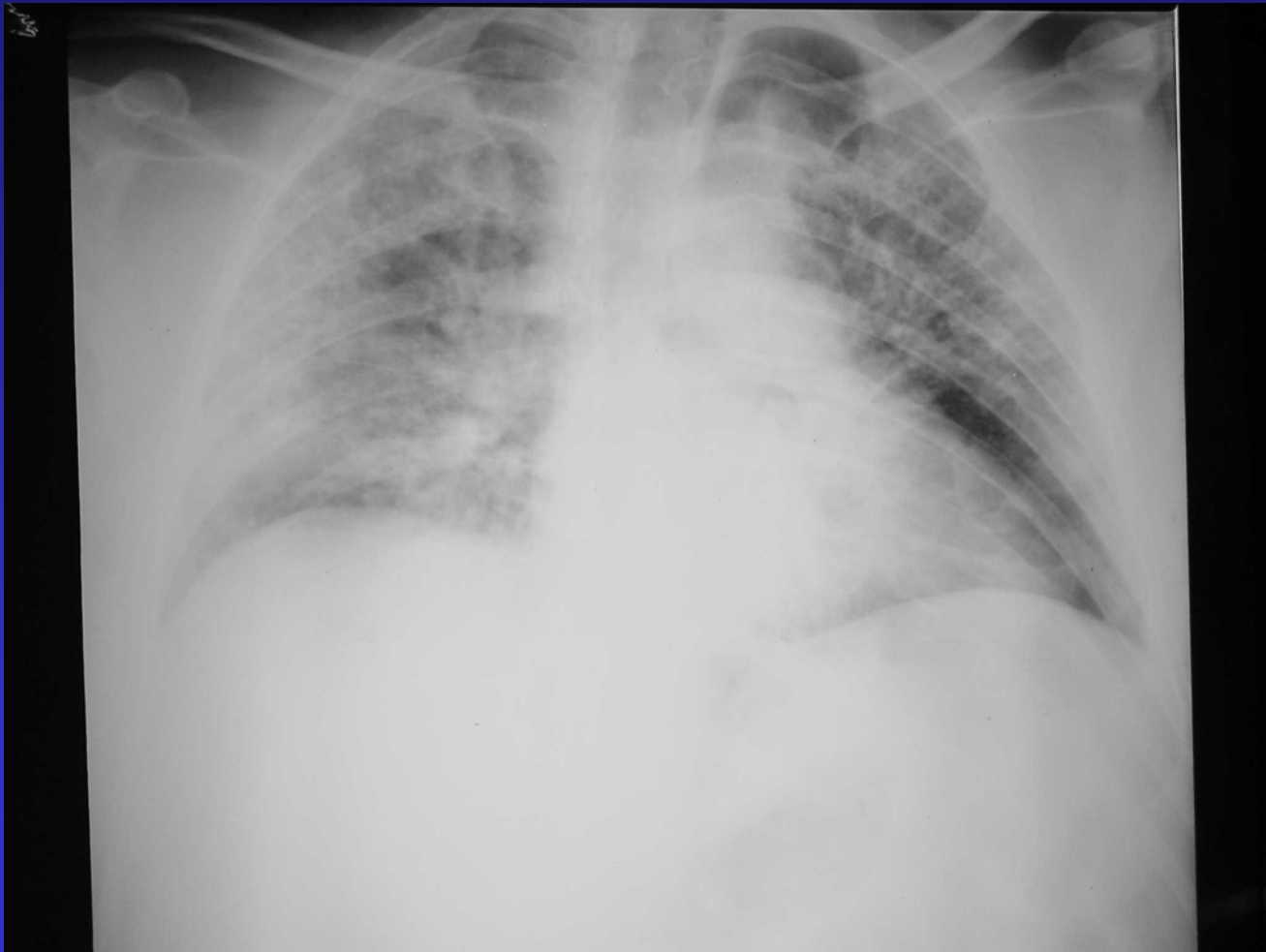
## Voluntary Use of Masks



## Fever Screening



# Chest Xray, Day 13

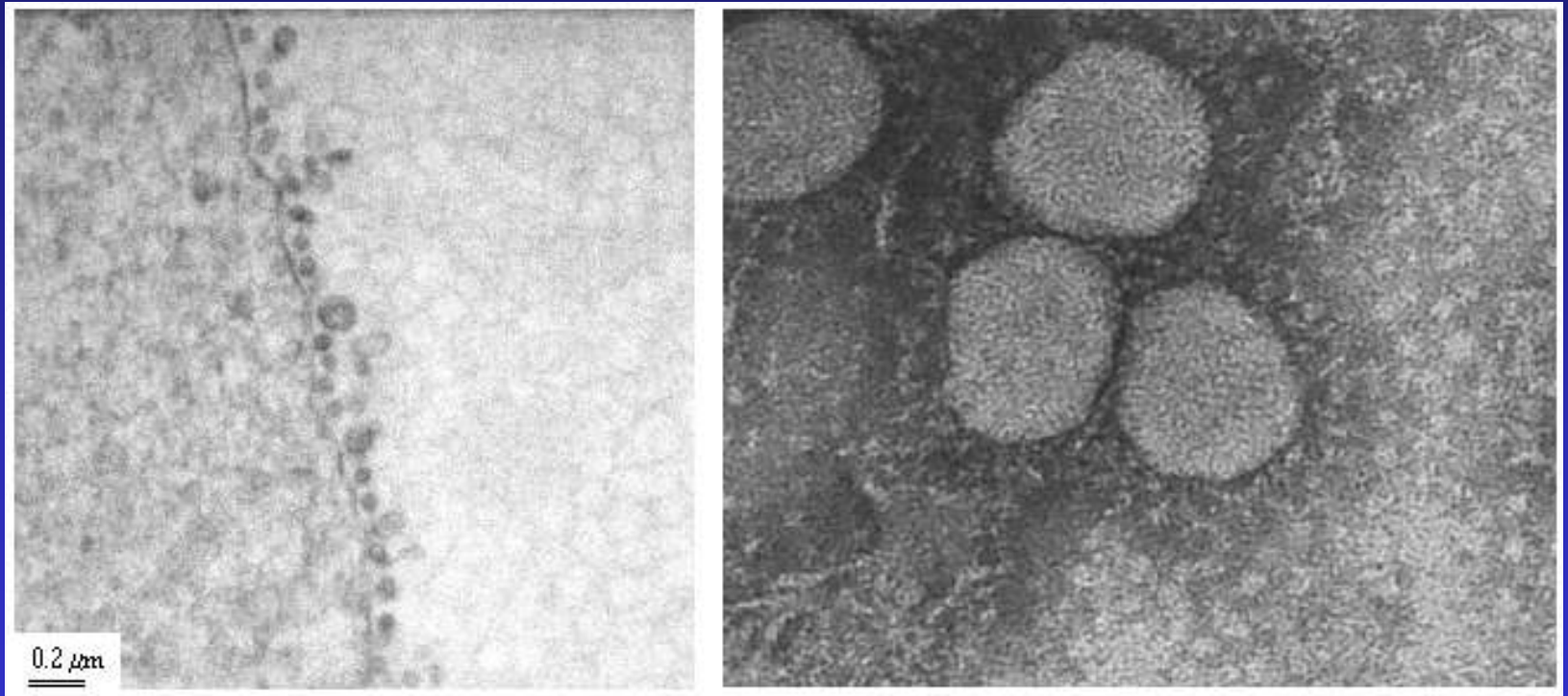


# Clues to the Causative Agent

- Epidemiology – highly transmissible respiratory pathogen
- Clinical – unusually severe disease
- Laboratory – generally consistent with virus
- Pathology – possibly paramyxovirus
- No known agent could explain all features



# Coronavirus – EM appearance



# Personal Protective Equipment

- N-95 or better respirator
- Head cover
- Goggles or face shield
  - eyeglasses not adequate
- Double gown
- Double gloves
- Double shoe covers



# SARS on Hospital Surfaces

Surface, Hospital B, Taiwan	# Positive/# Tested
<b>Patient rooms (71%)</b>	
