



CDC Update June 21, 2006

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What is influenza?

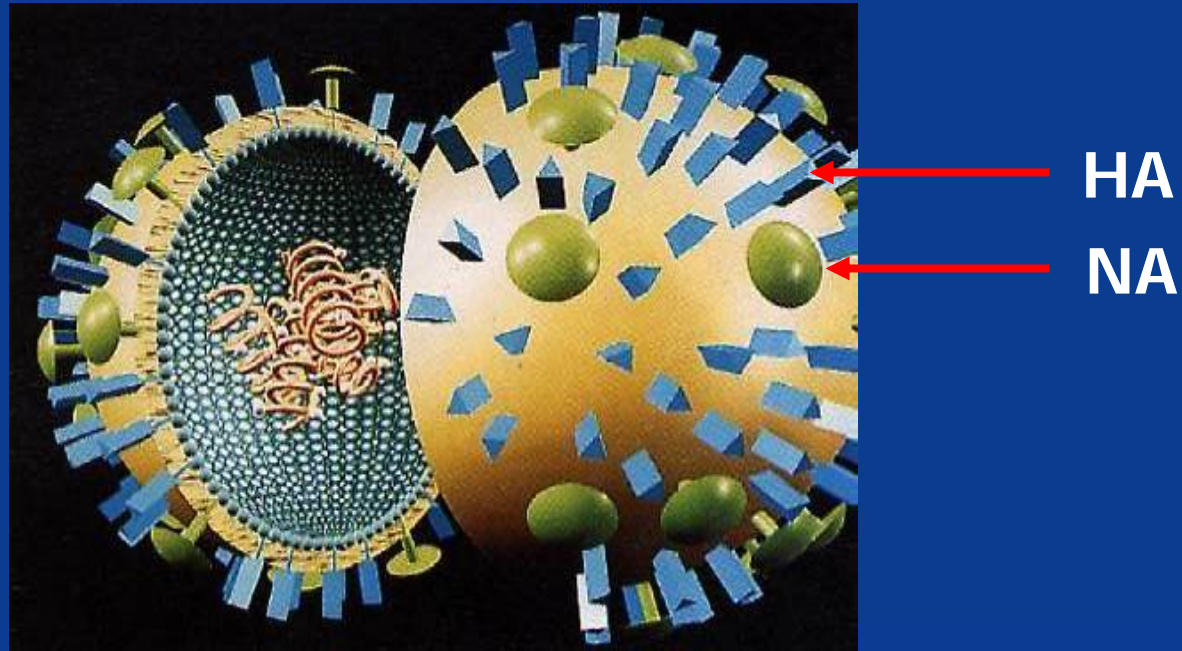
- A contagious disease caused by an RNA virus
 - Spreads easily from person to person
 - Primarily affects the respiratory tract
 - Can cause severe illness and lead to life-threatening complications
- An annual public health problem
- A global infectious disease threat



How influenza viruses spread

- Primarily through respiratory droplets
 - Coughing
 - Sneezing
 - Touching respiratory droplets on self, another person, or an object, then touching mucus membranes (e.g. mouth, nose, eyes) without washing hands)

Influenza A viruses



Subtyped on basis of surface glycoprotein antigens:

- 16 hemagglutinins (HA) and 9 neuraminidases (NA)
- Current human subtypes: H1N1, H3N2

Antigenic change: a key feature of influenza viruses

- Change more than other respiratory viruses
- Minor changes (“drift”) occur constantly
 - Cumulative
 - Reason why vaccine is updated each year
- Radical change (“shift”) occurs infrequently
 - New surface protein (no immunity among people)



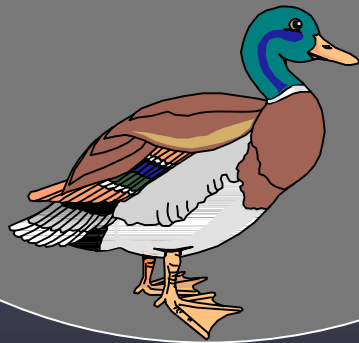
Influenza viruses

- People are usually infected only by human influenza A viruses
- Wild birds are the main reservoir for influenza A viruses:
 - All known 'A' subtypes circulate in wild birds
 - Can spread to domesticated birds
 - Ultimate source for influenza viruses (and genes) infecting other animal species, including humans

