ACBSA, May 2005

Pandemic Influenza Preparedness and Response

"The pandemic influenza clock is ticking.
We just don't know what time it is."

Ed Marcuse, ACIP Member

Ben Schwartz, National Vaccine Program Office

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Presentation Outline

- Background on influenza pandemics and the avian influenza threat
- Pandemic planning and preparedness
- Pandemic response components
- Blood safety and availability issues

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Pandemic Influenza

- Emergence & spread of “novel” influenza A virus
  - HA (or HA/NA) derived from animal viruses
  - Susceptibility among most/all of the population
  - Sustained & efficient human-human transmission
- Near simultaneous global outbreak
- Elevated rates illness & death
- Start of new viral era

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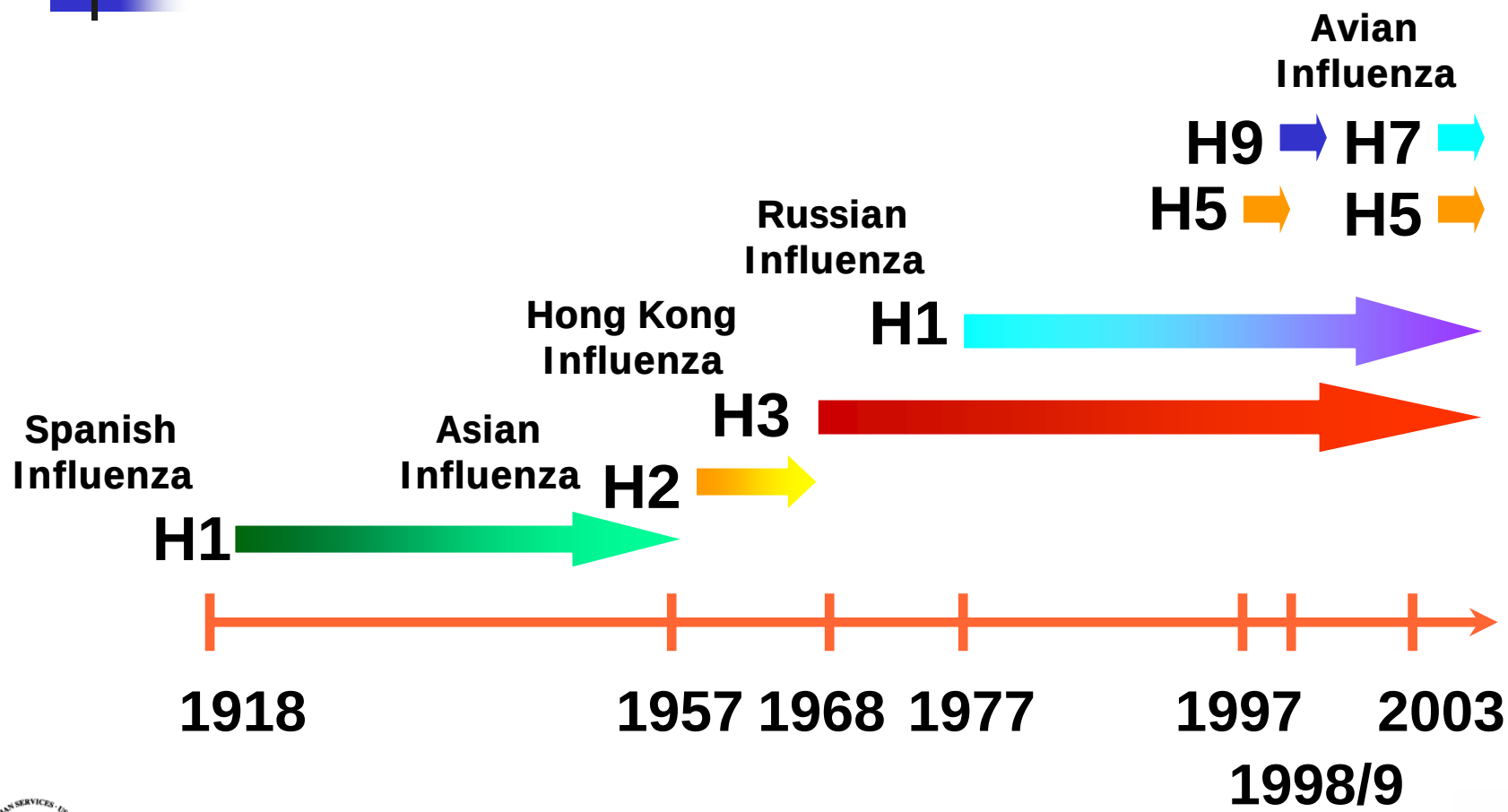
Timeline of Emergence of Influenza A Viruses in Humans



