



DoD Pandemic Influenza Surveillance and Detection Activities

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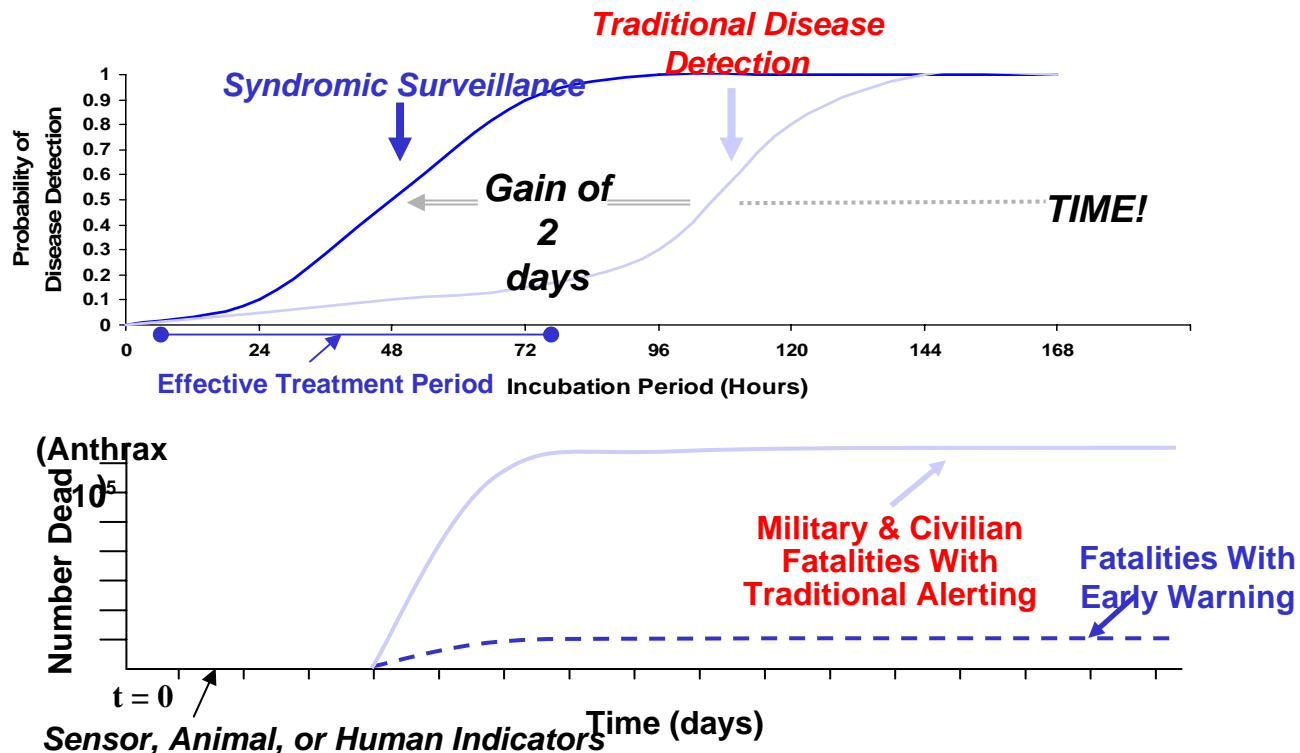
Outline

- U.S. National PI Surveillance Plan
- DoD General Contributions to National PI Surveillance
 - Virologic Surveillance
 - Disease Surveillance
- Integrating Diverse Information Sources
 - Sample DoD PI Surveillance Report
- Questions/Discussion



Definition

- Surveillance and Detection: domestic and international systems that provide continuous “situational awareness,” to ensure the earliest warning possible to protect the population.



HHS PI Surveillance Plan

PH Roles & Responsibilities

- Virologic Surveillance
 - Rapidly detect early cases of a PI virus in U.S.
 - Track the virus' introduction into local areas
 - Monitor changes in the pandemic virus, including development of antiviral resistance
- Disease Surveillance
 - Serve as an early warning system to detect increases in influenza-like illness (ILI) in the community.
 - Monitor the pandemic's impact on health (e.g., by tracking outpatient visits, hospitalizations, and deaths).
 - Track trends in influenza disease activity and identify populations that are severely affected.

- <http://www.hhs.gov/pandemicflu/plan/sup1.html>



DoD Value to National Medical Surveillance Efforts

- Worldwide presence in more than 140 countries
 - Approx 475,000 military personnel overseas at any given time
- Large 9.2 million beneficiary population including vulnerable groups such as children and aging retirees
 - 1.8 million outpatient encounters and 19,500 inpatient admissions per week, on average
- Robust public health surveillance programs & systems
 - 70 military hospitals and 411 medical clinics
 - 129,500 military healthcare workers world-wide



DOD Military Health System Surveillance Activities

- Epidemiology, Public Health, and Preventive Medicine:
 - Installation level, variable capabilities across Services
 - Service Public Health Centers: USACHPPM, NEHC/NEPMU, and AFIOH
- CONUS Lab/Research Network
- OCONUS Medical Research Network
- Clinical:
 - Human: MTFs, COCOM deployed medical units
 - Animal: VETCOM
- Coordination, planning, training, investigation, and response: GEIS, JS/SG, COCOM SGs