Avian Influenza A Viruses



H1 – H16



H1 – H3

Human Influenza A Viruses



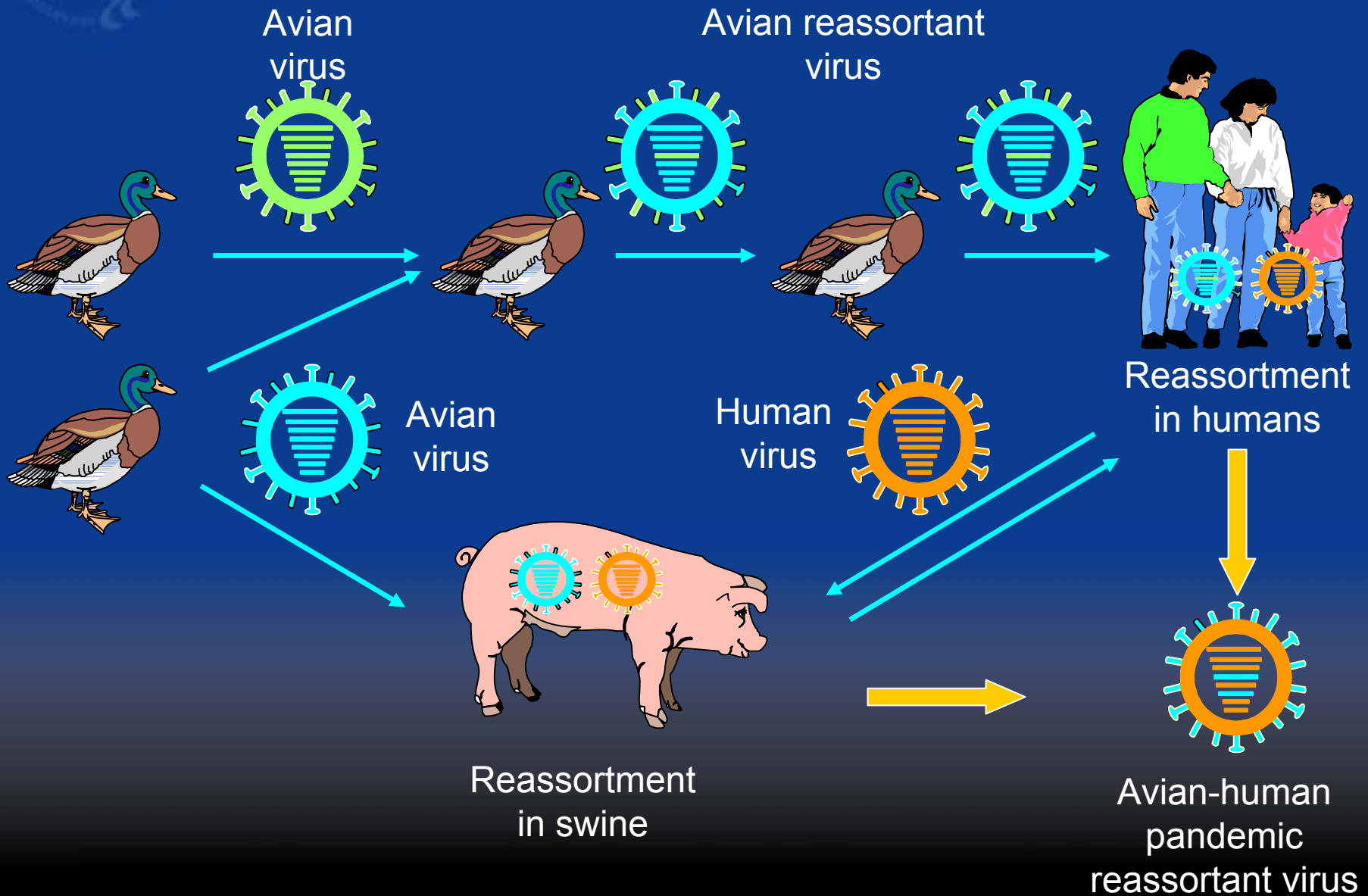


Seasonal vs. pandemic influenza

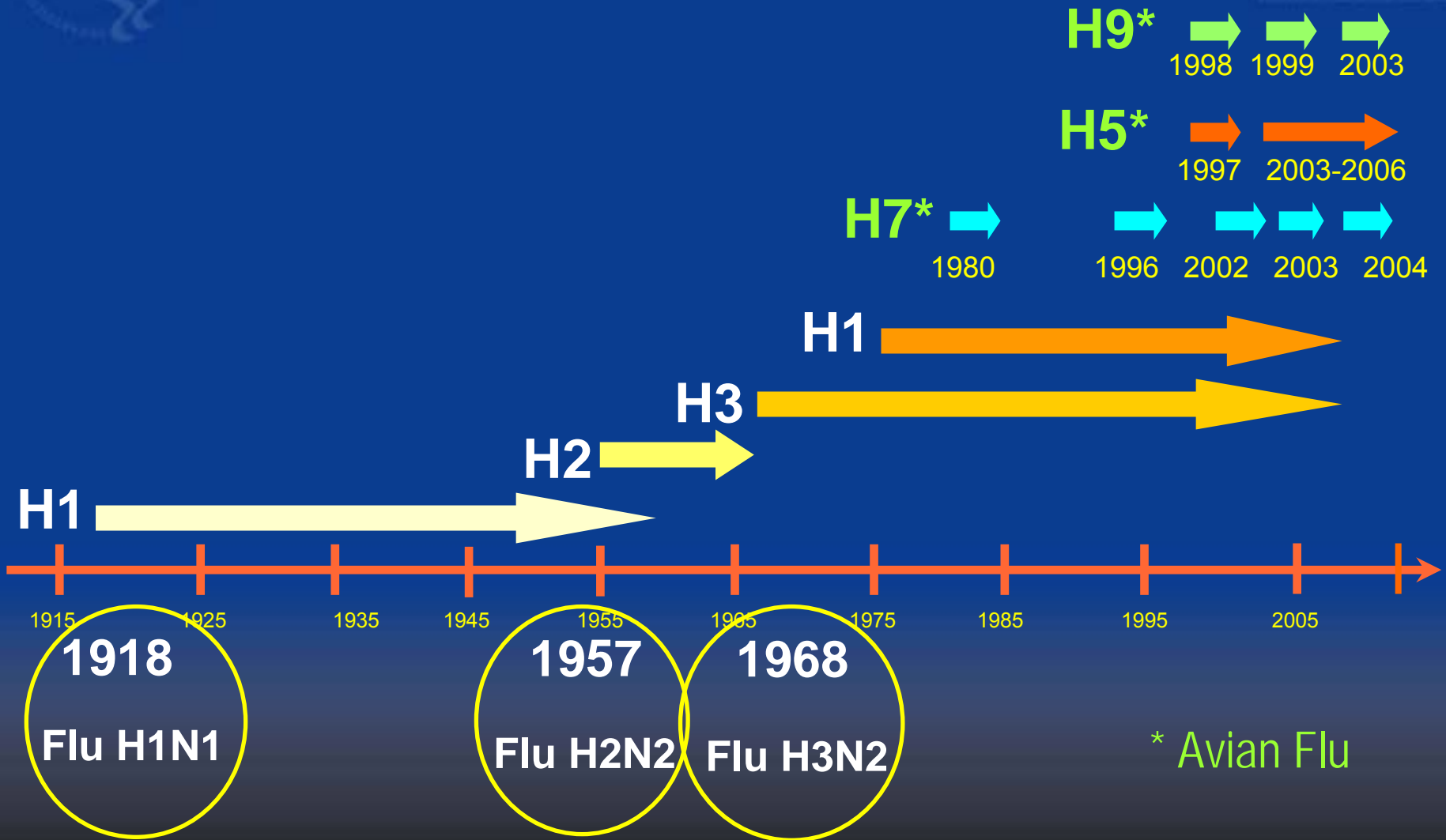


- Seasonal outbreaks
 - Caused by subtypes of influenza viruses that are already circulating among people
- Pandemic outbreaks
 - Caused by new subtypes
 - Or subtypes that have never circulated among people
 - Or subtypes that have not circulated among people for a long time

Model of the emergence of a pandemic influenza virus



Emergence of influenza A viruses in humans



Three criteria for an influenza pandemic



- An influenza pandemic is a global outbreak of disease that occurs when:
 - A new influenza A virus appears or ‘emerges’ in the human population
 - It causes serious illness in humans
 - It spreads easily from person to person worldwide



Concerns about pandemic influenza