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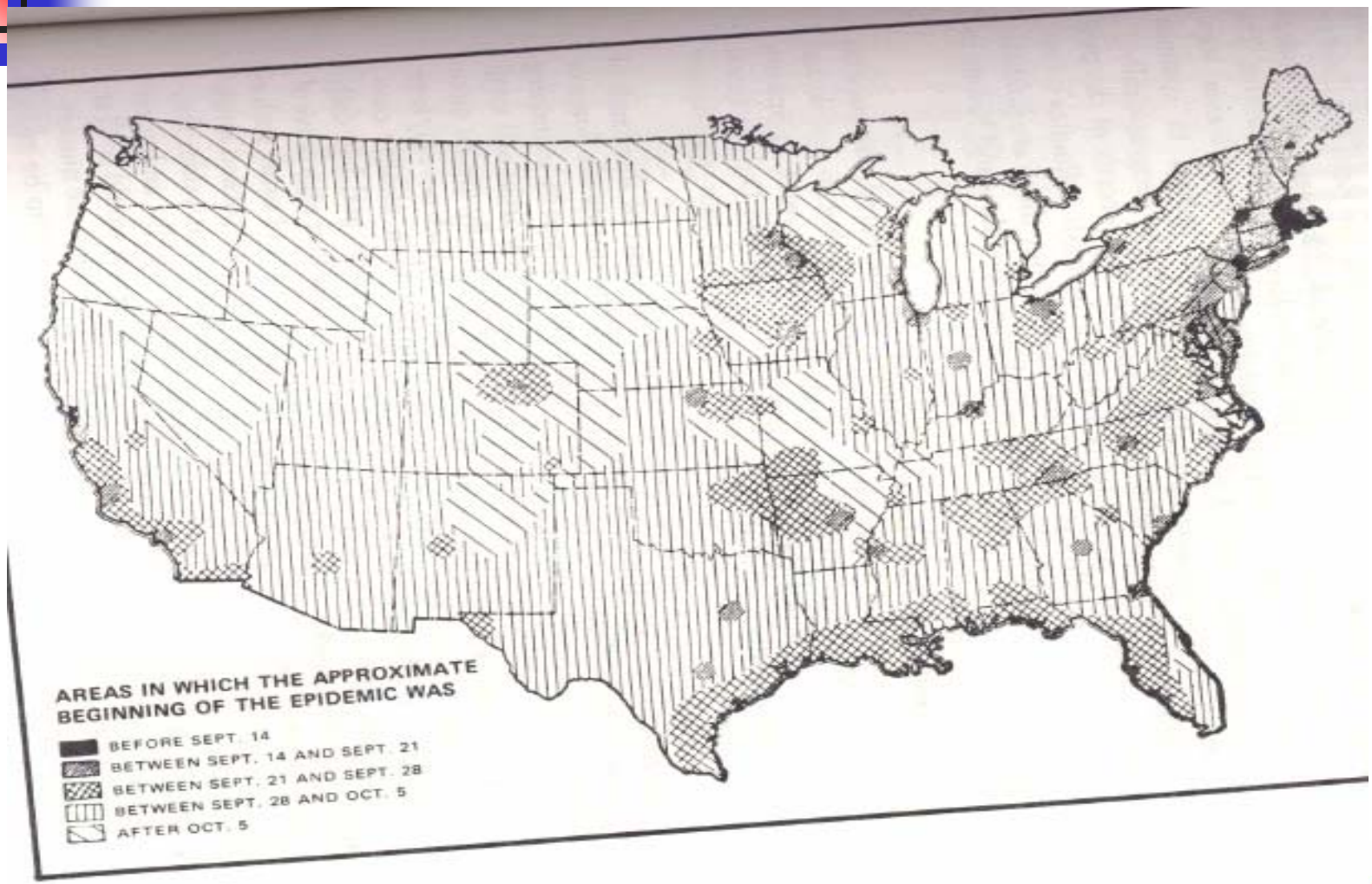
Influenza Pandemics 20th Century