Endotracheal tube	3/3
Bedrail	3/4
Ventilator panel	1/3
Other	3/4
<b>Nursing stations (56%)</b>	
Telephone	1/3
Computer mouse	2/2
Doorknob	1/2
Other	1/2
<b>Public areas of hospital (20%)</b>	
Elevator handrail	1/1
Other	0/4
Total	16/28 (57%)

# Intubation of a SARS Patient



ANALYSIS / SEVERE ACUTE RESPIRATORY SYNDROME

BP

# Sars: Four months that shook Asia

After four traumatic months, Asia appears to have brought Sars under control, ending for now early fears the outbreak would escalate into a pandemic to rival the 1918 influenza.

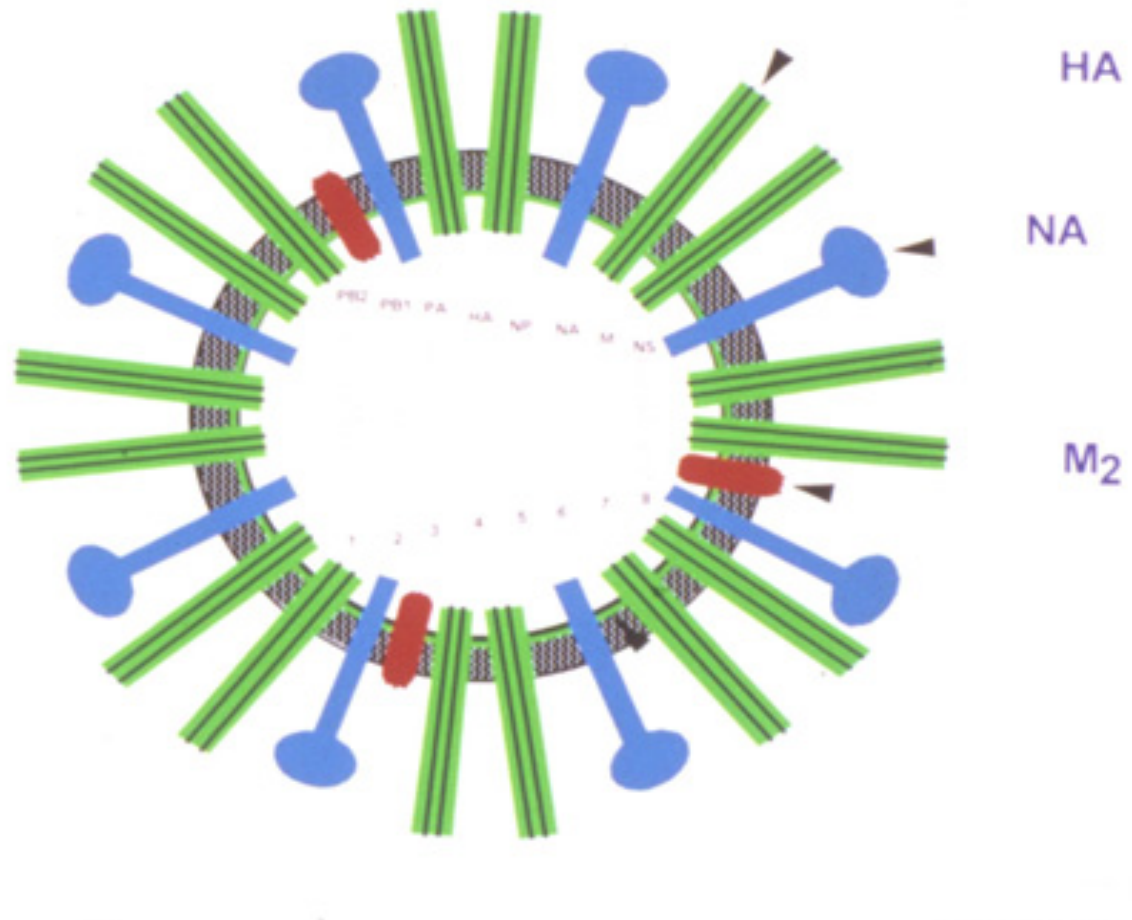
But as the region breathes a sigh of relief and a palpable optimism returns to Asia's streets, its leaders have begun picking through the economic and