- Rapid global spread (high morbidity and mortality)
- Shortages and delays (vaccines and antiviral medications)
- Increased burden on hospitals and outpatient care systems
- Simultaneous impacts that disrupt national and regional infrastructures

Avian influenza A(H5N1): why is concern so high?

- Impact on animals and economies:
 - Lethal to poultry and other animals
 - Present in healthy waterfowl (shed in feces)
 - Has had (and could have) major economic impact

Avian influenza A(H5N1): why is concern so high?

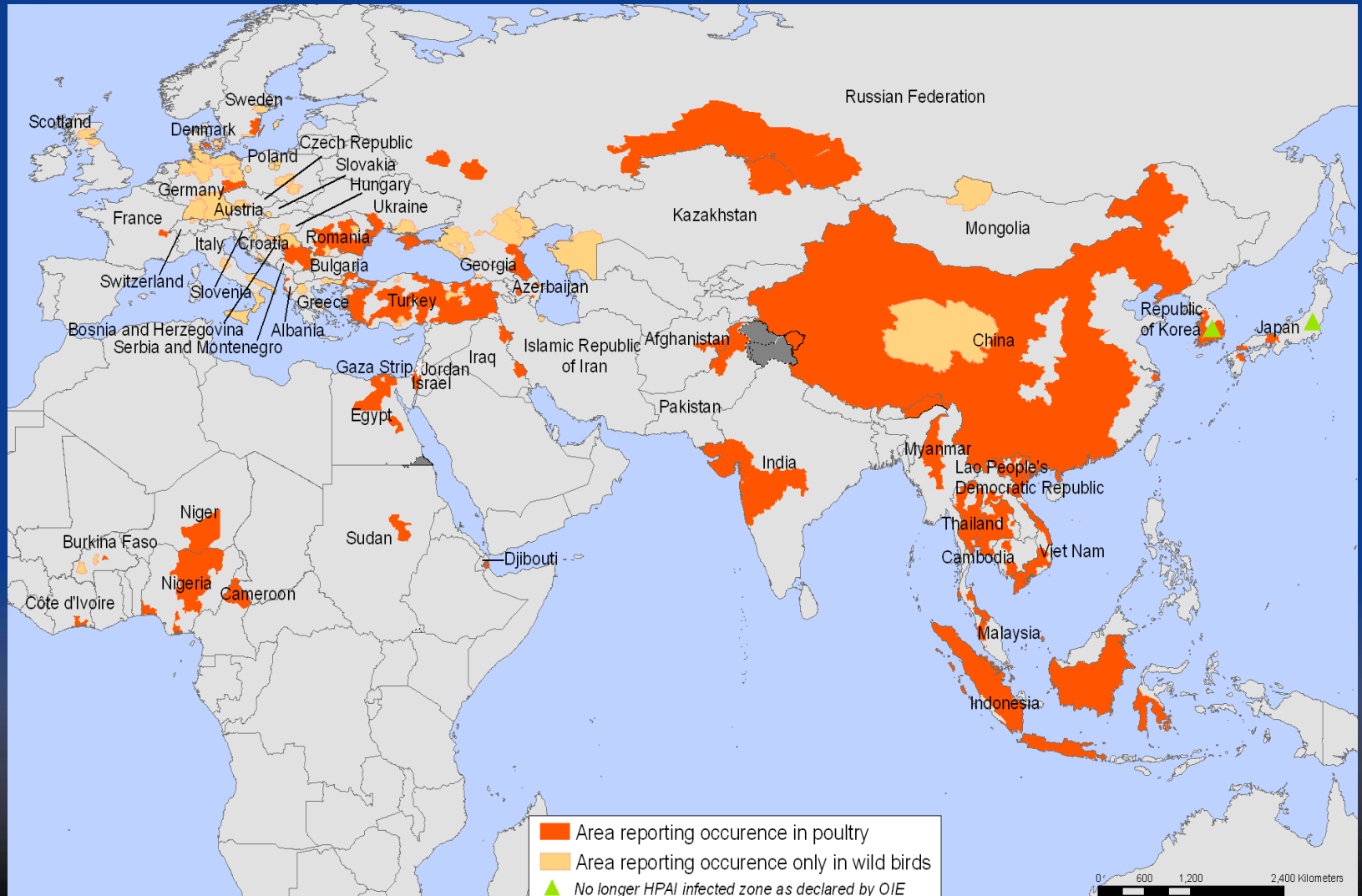
- Direct impact on humans:
 - Has caused severe disease in people who have become infected
 - Limited human-to-human transmission has occurred in SE Asia
 - Could evolve to become easily transmissible in humans
 - No human H5N1 vaccine commercially available
 - Limited supplies of expensive antiviral medicines