Credit: US National Museum of Health and Medicine

1918: "Spanish Flu" A(H1N1)	**1957: "Asian Flu"** A(H2N2)	**1968: "Hong Kong Flu"** A(H3N2)
20-40 m deaths	1-4 m deaths	1-4 m deaths
675,000 US deaths	70,000 US deaths	34,000 US deaths

Pandemic Influenza: 1st Wave, Sept to Oct 1918



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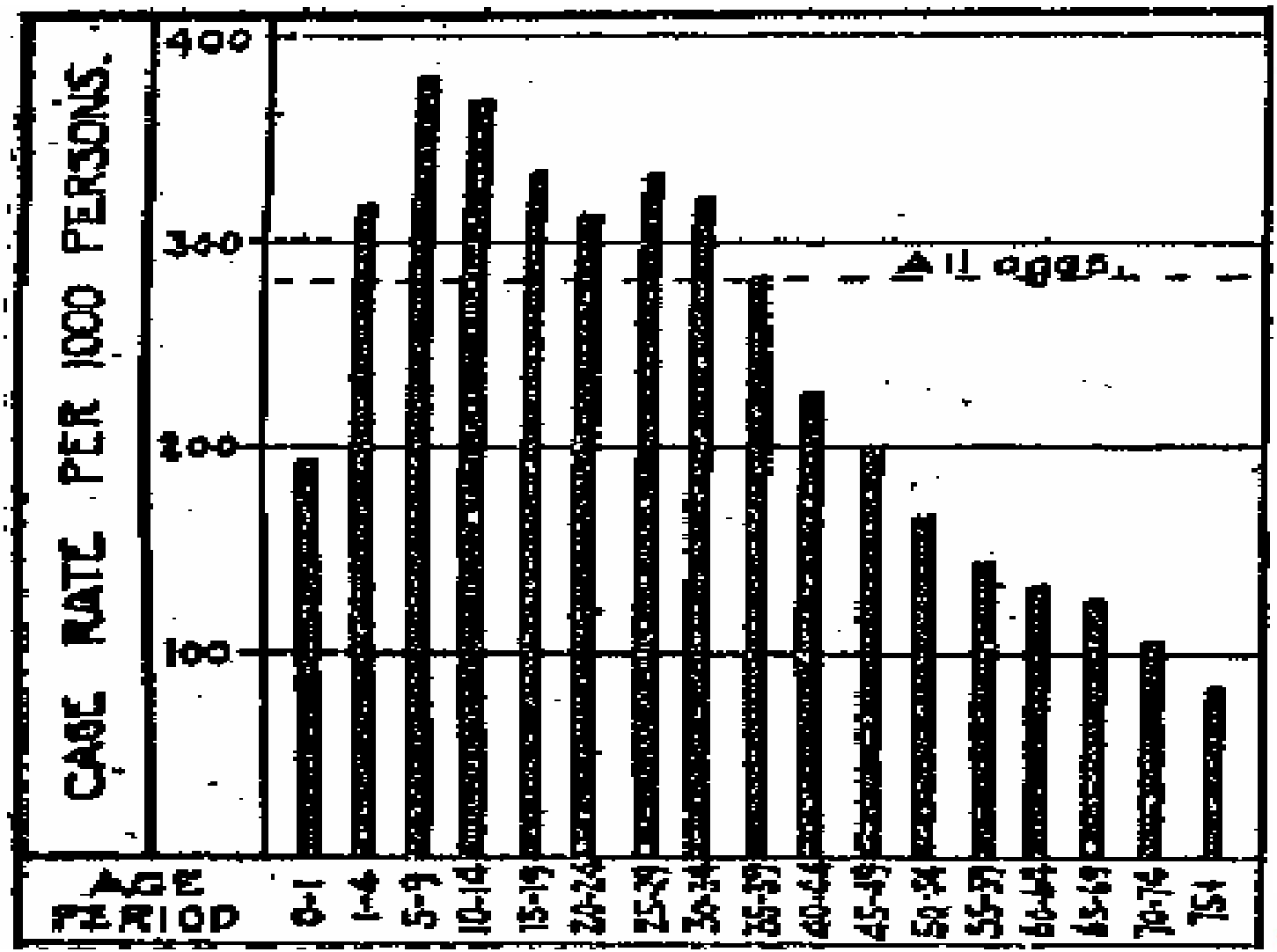
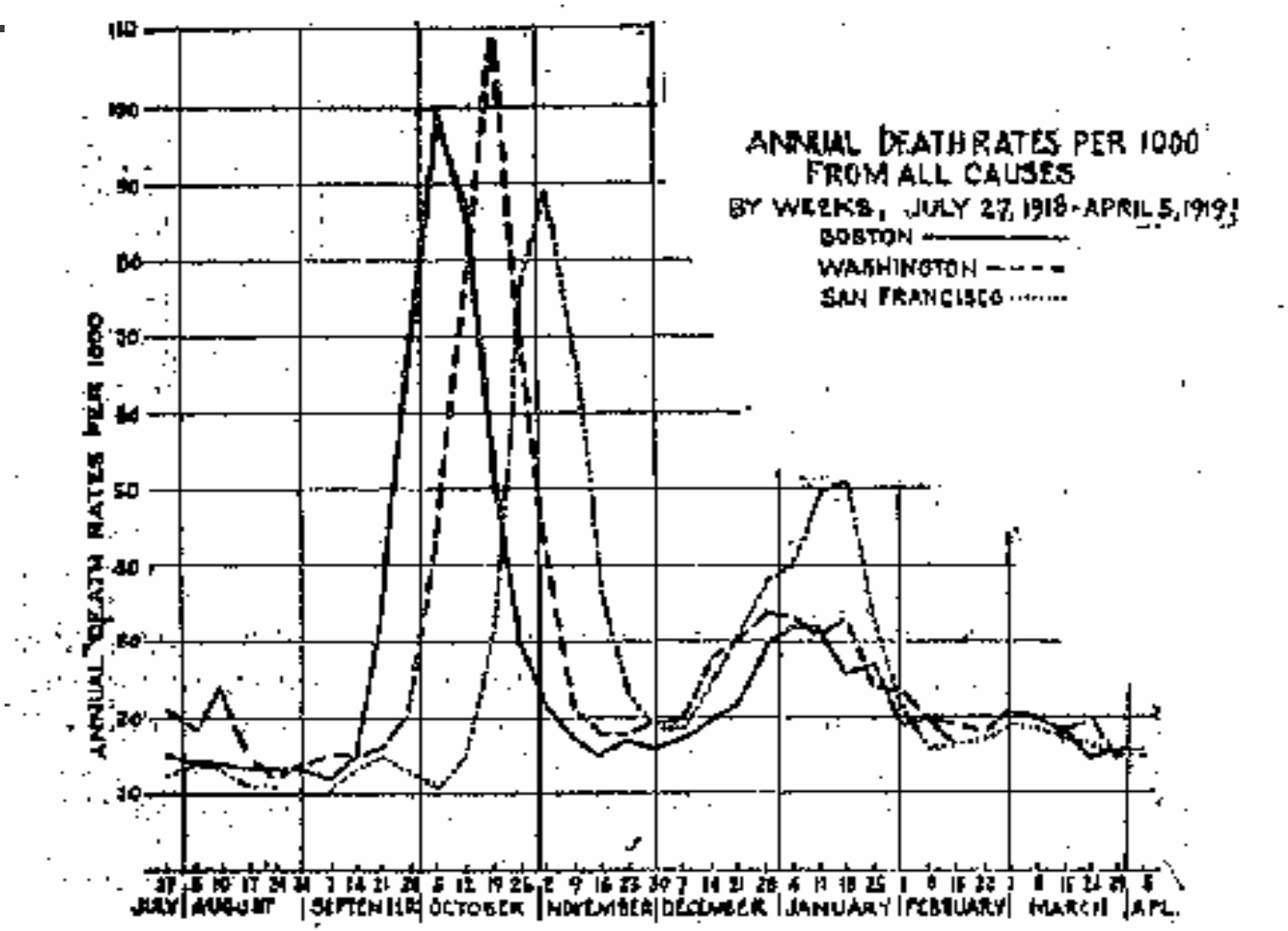
1918 Influenza Pandemic: USPHS Survey of Case Rates



1918 Influenza Pandemic: Death Rates in 3 Cities, 1st & 2nd waves



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Timeline of First and Second Pandemic Waves, 1957-58