*Everyone is feeling a lot better the epidemic is dying down, but a full recovery cannot be expected for quite some time yet. In the meantime, there has been the silver lining of Beijing being more open with the world.*

a team of its experts from travelling there to investigate and even denied any Sars problem on the mainland.

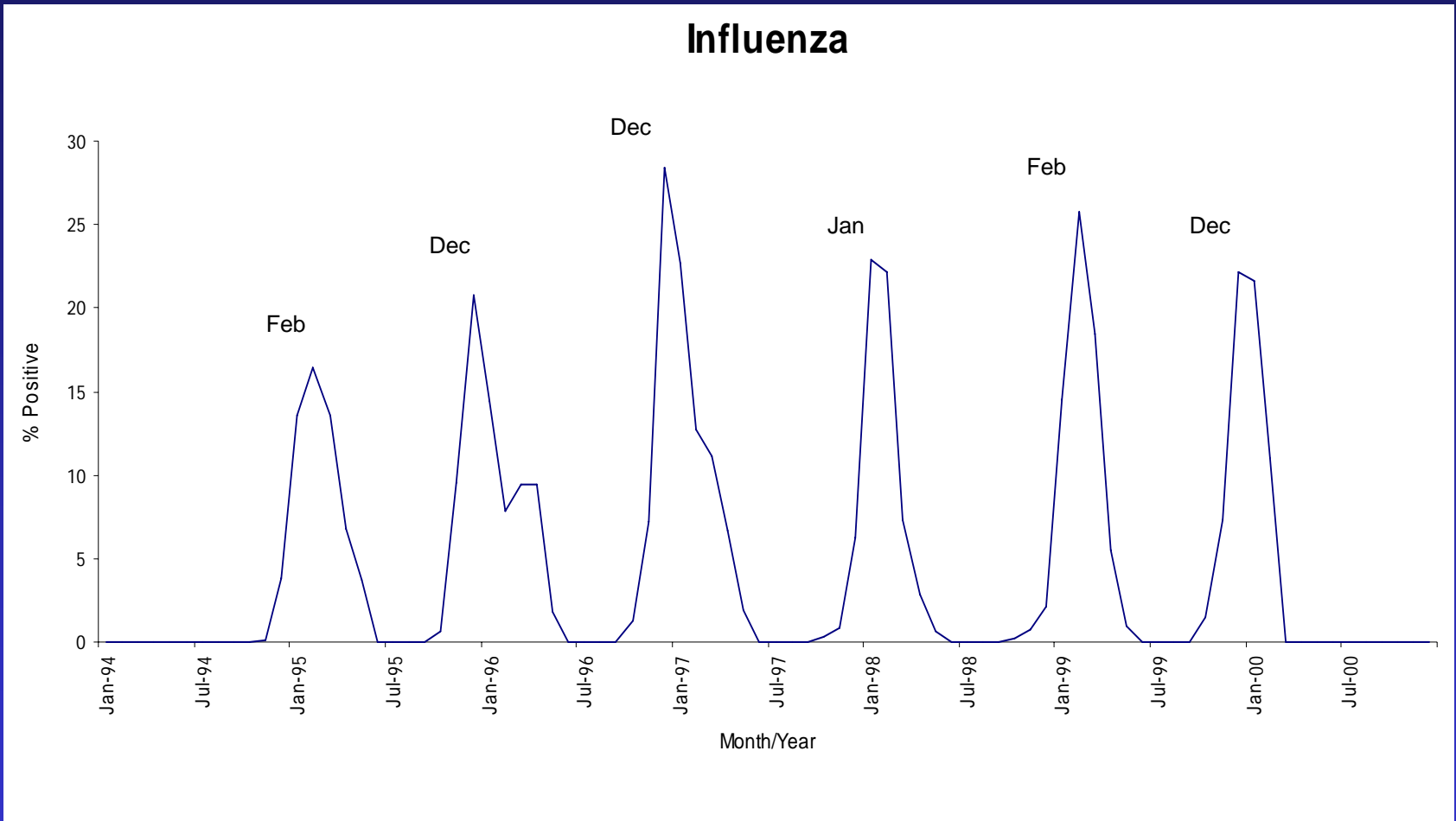
The April 2 advisory, however, turned international ire on China and pressure to come clean on a cover-up arguably responsible for what had by then become a full-blown worldwide outbreak with 180 dead and 3,000 infected was immense.