Impact of potential pandemic

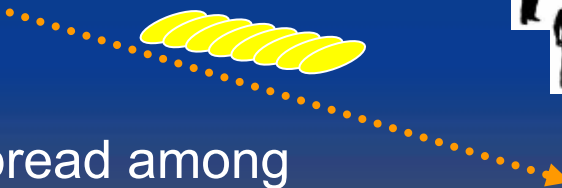
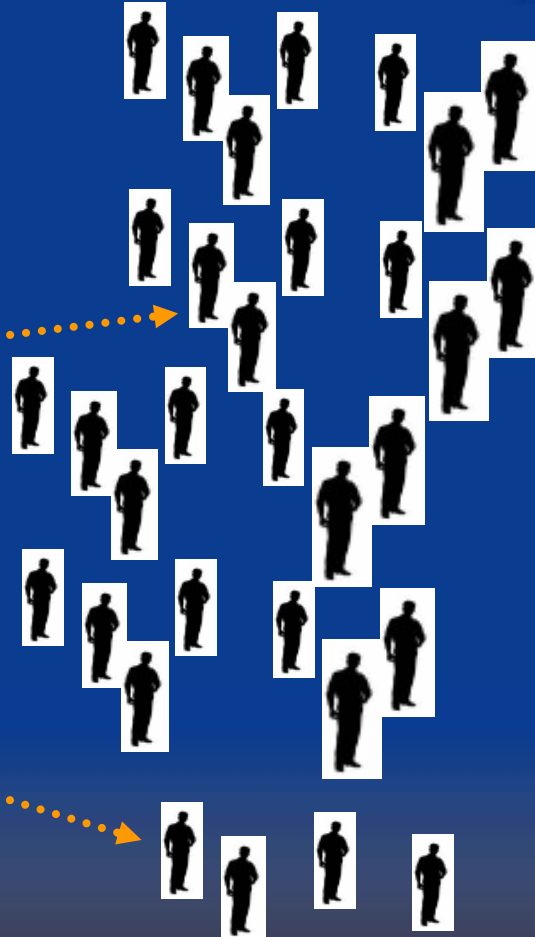
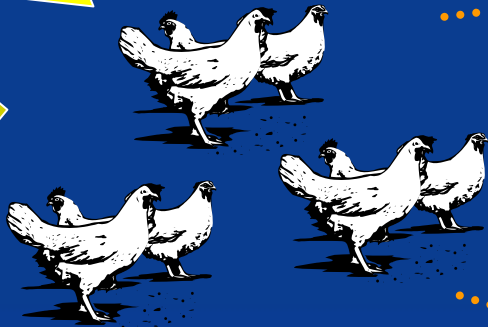
- Illness (estimated 30% attack rate)
 - Moderate 90 million
 - Severe 90 million
- Hospitalization
 - Moderate 865,000
 - Severe 9.9 million
- Deaths
 - Moderate 209,000 (comparable to 1956-58)
 - Severe 1.9 million (comparable to 1918-19)

Countries reporting confirmed A/H5N1 in poultry/wild birds since 2003





Currently...