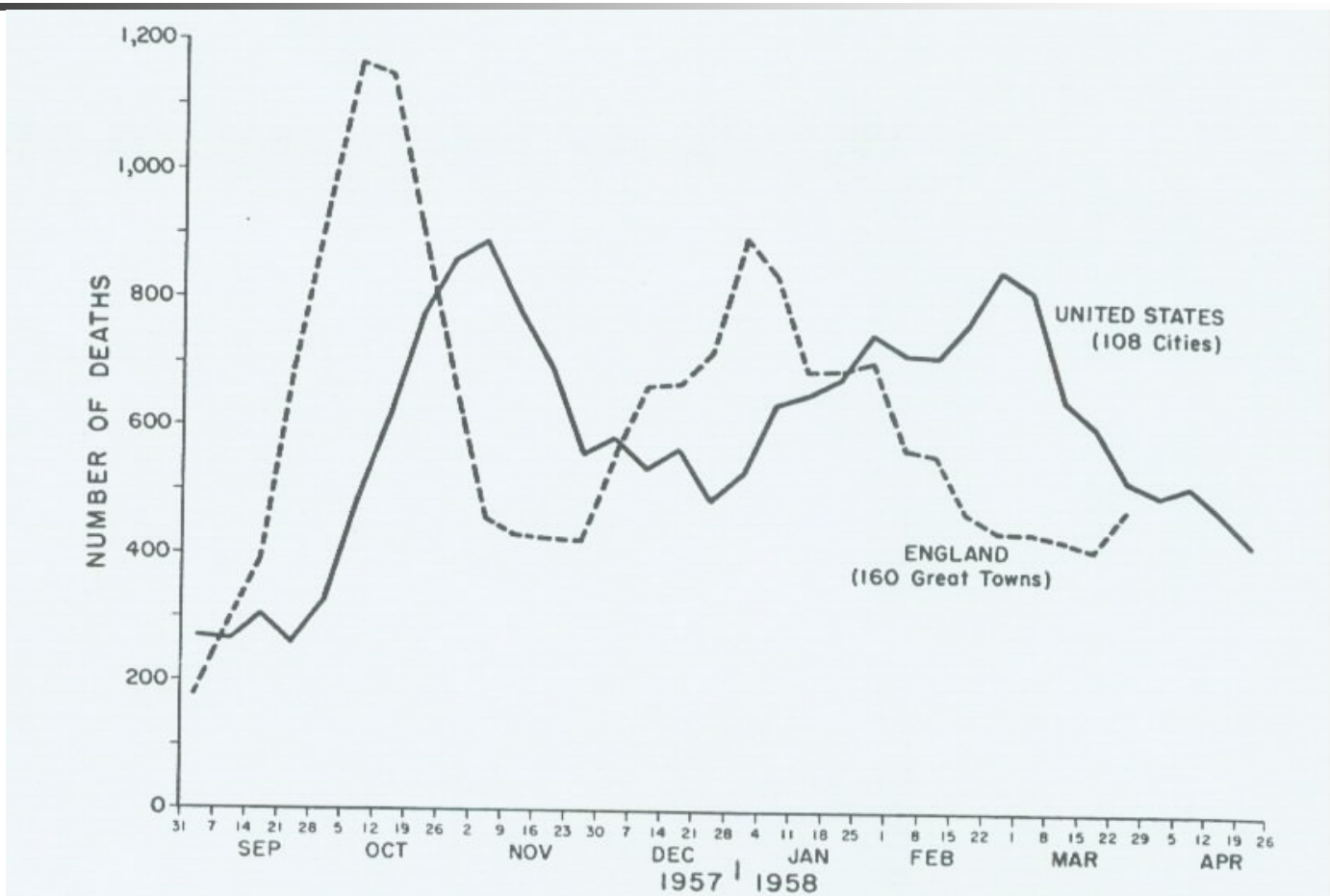

FIGURE 8. Weekly influenza and pneumonia deaths in England and the United States, 1957–1958.

Ref: Trotter, Am J Hyg, 1959

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Potential Impact of the Next Influenza Pandemic in the U.S.