In the face of international condemnation



LAMB AND HORVATH FIG. 1

# Influenza – “Drift”

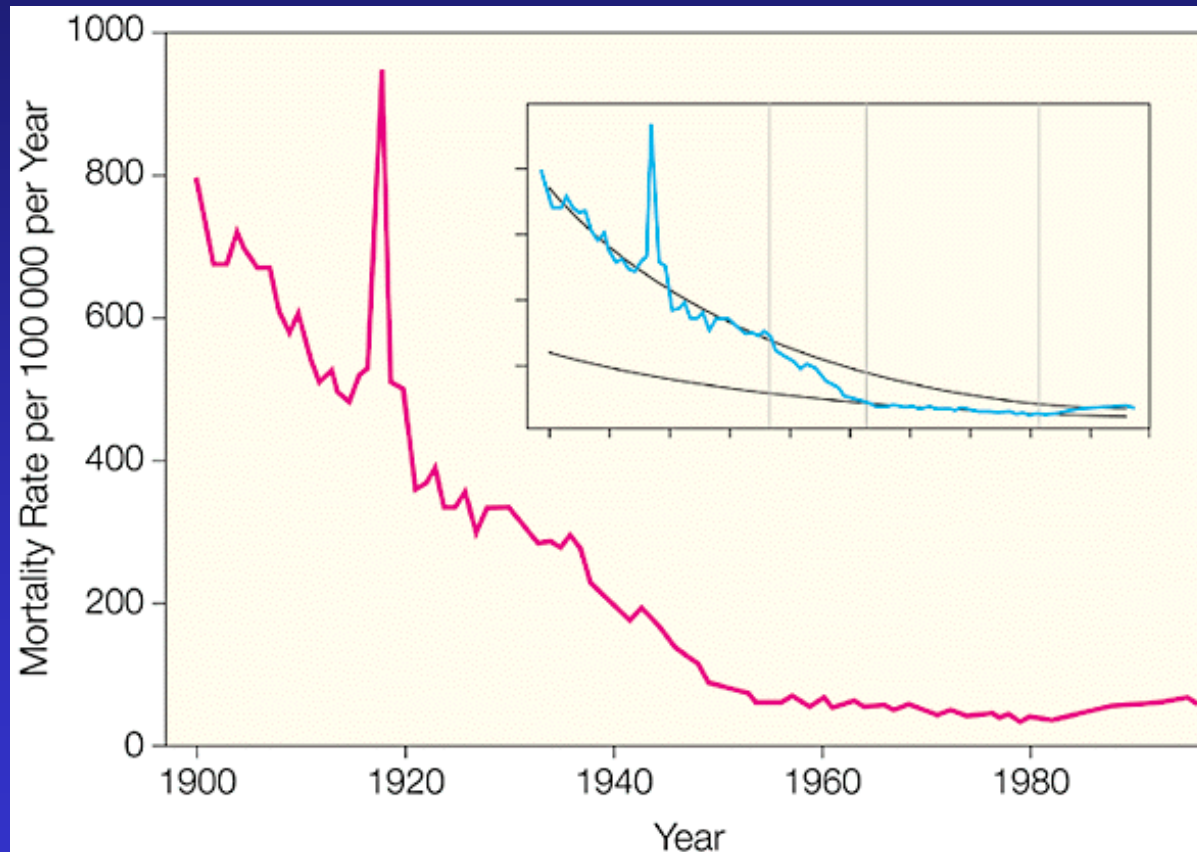


# Influenza – “Shift”





# US Infectious Disease Mortality: The Impact of Influenza and AIDS



Armstrong. JAMA 1999;281:61

# Avian Influenza in Thailand?

AGRICULTURE

## Newin denies bird flu cover-up

*Rivals spread rumour  
'to hurt local market'*

Post reporters

The Ministry of Agriculture and Cooperatives insists Thailand is free of bird flu and denies allegations staff concealed a report on its outbreak.

"A report that poultry farms have been contaminated with bird flu disease is groundless," said Deputy Agriculture Minister Newin Chidchob. "The rumour may have been spread by our competitors who want to ravage the (Thai) poultry export industry, which has a bright market opportunity since the bird flu outbreak hit many Asian countries."

He also criticised farmers and local politicians who claimed their chickens were infected with the disease, saying they hoped to get compensation from the Livestock Department.

Poultry farmers say the department is hiding the fact that avian influenza has attacked hundreds of poultry farms.

They say the department is trying to protect giant poultry exporters.

Bird flu has swept through several Asian countries, including Vietnam, Japan, Taiwan, and South Korea.

Prime Minister Thaksin Shinawatra said the government had put in place measures to prevent the possible spread of the disease to the poultry industry.

Agencies had not found any infections in chicken that were related to bird flu.

Bird flu is an animal type of influenza. The disease can range from a mild disease with only minor effects to a highly infectious fatal version.

It can be transmitted to humans by contaminated feed, water, and equipment. However, human fatalities from avian influenza are rare and were unknown before 1997.