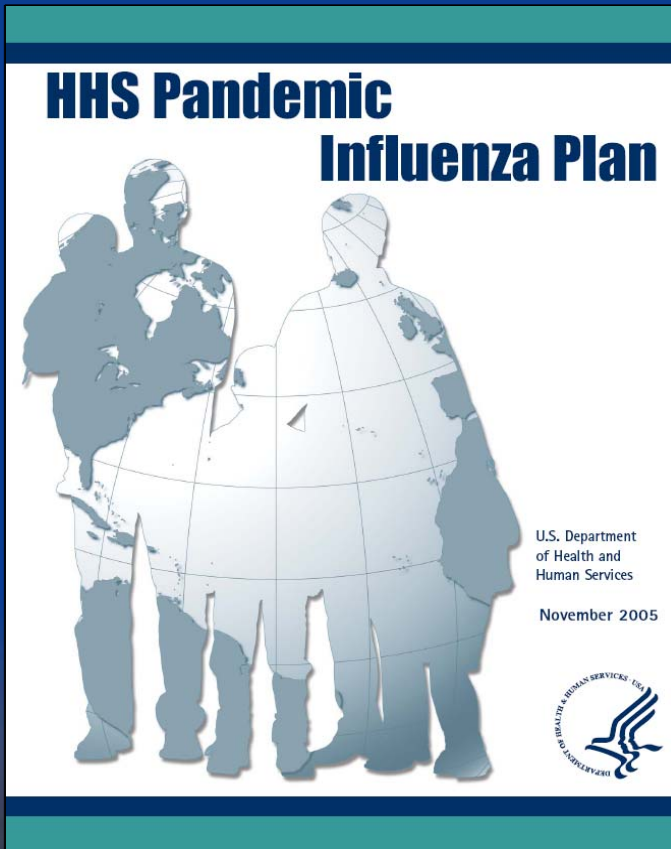
H5N1 infection is widespread among wild birds and domestic poultry

Reports of H5N1-infected humans
Limited human-to-human spread of virus

Governments and others working together

- Limit animal infections
 - Improve farming practices to reduce contact between wild and domestic birds
 - Cull sick/exposed farm animals to limit further spread
 - Vaccinate poultry to limit infection/transmission
- Limit human infections
 - Isolate and treat human cases
 - Use protective gear when working with sick animals and humans
 - Conduct public awareness campaigns
- Coordinate preparedness
 - Preparedness planning, interagency coordination
 - Stockpile medicines, protective gear, animal vaccines etc.

HHS Pandemic Influenza Plan



- Serves as a blueprint for all HHS pandemic influenza preparedness planning and response activities
- The U.S. government is committing large financial and human resources to:
 - Take immediate steps to ensure early warning of avian pandemic influenza outbreaks among animals or humans
 - Support development of new vaccines
 - Coordinate stockpiling of antiviral medications

The role of CDC in pandemic preparation and response

Selected examples:

- Conducts and supports clinical and virological influenza surveillance
- Coordinates pandemic response activities with state, local and tribal public health agencies
- Coordinates antiviral and other drug delivery from the Strategic National Stockpile



Pandemic influenza

- Another pandemic is probably inevitable
- We are facing an unknown, but increased risk of a pandemic
- H5N1 will likely persist/recur in Asia, Europe and Africa, and may spread to other parts of the world
- H5N1 is a 'new' virus to humans and can cause severe disease; person-to-person spread has so far been very limited



Pandemic influenza

- No evidence at present of sustained H5N1 transmission among people
- H5N1 is a leading pandemic candidate, but
 - Must continue to monitor other avian influenza viruses
 - Must push forward pandemic preparedness actions **before** final warning signs are detected



Food-related illnesses are a substantial burden in the United States

‘We estimate that foodborne diseases cause ~76 million illnesses, 325,000 hospitalizations, and 5000 deaths in the United States each year’

This article had been cited on **1289** occasions through 5.31.06

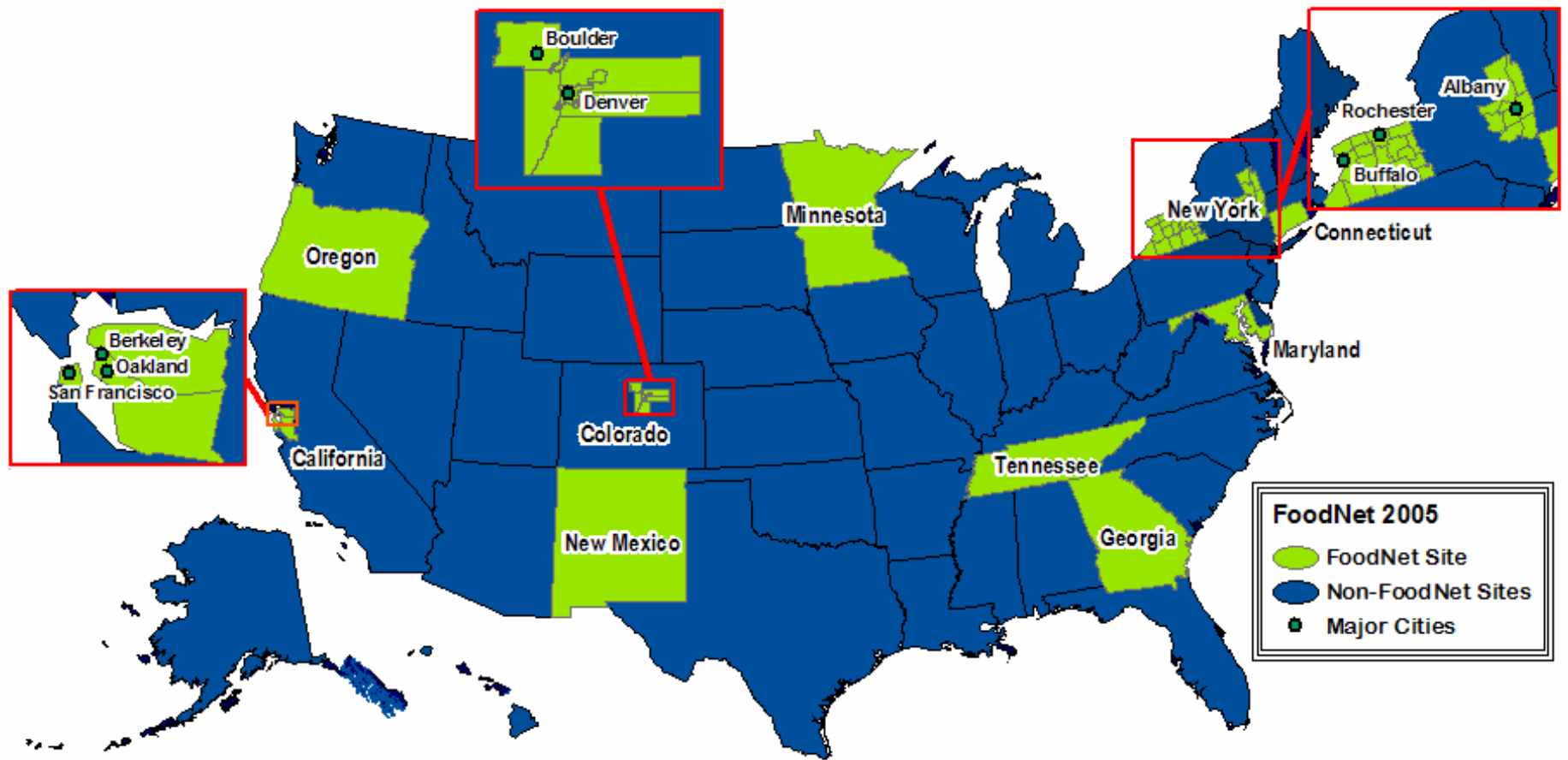
Foodborne Diseases Active Surveillance Network (FoodNet)