Virologic Surveillance

Laboratory Capabilities

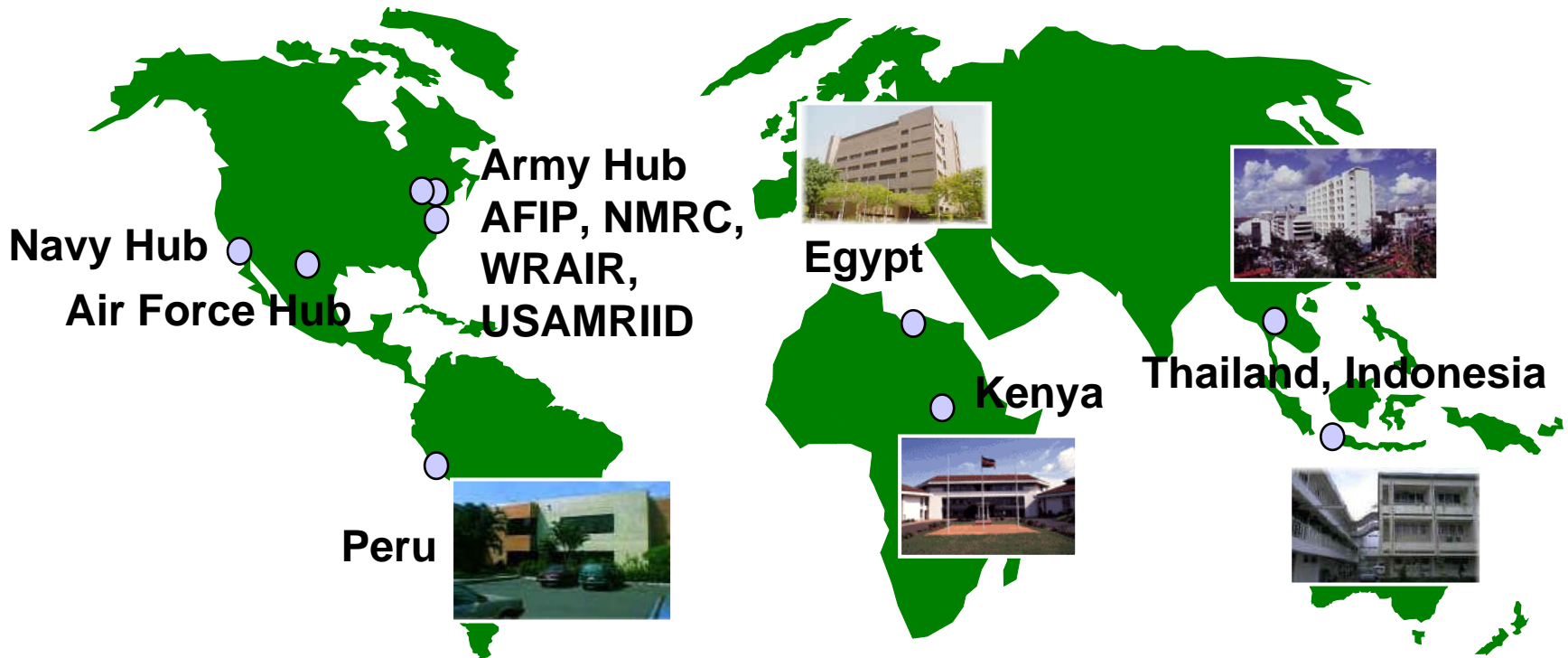


Lab-based Influenza Surveillance

- Specimens for identification & culture of influenza viruses are collected from:
 - DoD beneficiaries in the Military Health System (MHS) worldwide, including ships at sea
 - DoD infectious diseases research laboratories located in Bangkok, Jakarta, Cairo, and Peru collect and analyze influenza specimens from American & local national patients in more than 30 countries
 - Central America in collaboration with SOUTHCOM and the US Army Center for Health Promotion & Preventive Medicine-West (CHPPM-W)