The latest cases were reported on Tuesday, when the World Health Organisation confirmed that three Vietnamese

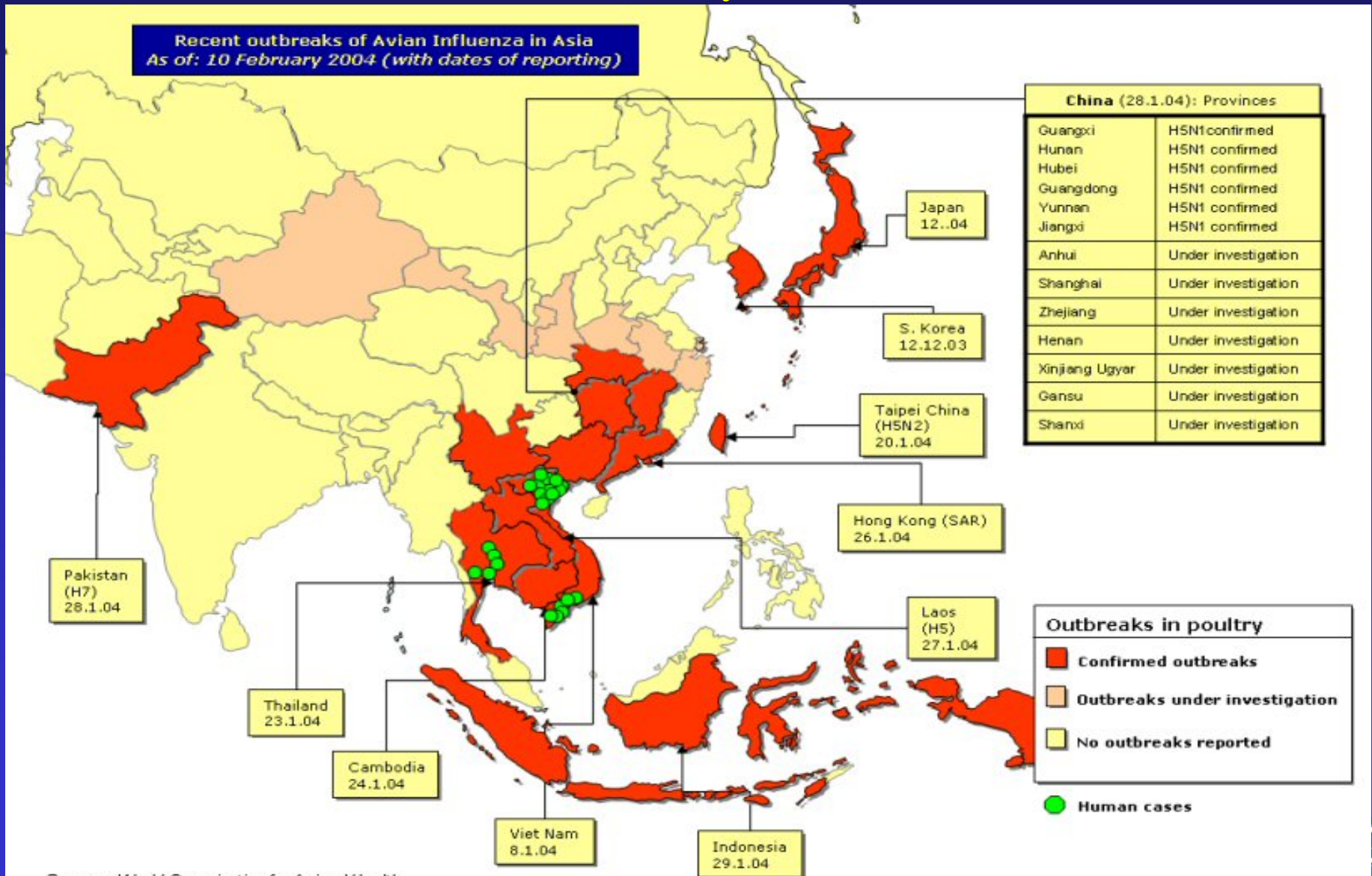


A farmer collects dead poultry at a chicken farm in tambon Theparat, Ban Pho district, Chachoengsao. — PHONGTHAI WATTANAVANITVUT

# Avian Influenza in Asia

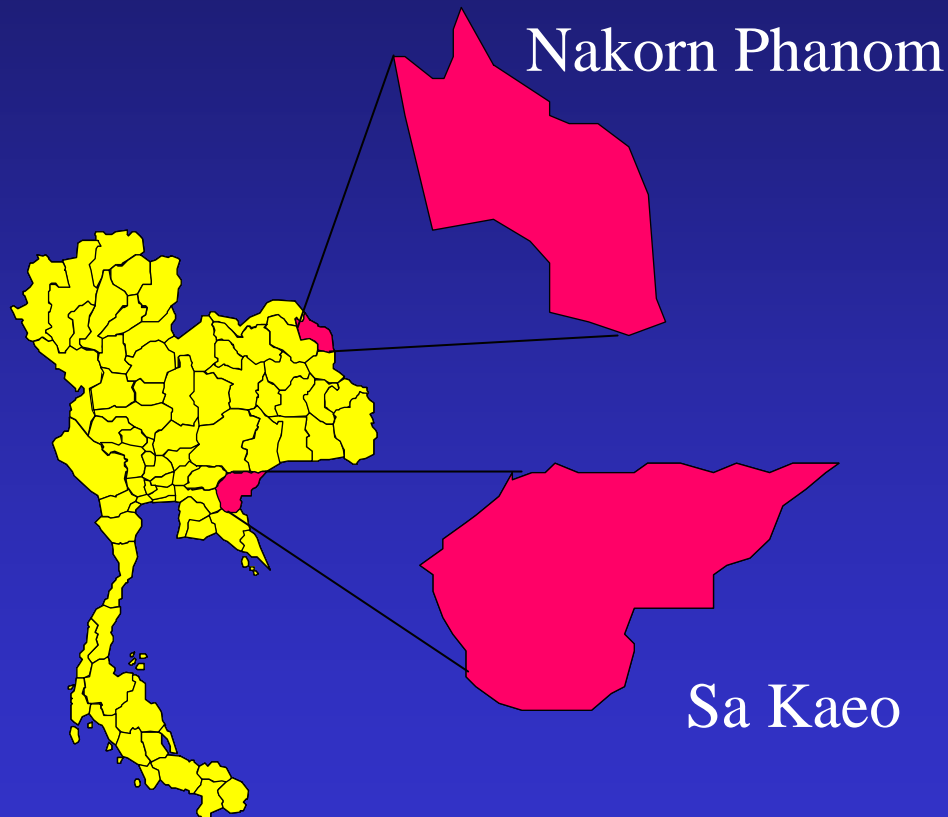
(10 February, 2004)