- Collects data from 10 states regarding diseases caused by enteric pathogens transmitted commonly through food
- Quantifies and monitors the incidence of these infections by conducting active, population-based surveillance for laboratory-confirmed illness

FoodNet

Foodborne Diseases Active Surveillance Network



44.5 million persons in 10 states (15% of U.S. population)



Preliminary FoodNet data for 2005



16,614 laboratory-confirmed cases of infection were identified:

6,471 cases	Salmonella
5,655 cases	Campylobacter
2,078 cases	Shigella
1,313 cases	Cryptosporidium
473 cases	E. coli O157
159 cases	Yersinia
135 cases	Listeria
119 cases	Vibrio
65 cases	Cyclospora

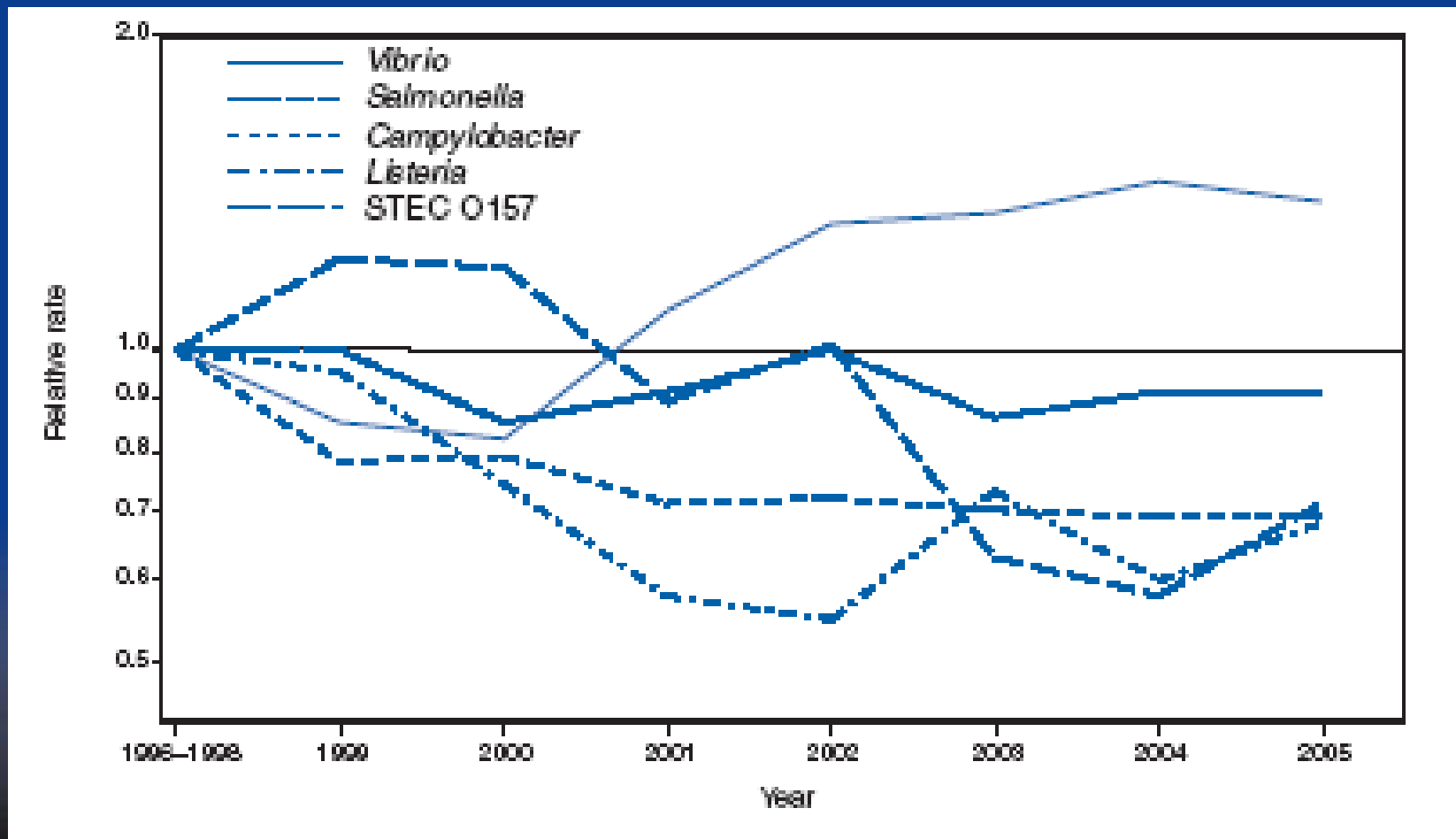
Preliminary FoodNet data for 2005