DoD International Network

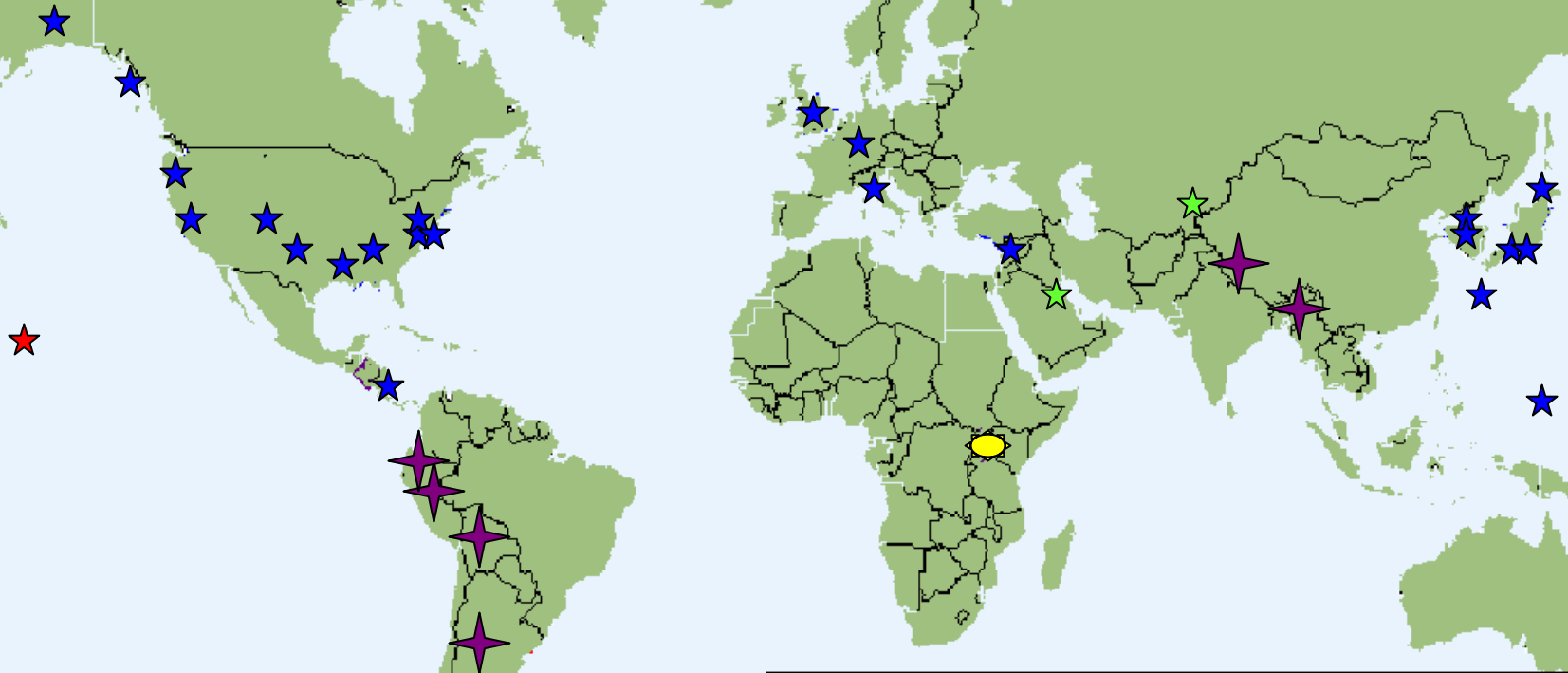


DoD Influenza Surveillance (Lab-based)

- Air Force Institute for Operational Health is DoD lead
 - Avg workload of 3-4K specimens/yr (approx 15% Flu A, 5% Flu B)
- Integrated surveillance of inpatient and outpatient respiratory disease health events
- Vaccine effectiveness studies
- Lab: BSL-3 (small capacity), full BSL-2/2+, rapid RT-PCR (including H5), serologic subtyping by hemagglutination inhibition or PCR, molecular sequencing, and cell culture
 - Subset of positive isolates shared with CDC for confirmation and further testing, has provided seed material for vaccine production
- <https://afioh.brooks.af.mil/pestilence/influenza/default.csm>



DoD 2005-2006 Influenza Surveillance Sentinel Sites



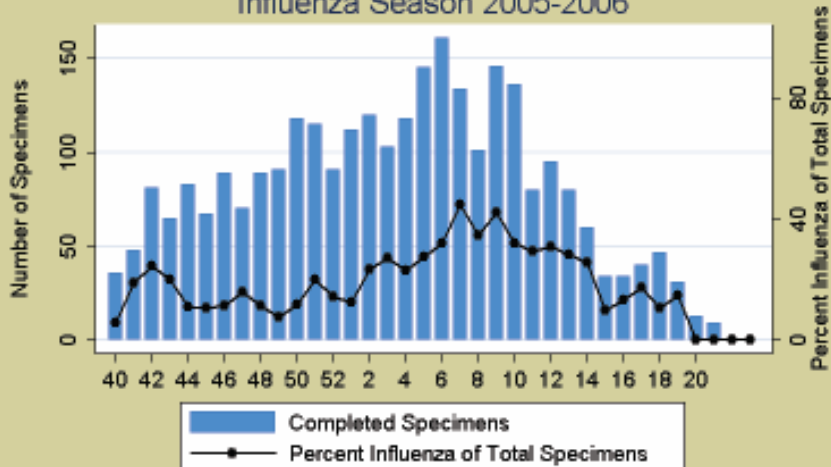
KEY:

- ★ = Sentinel Sites
- ★ = Hawaiian Sentinel Sites (**3 Total**)
- ★ = Clinics & Hospitals Associated with Overseas Research Labs
- ☀ = Participating Overseas Local Labs
- ★ = CENTCOM In-Theater Sentinel Sites