Recent outbreaks of Avian Influenza in Asia  
As of: 10 February 2004 (with dates of reporting)

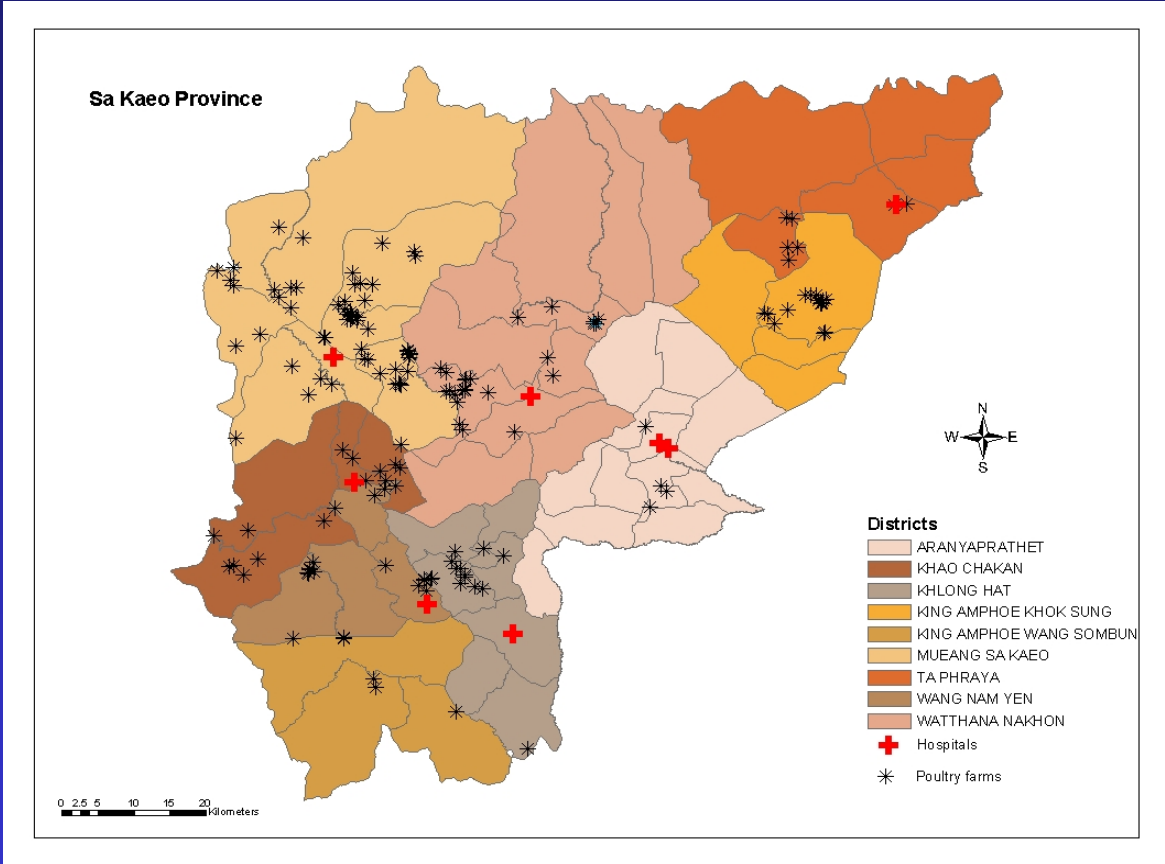


# Intensive Pneumonia Surveillance

- Active
- Population-based
- CXR-confirmed
- Laboratory testing
  - Influenza
  - Other viruses
  - Bacterial agents
- Community surveys



# Locations of Registered Poultry Farms Sa Kaeo, Thailand



# Poultry Exposure is Common



- There are ~6 birds to every person in Sa Kaeo Province
- 1.3% of poultry is on commercial farms
  - 178 farms
  - 31,221 poultry
- 98.7% of poultry is in backyards
  - 2,410,820 poultry