In comparison with the average annual incidence between 1996 and 1998:

↓	9%	Salmonella
↓	29%	E. coli O157
↓	30%	Campylobacter
↓	32%	Listeria
↓	43%	Shigella
↓	49%	Yersinia
↑	41%	Vibrio

Preliminary FoodNet data for 2005: relative rates for lab diagnosed cases compared with 1996-98 baseline

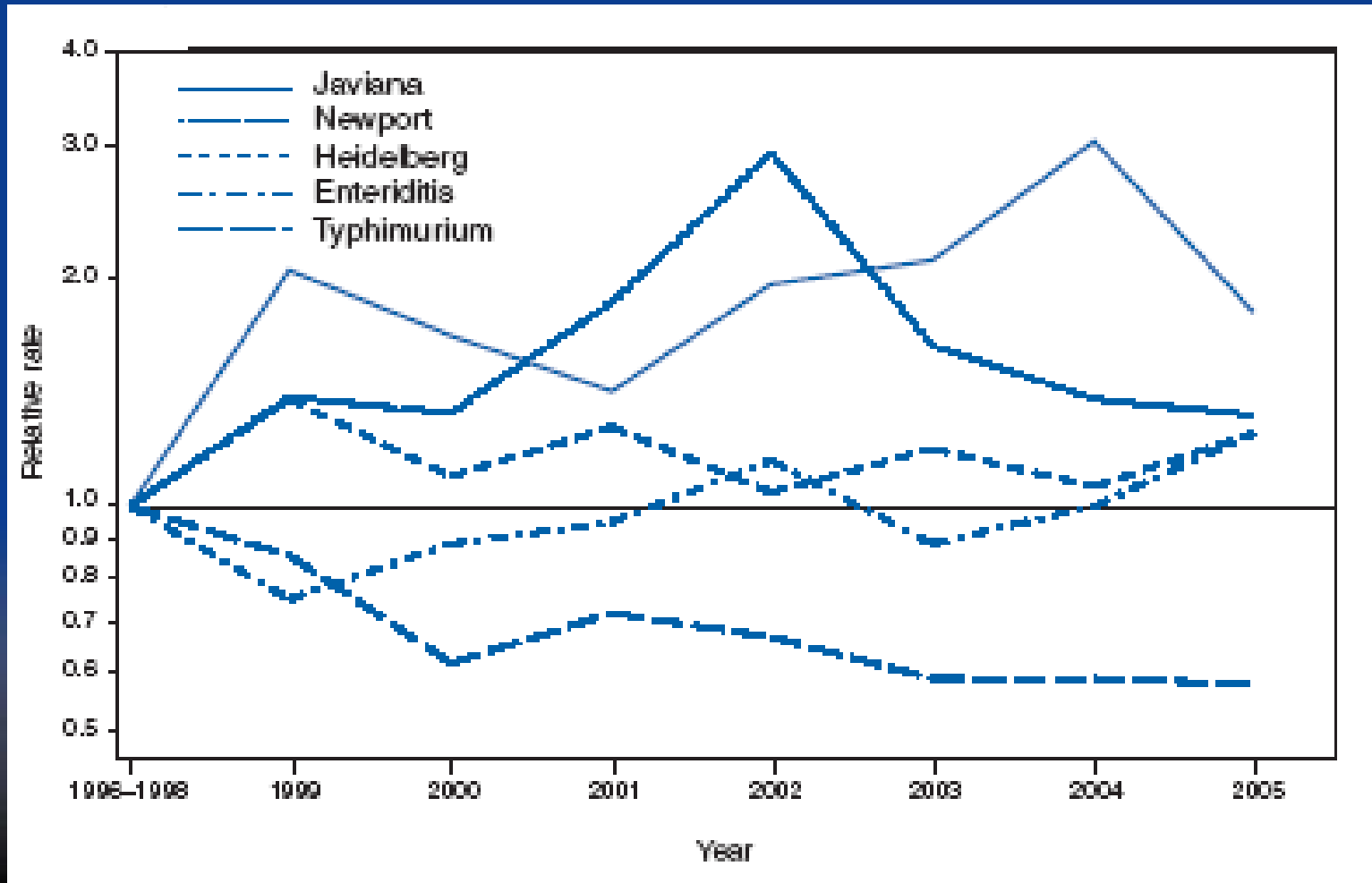




Trends in *Salmonella*

- Little change
 - Compared to 1996-1998 baseline, *Salmonella* decreased 9% (CI = 2%–15%) in 2005
- Of the five most common *Salmonella* serotypes, only the incidence of *S. Typhimurium* decreased
- Consistent with FSIS data
 - Decrease in *Salmonella* contamination of ground beef since 1998
 - Sustained increase in chicken broiler carcasses testing positive for *Salmonella* during 2002-2005