Total Viral Specimens

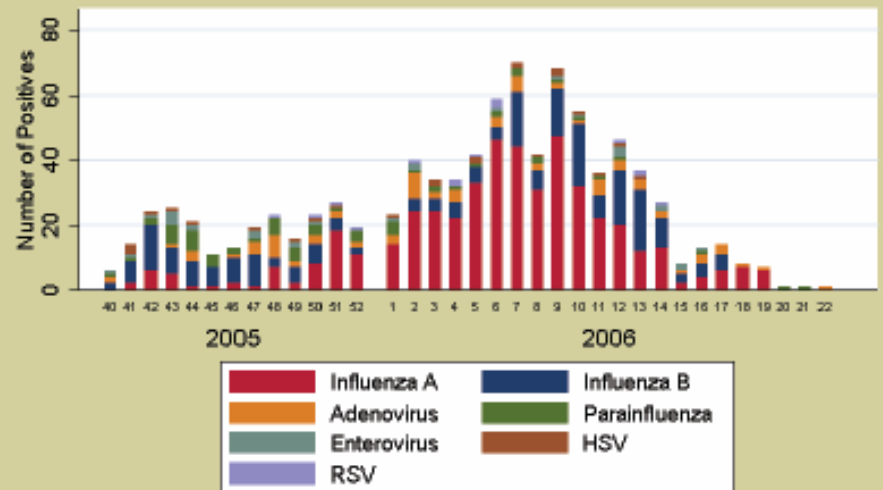
Sentinel & Nonsentinel

Summary of Submitted Specimens
All Sites
Influenza Season 2005-2006



As Of 9 Jun 2006

Positive Viral Results by Week and Year
Influenza Season 2005-2006



As Of 9 Jun 2006



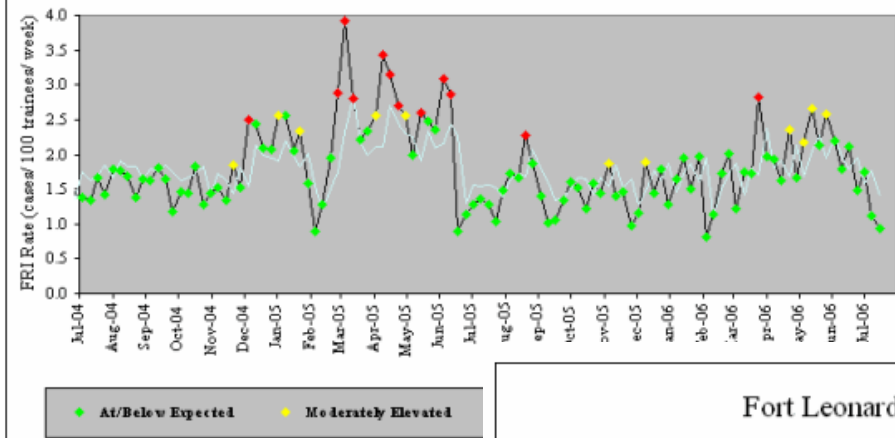
DoD Febrile Respiratory Illness Surveillance (Population-based)

- Naval Health Research Center is DoD lead
- Pacific Fleet shipboard surveillance (7 platforms)
 - Identifies influenza clusters after international port stops prior to US seasonal epidemics making specimens valuable
- Febrile respiratory pathogen surveillance at 8 military recruit training centers
- Avg workload of 2,300 specimens/yr
 - 61% adenovirus, 3% flu A, 1% flu B
- Lab: BSL-3, rapid RT-PCR (including H5), serologic subtyping by hemagglutination inhibition or PCR, molecular sequencing, and cell culture
- <http://www.nhrc.navy.mil/geis/studies/Fafrile%20Respiratory%20Illness%20Surveillance.htm#Current%20Findings>

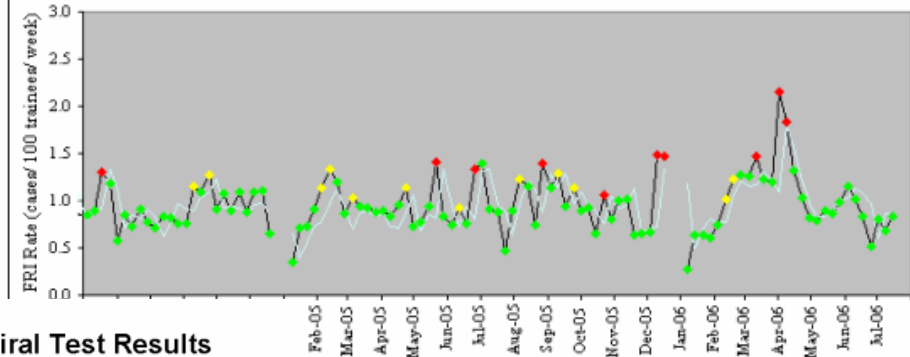


Surveillance is a Local Phenomenon

RTC Great Lakes FRI Rate Status

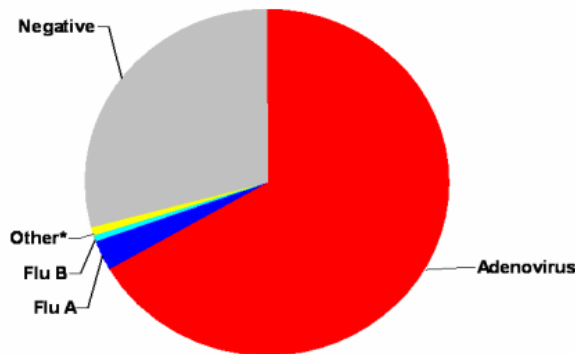


Fort Leonard Wood FRI Rate Status



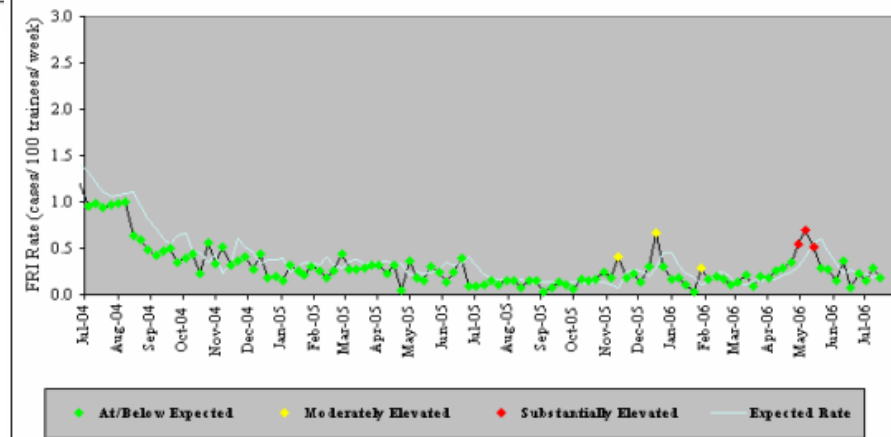
Proportional Distribution of Viral Test Results

June 1998 – October 2005
n=19,674



*RSV and parainfluenza 1, 2, and 3

Lackland AFB FRI Rate Status





Disease Surveillance

Health Events/Encounters



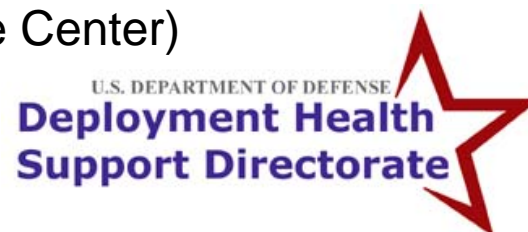
DoD Disease Surveillance

- Outpatient
 - Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE), daily garrison monitoring
 - Joint Medical Work Station (JMeWS), for deployed forces
 - Reportable Medical Events systems (not real-time across DoD)
- Inpatient
 - Standard Inpatient Data Record (SIDR), usually lags 30-60 days
 - Patient Accounting and Realtime Tracking Application (PARRTS)
 - Preliminary data usually entered within 24-48 hours of admission
 - Army facilities only
 - Joint Patient Tracking Application (JPTA), for deployed operations
- Medical Movement Data (TRAC²ES), domestic & deployed