	Low estimate (1957 & 68 based)	**High estimate** (1918 based)
Deaths	104-243,000	952,000-2.2 million
Hospitalizations	360-839,000	4.1-9.6 million
Illnesses	43-100 million	43-100 million

Source: Meltzer, CDC, unpublished data

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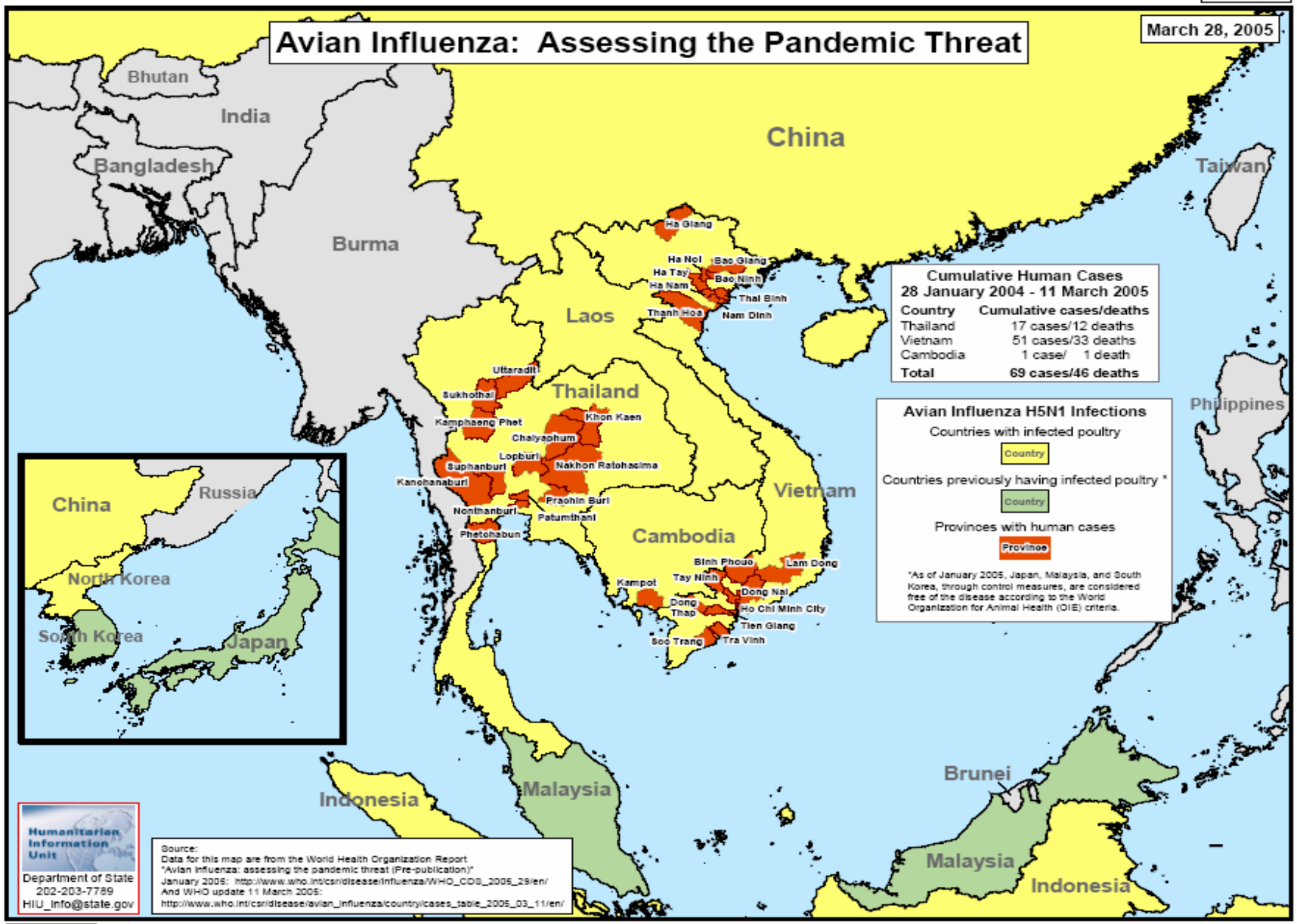

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H5N1 Cases & Mortality Through 14 April 2005

Country	H5N1 Cases	Deaths	Case Fatality
Thailand	17	12	71%
Vietnam	68	36	53%
Cambodia	3	3	100%
Total	88	51	58%

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Summary of Avian Influenza: Is a Pandemic Imminent?