# A Cluster of H5 Cases

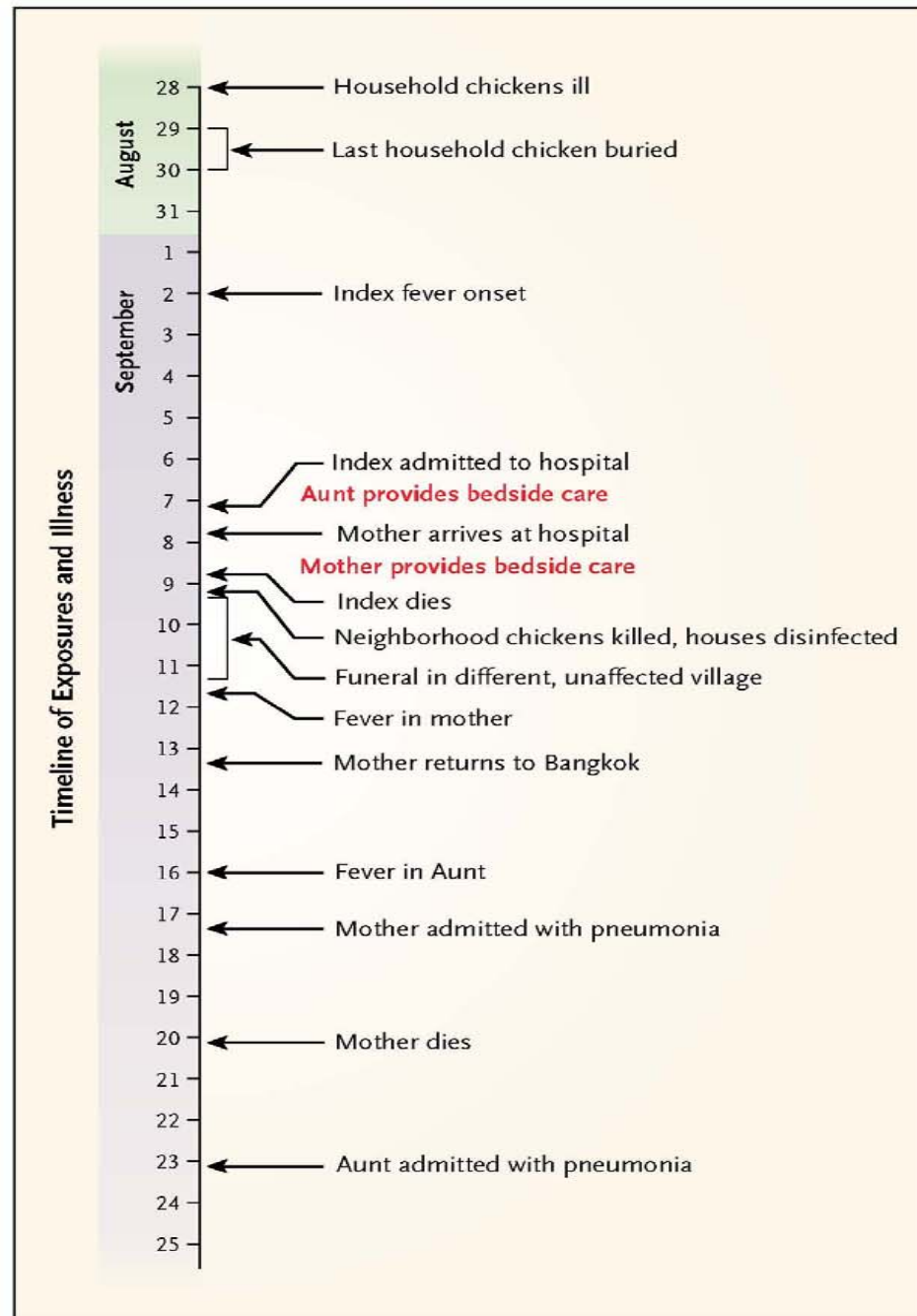
- Three family members linked coincidentally during investigation of another pneumonia case
- Urgent concern about person-to-person transmission
- At the time cluster was recognized;
  - Index case dead, cremated
  - Mother dead, body embalmed
  - Aunt admitted to hospital
- Interviews rapidly conducted on family, contacts, neighbors, and healthcare workers

# Investigation at Home of Index





# Timeline of Exposures and Illness



# Laboratory Investigation

- Immediate and urgent effort to collect specimens
- Specimens promptly shared with WHO network
- Index patient dead, cremated
  - 0.5ml serum from day 6 of illness
- Mother's body embalmed
  - Lung and other tissues tested by PCR
- Aunt survived
  - NP and OP swabs tested by cell culture, RTPCR
  - Acute and convalescent serum (neutralization, ELISA)