DoD Disease Surveillance, cont'd

- Mortality Surveillance
 - Armed Forces Institute of Pathology
 - Medical Examiner program
 - Full autopsies and investigations on all active duty service member deaths
 - Special emphasis on identifying sentinel infectious deaths
- Veterinary Surveillance
 - Existing animal/vector disease surveillance programs
 - Primary responsibility with USDA
 - DOD VETCOM provides surge support
 - No DoD-wide integrated electronic data sources
- Open Source Monitoring (Medical Intelligence)
 - Domestic (Dept of Homeland Security, National Biosurveillance Integration System)
 - International (Armed Force Medical Intelligence Center)





Putting it All Together

Sample PI Surveillance Report



Flu Surveillance and Detection

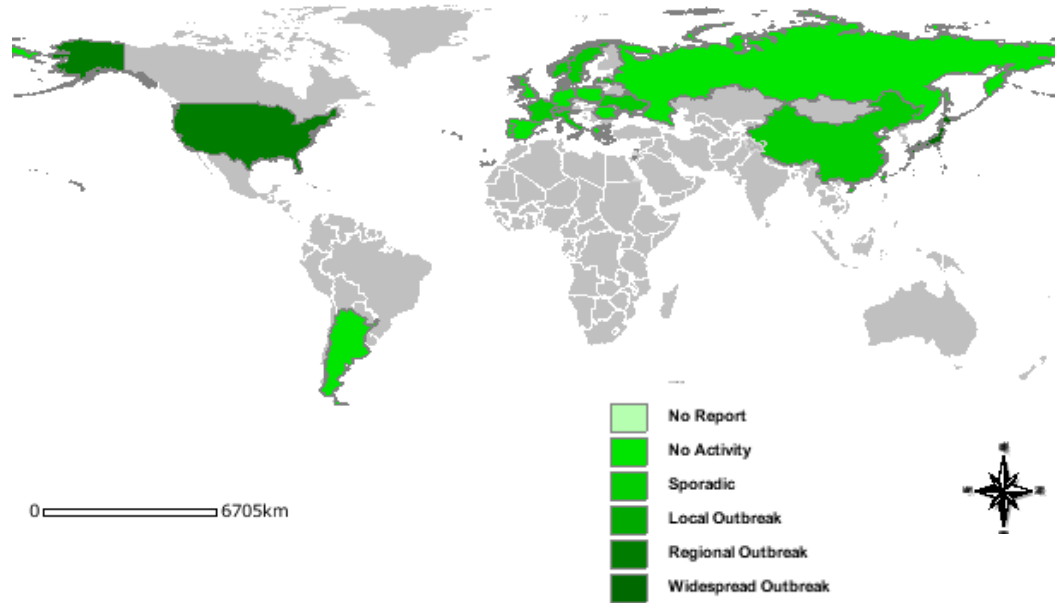
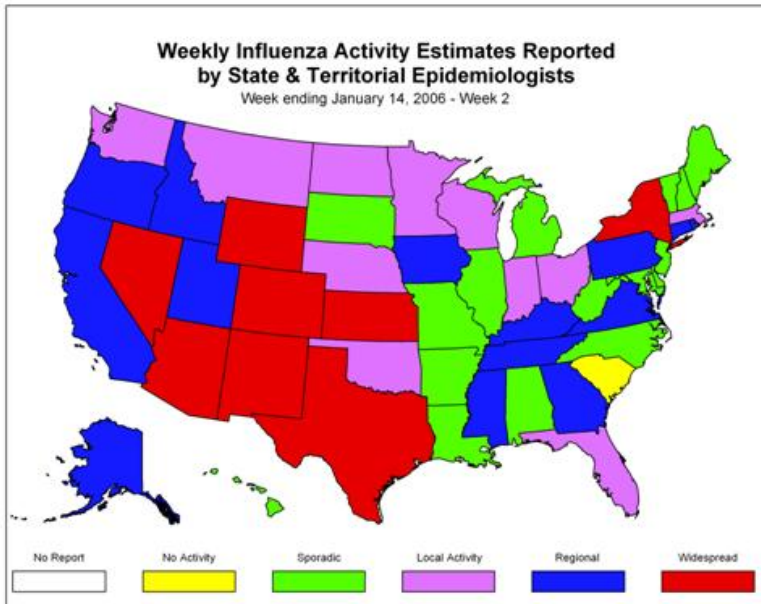
26 Jan 06 Report to ASD/HA

- Turkey human H5N1 situation
 - WHO reports 21 confirmed cases with 4 deaths, as of 18 Jan
 - All confirmed cases had close contact with poultry
 - ILI disease counts rising at Incirlik AB over the past week, but less than same period last year, ILI 16% of outpatient visits
 - USAFE expanding surveillance capability at Incirlik AB
 - Lab hood ordered for BSL-2 capability
 - Lab already has rapid flu test kits (determines A vs. B)
 - Incirlik AB is a DoD flu sentinel site, no positive specimens to date
 - Local public health staff routinely monitor ESSENCE
 - Enhanced surveillance will start with the confirmation of H5N1 in local poultry or with human-to-human transmission anywhere in Turkey
 - H5N1 AI currently poses a low health risk to US forces in Turkey
- Media reports of suspected cases (Iraq, Lebanon, Syria, Moldova, Russia) remain unconfirmed by WHO, AFMIC, or other authorities

Current WHO Phase of Pandemic Alert=Phase 3: a new influenza virus subtype is causing disease in humans, but is not yet spreading efficiently and sustainably among humans.