- Asian H5N1 epizootic of unprecedented scope
- Limited prospects for eradication of H5N1
  - Asymptomatic infection in wild bird species
  - Massive poultry culling can be successful in eliminating "hot spots" and decreasing human exposure
- Unclear likelihood of this strain reassorting and spreading between people
- Other pandemic threats (e.g., H7N7, H7N3) exist and could cause the next pandemic


How to avoid Influenza
Gargle Daily

Draft HHS Pandemic Influenza Preparedness & Response Plan

- Plan was released for public comment on August 26 (Federal register and NVPO website)
- Goal is to “finalize” plan by summer 2005
  - Resolve critical issues
  - Improve guidance in several areas (e.g., public health measures, health care surge capacity)
  - Respond to public comments
  - Modify actions by pandemic phase to correspond with new WHO phases

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Key Unresolved Issues

- Public and private sector vaccine purchase and distribution
- Priority groups for early vaccine and for antiviral chemoprophylaxis and therapy
- Approach to indemnification, liability protection, and compensation

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U.S. Pandemic Influenza Preparedness Activities

- Enhanced surveillance
- Vaccine security and supply
  - Contract for year-round egg availability and expansion & diversification of U.S. influenza vaccine production
  - Clinical trials of H5N1 vaccine & small stockpile
- Antiviral drug stockpile in the SNS
- State/local preparedness
  - CDC support for State planning activities
  - HRSA funding for health care system preparedness
- Research and development

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Interventions to Decrease Pandemic Health Impacts

- Vaccine
- Antiviral drugs
- Medical care
- Public health (community) interventions to decrease disease spread

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Pandemic Vaccine Supply

- Assumptions
  - Imported vaccine will not be available
  - Two doses (15 ug) will be needed for protection
- Current U.S. manufacturing capacity
  - Estimated 12-20 million doses per month produced
- Implications
  - About 1% of the population may be protected per week
  - Need to target defined groups for early vaccine supply

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Potential High-Risk Populations for Pandemic Influenza Vaccine

- Risk groups for severe illness from annual influenza (N=~80 million)
  - Persons ≥65 yrs old – 90% of excess annual deaths
  - Persons with underlying illnesses – cardiac & pulmonary disease, metabolic disease (diabetes), renal disease, immunosuppression (cancer, HIV, transplant), etc.
  - Pregnant women
  - Young children 6-23 mo.
- Caveat – pandemic risk groups may differ
  - Increased proportion of young & previously healthy

Potential Occupational Priority Groups for Pandemic Vaccine

Category	Population in millions (%)
Health care worker	12.6 (4.3%)
Emergency service provider	1.0 (0.3%)
Public safety	2.3 (0.8%)
Utility	0.7 (0.3%)
Transportation	5.0 (1.7%)
Other	1.2 (0.4%)

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Influenza Antiviral Drugs

	Adamantanes	Neuraminidase inhibitors
Agents	Amantadine Rimantadine	Oseltamivir Zanamivir
Stockpile	4 M rimantadine	2 M oseltamivir
Impacts		
Prophylaxis	70-90% effective*	70-90% effective
Treatment	No controlled trials	Decreases pneumonia & hospitalization
Resistance	Common; develops with therapy	Uncommon
Adverse events	Neuro (amant); GI	GI