# Mother: Lung Tissue Pathology

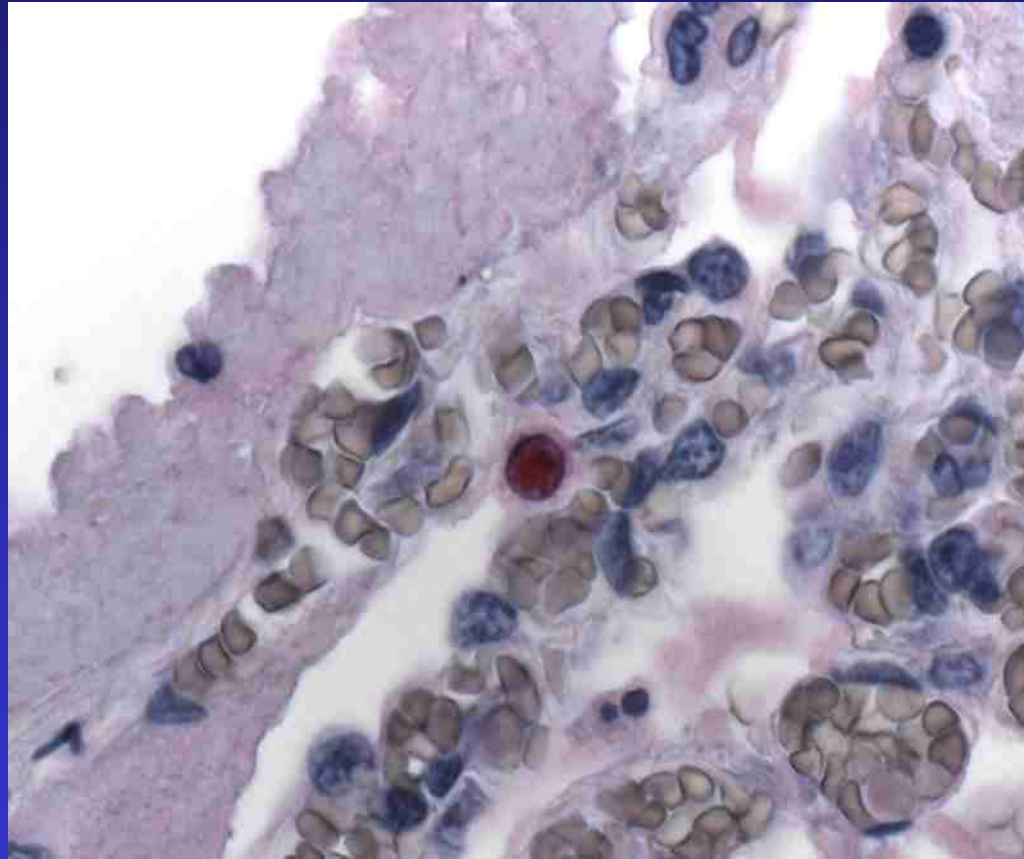
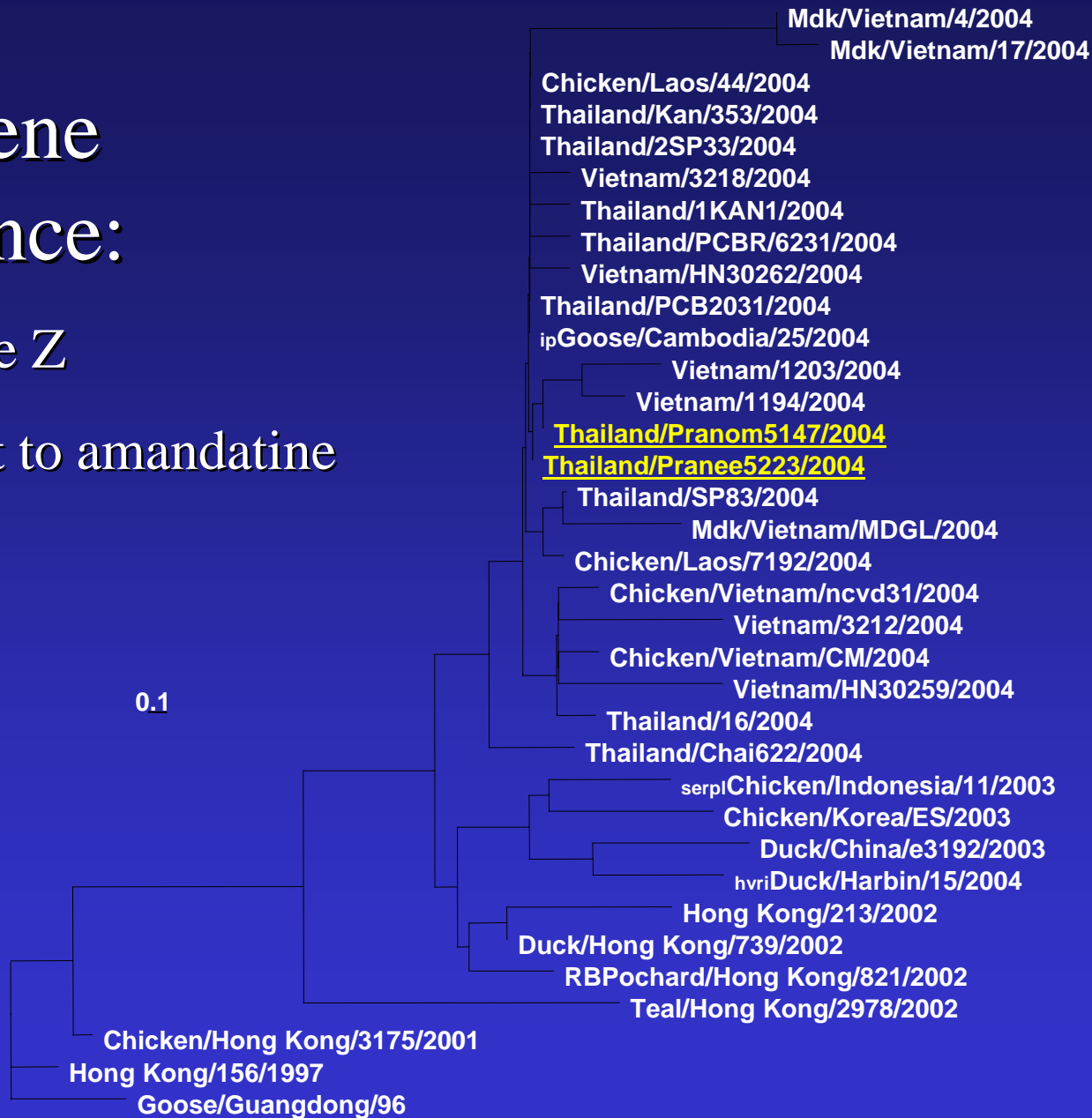


Photo courtesy of S. Zaki

# HA Gene Sequence:

- Genotype Z
- Resistant to amandatine



# Conclusions from Family Cluster

- Probable person-to-person transmission
- No further spread to contacts
- No significant mutation of virus
  - All gene segments were of avian origin
  - Critical binding and cleavage sites unchanged
- Isolation precautions needed for H5 patient care
- Future clusters also warrant intensive investigation

# Summary: SARS and Avian influenza

- SARS redefined emerging zoonoses
  - Broad economic and public health impact
- Avian flu: unprecedented & unpredictable
  - Scale of the epizootic unprecedented
  - Ongoing potential for re-assortment event