Surveillance and Detection

U.S and World Influenza Activity Maps (WHO, as of 21 Jan 06)



1. National Influenza Activity (**CDC**): <http://www.cdc.gov/ncidod/diseases/flu/weeklychoice.htm>
2. International Influenza-like Illness Activity (**WHO**): <http://gamapserv.who.int/GlobalAtlas/home.asp>





NBIC BioStatus Avian Influenza in Birds



UNCLASSIFIED
As of 24 Jan 06



Data Sources
ESRI ITIC
Open Source
130e02 - 34Jan2006 110237

Prioritized Area of Interest

-  Area of Interest
-  Confirmed H5N1 Event
-  Change from Previous Report



NBIC BioStatus Avian Influenza in Humans






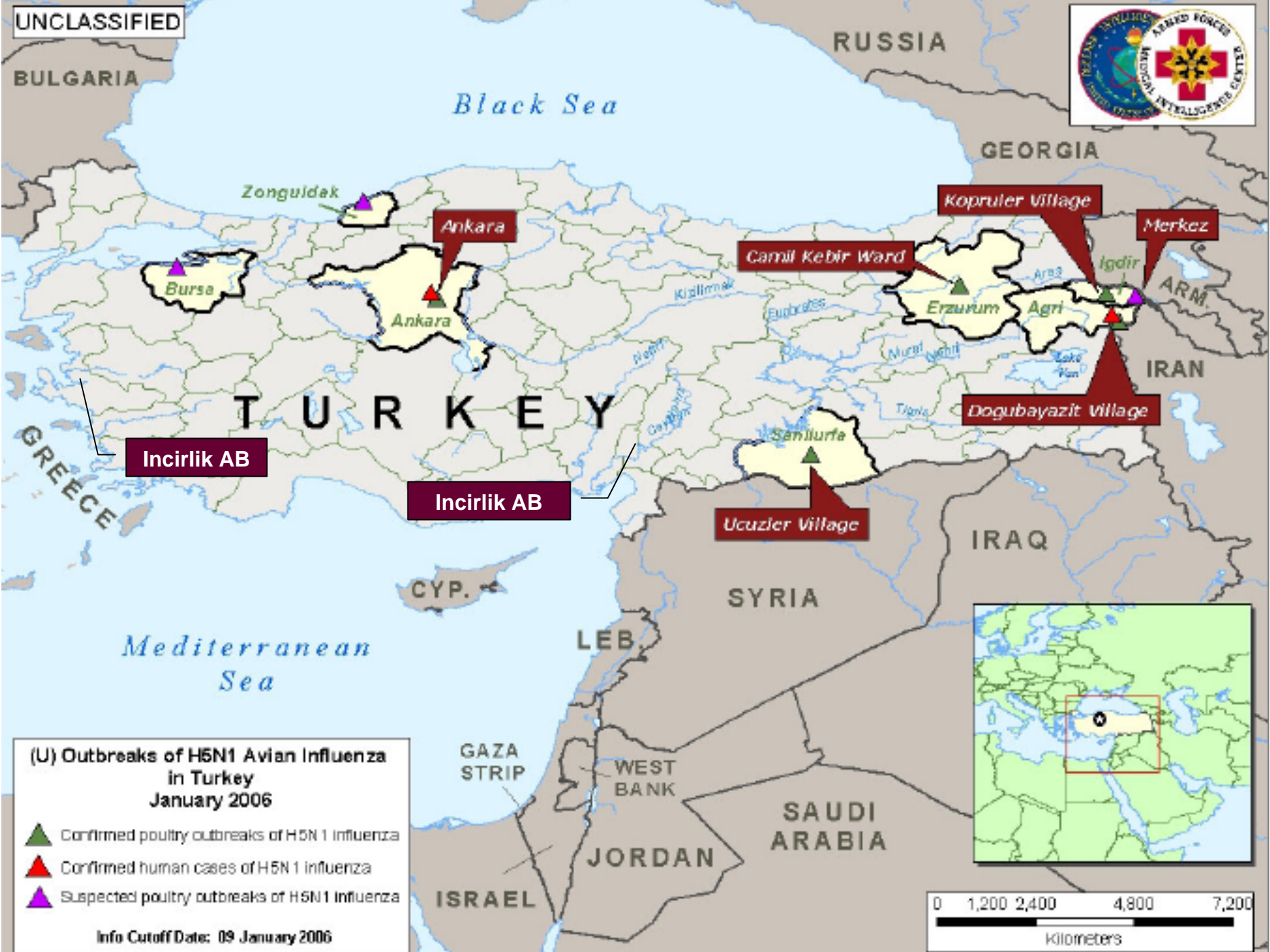
UNCLASSIFIED
As of 24 Jan 06



Data Sources
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Open Source
10Dec05 - 24Jan06 | 100027

Prioritized Area of Interest

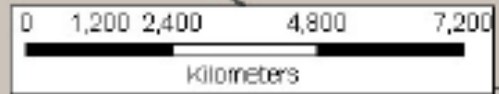
-  Area of Interest
-  Confirmed H5N1 Event
-  Change from Previous Report