Preliminary FoodNet data for 2005: relative rates for lab diagnosed cases compared with 1996-98 baseline





EHS-Net



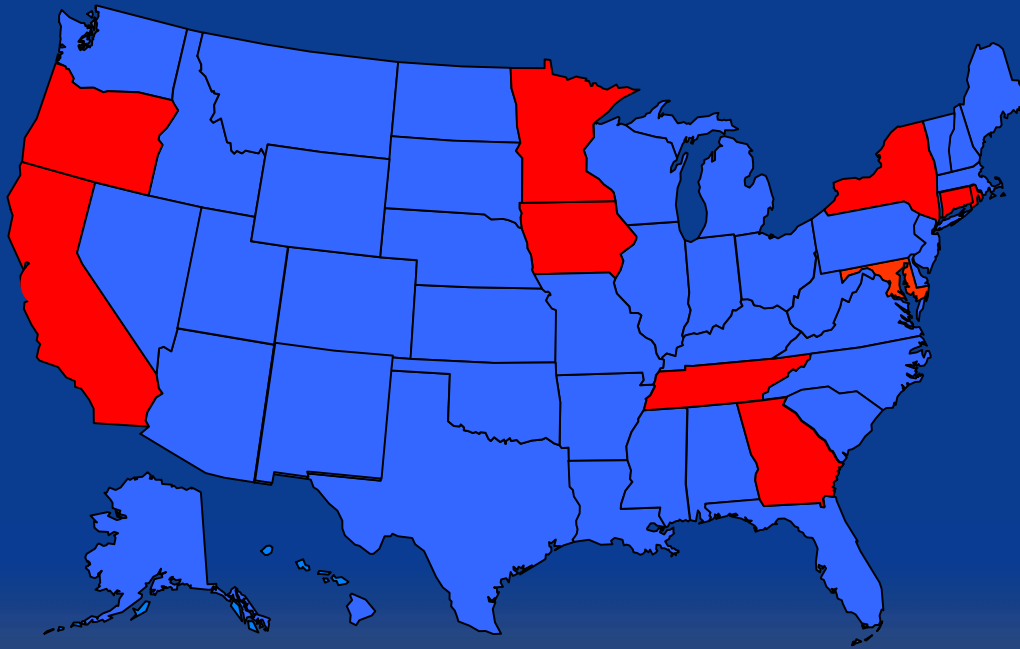
- Network of environmental health specialists that collaborate with epidemiologists and laboratorians to identify and prevent environmental factors that contribute to foodborne and waterborne illness and disease outbreaks
- Assists state health departments in their efforts to improve the practice of environmental health service programs

EHS-Net partners



2000 - 2004

- California
- Colorado
- Connecticut
- Georgia
- Minnesota
- New York
- Oregon
- Tennessee



2005 - 2009

- California
- Connecticut
- Georgia
- Iowa
- Minnesota
- New York
- Oregon
- Rhode Island
- Tennessee

FDA
USDA
CDC

Why look at restaurants?



- FoodNet sporadic case control studies indicated that eating outside the home is often associated with foodborne illness
- Meals prepared in facilities that serve the public more likely to impact larger number of people
- Investigating food handling practices in homes is less feasible
- EHS-Net's partner state and local health departments have programs to oversee food handling practices in restaurants

Some completed studies



- Egg handling study*
 - To determine prevalence of high-risk practices and policies in restaurants serving all-day breakfasts
- Service worker food preparation practices**
 - To determine self-reported prevalence of workers' safe and unsafe practices
- Food worker and managers focus groups***
 - To identify barriers and facilitators to safe food handling practices

*Journal of Food Protection 2004;67:1444-50

**Journal of Hygiene & Environmental Health 2005;208:27-35

***Food Protection Trends (in press)



Some ongoing studies



- Ground beef study
 - To evaluate handling practices and use of irradiated beef in restaurants
- Tomato study
 - To describe handling practices that could lead to contamination and/or proliferation of pathogens
- Chicken study
 - To describe handling practices that could lead to contamination and/or proliferation of pathogens



- Estimated 30 million persons in US wear soft contact lenses
- Annual incidence of microbial keratitis ranges from 4-21 per 10,000 users (depending on overnight wear)
- Etiologic agent is fungal in 1% to 35% of keratitis cases (depending on location)



Fusarium keratitis : United States, 2006



- On March 8, CDC received a report from an ophthalmologist in New Jersey of three cases of contact lens-associated *Fusarium* keratitis during the preceding 2 months
- This report, together with reports of similar cases from several Asian countries, prompted CDC and FDA to begin an investigation to determine the extent and cause of the problem

Fusarium keratitis : United States, 2006



- 130 cases in 26 states; 125 wore soft contact lenses; one-third required corneal transplantation
- ~80% had used ReNu with MoistureLoc lens care solution during month before onset of infection
- Case-control study showed use of ReNu with MoistureLoc solution associated with infection (adjusted odds ratio, 19.0, $p < 0.001$)

Fusarium keratitis : United States, 2006



- ReNu with MoistureLoc removed from U.S. market on April 10, and worldwide on May 15
- This has proved an effective intervention
- The cause of the association with *Fusarium* keratitis remains unclear, but appears to be related to formulation and use of the product, rather than contamination



Thank you

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