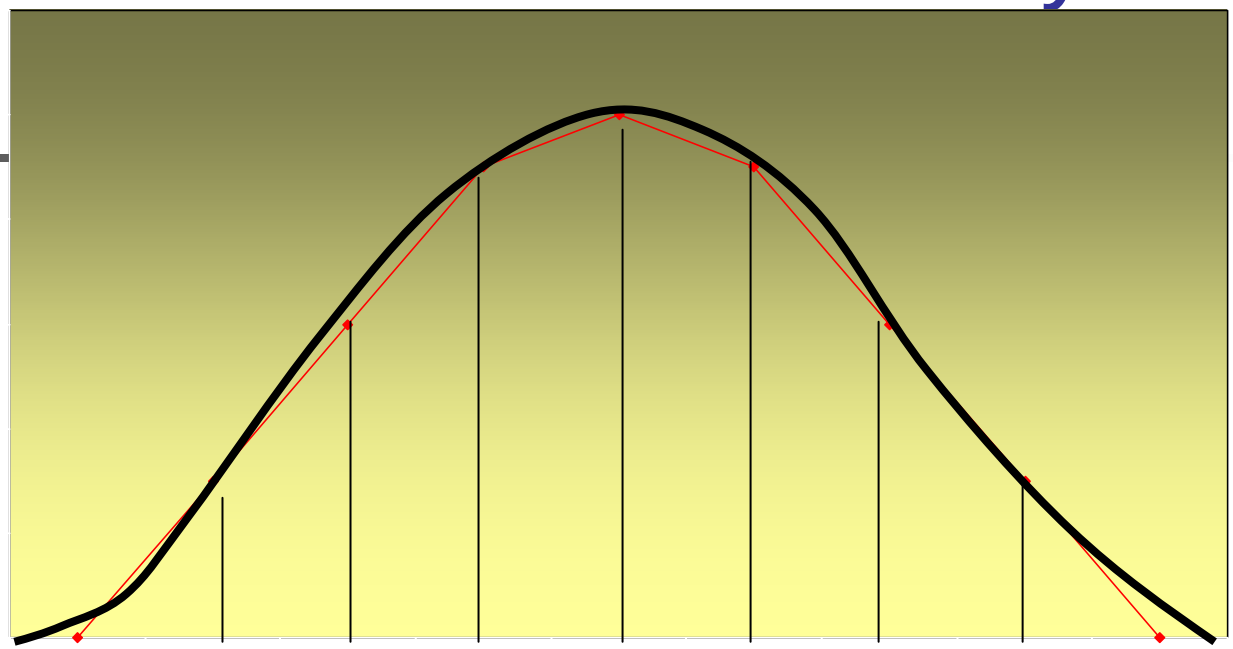
*If strain is susceptible

Pandemic Influenza Antiviral Drug Use Issues

- Definition of priority groups
  - Similar considerations as for vaccine priority groups
- Drug use and distribution strategies
  - Treatment preferred over prophylaxis given limited drug supply
  - Early treatment most effective so delivery site will become the point-of-care
- Total antiviral drug supply
  - Additional stockpile purchases pending definition of priority groups and strategies

Pandemic Influenza Impact on Health Care in a Community

Estimates using Flu surge software



Pandemic week:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Hosp. census	274	843	1432	1884	1915	1504	925	336
% capacity:	4%	12%	20%	26%	26%	21%	13%	5%
ICU census:	41	144	268	370	401	340	226	103
% capacity	5%	16%	30%	41%	45%	38%	25%	11%
Vent.census:	21	72	134	185	201	170	113	52
% capacity	3%	10%	19%	27%	29%	25%	16%	8%

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Challenges to Maintaining Quality Medical Care

- Ability to effectively triage patients
- Ability to care for ill outpatients
  - Delivery of medical care, medications, and food
- High demand for inpatient services
  - Estimated >25% increase in demand for inpatient beds, ICU beds, & ventilators for a mild pandemic
  - Staff absenteeism
  - Limited availability of critical resources
  - Surge capacity for inpatient care

Potential Blood Safety and Availability Issues

- Pandemic impacts on…
  - Blood donation
  - Blood safety
  - Blood needs
  - Blood drawing capability

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Influenza Illness

- Influenza illness
  - Duration 5 - 7 days with additional time for recovery
  - Illness characterized by fever, malaise, and respiratory symptoms
  - Viral shedding occurs 1 day before symptom onset and some persons develop asymptomatic infection
  - Viremia is seldom documented and unlikely to occur
- ~1/3 of the population will become ill during the pandemic

Potential Blood Safety and Availability Issues

Category	Potential impact
Donation	▪ Decrease due to illness & fever
Safety	▪ Unlikely to be affected -- Influenza-associated viremia rare -- If it occurs, it will be associated with fever & severe disease
Need	▪ Decrease with elective surgeries cancelled ▪ CT surgery need may increase but capacity will be limited
Blood drawing capacity	▪ Decrease due to illness & possibly need for staff to provide other health care services

Blood Supply: Conclusions & Next Steps

- A pandemic will decrease blood supply, demand, & blood drawing capacity but is unlikely to affect safety
- Questions to consider further
  - Given assumptions on attack rate of pandemic disease and on the need for blood, what might be the magnitude of a gap between supply & demand?
  - What options should be considered to close a gap?
  - Will lack of blood drawing capacity limit supply? Should donation center staff be a target group for pandemic vaccine or antivirals?