(U) Outbreaks of H5N1 Avian Influenza in Turkey January 2006

- ▲ Confirmed poultry outbreaks of H5N1 influenza
- ▲ Confirmed human cases of H5N1 influenza
- ▲ Suspected poultry outbreaks of H5N1 influenza

Info Cutoff Date: 09 January 2006

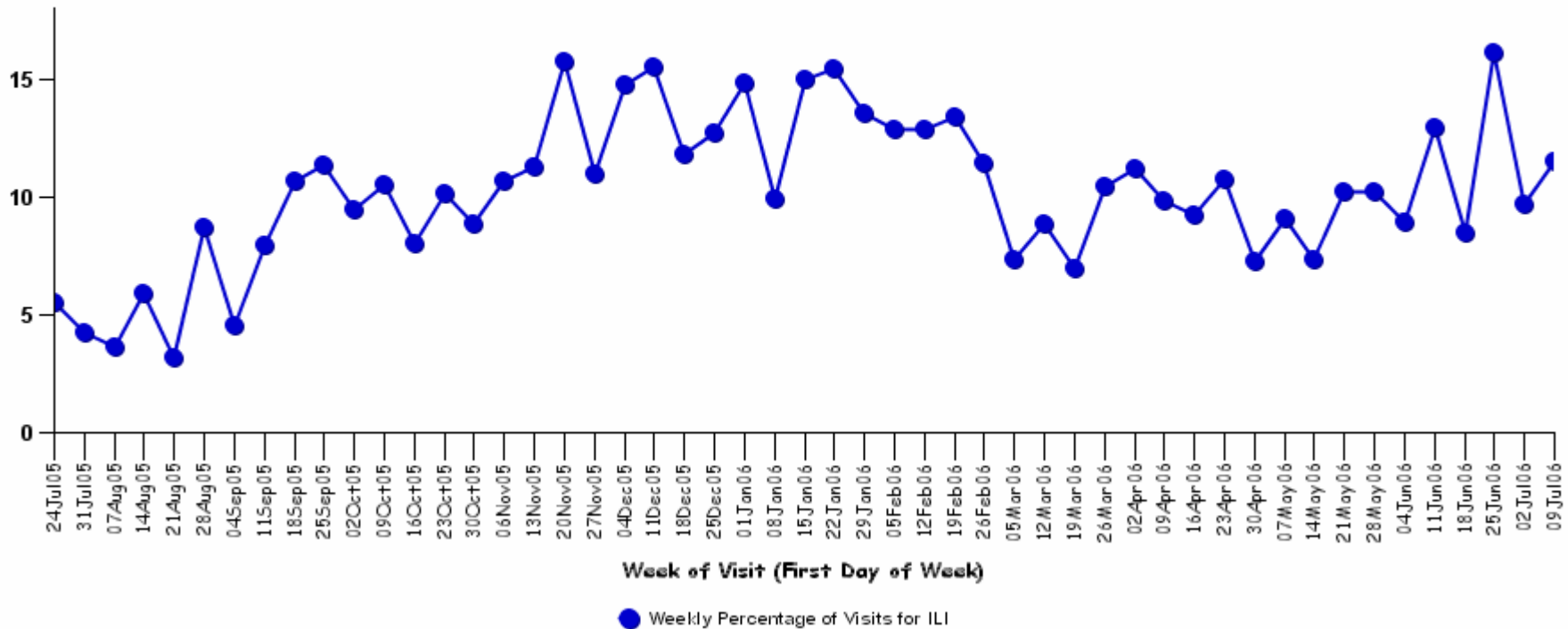


ILI as Percent of all Outpatient Visits

Jan 22: Turkey 16% vs. All MTFs 16%

ESSENCE IV - Medical Surveillance Weekly Percentage of Visits for ILI

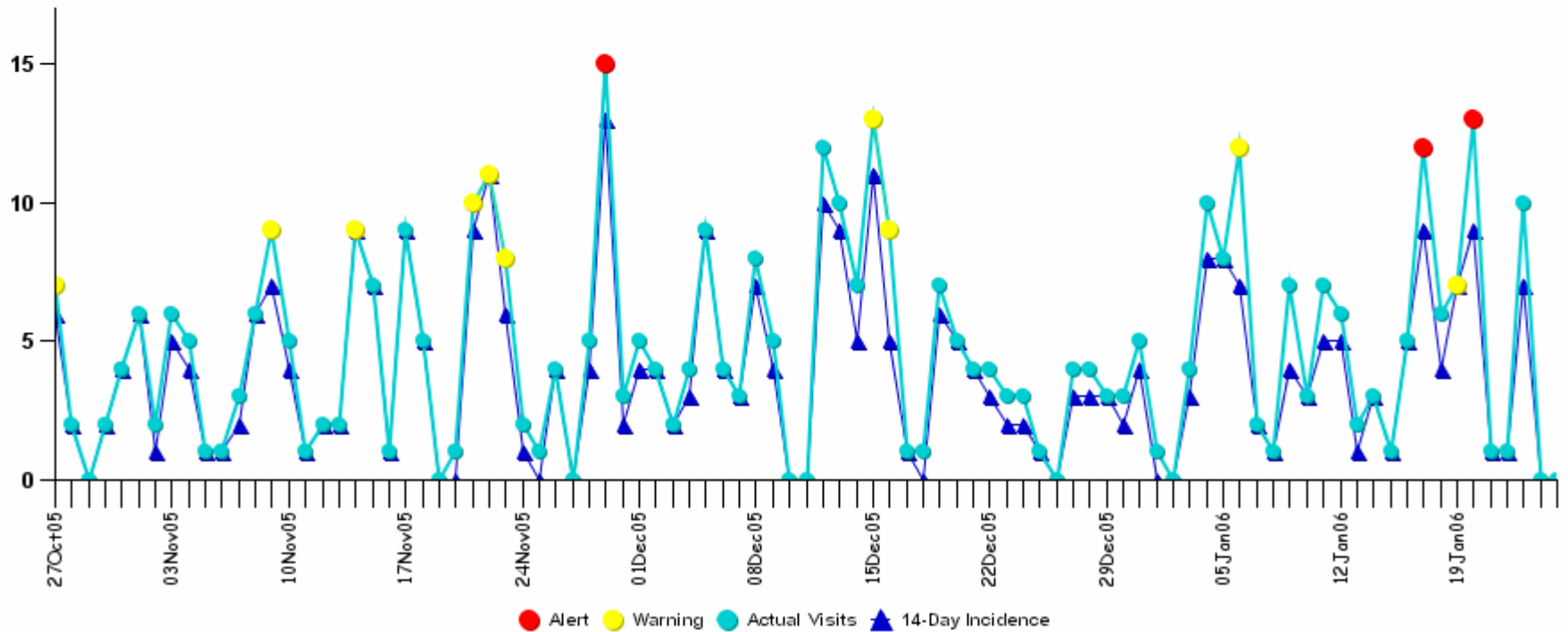
Weekly Percentage of Visits for ILI for OCONUS-Turkey



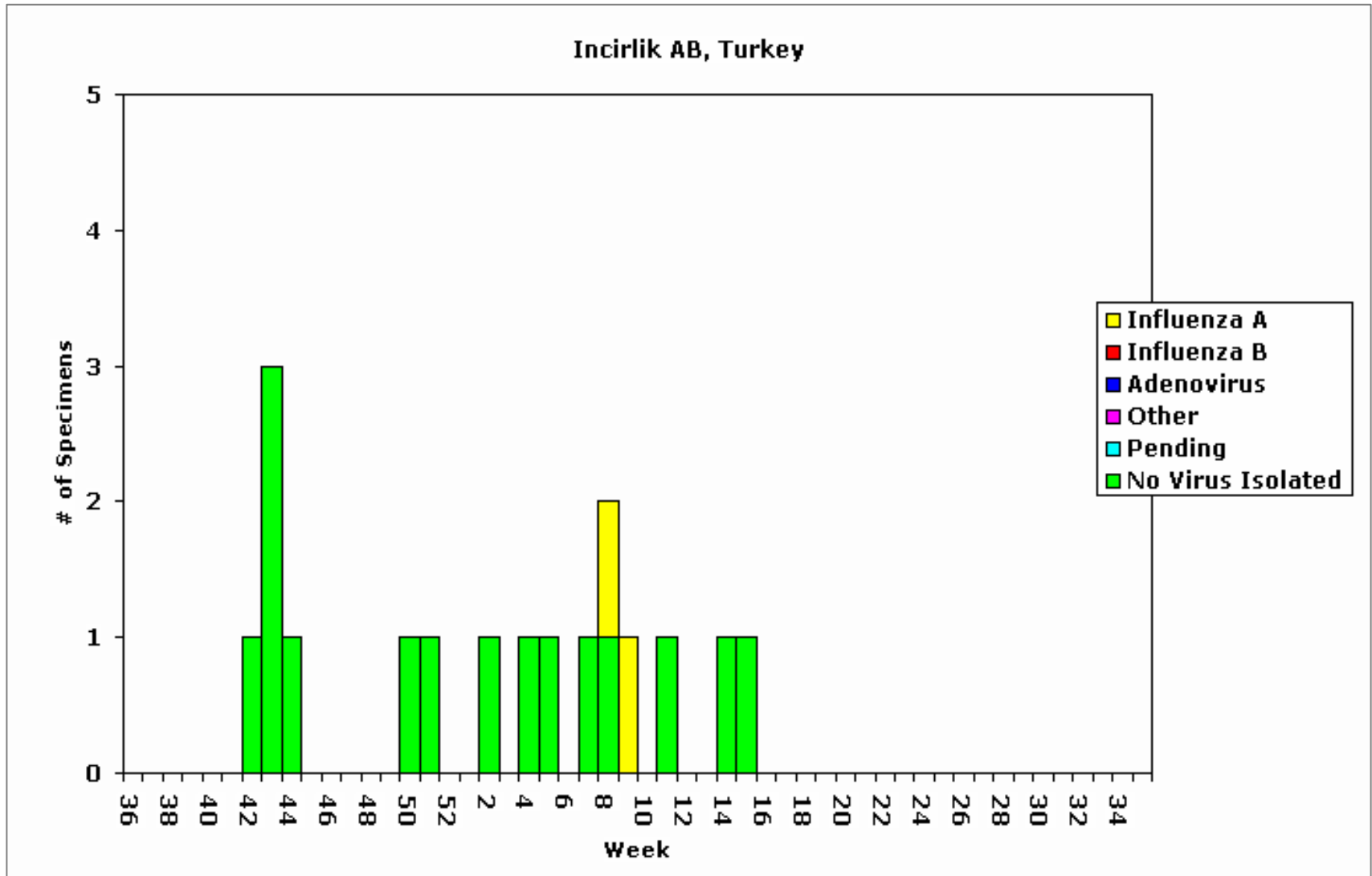
Site	OCONUS-Turkey
Data Source	ADM
MTF	All
Medical Grouping	ILI
Age	All
ClinicType	All
StartDate	27Oct05
EndDate	25Jan06

Figure Options
 ph

Daily Visit Counts



Site-specific Lab Results



Questions/Discussion & Backup Material



DOD Overseas Research Medical Unit Capabilities

- Armed Forces Research Institute of Medical Sciences (AFRIMS), Bangkok, Thailand
- Naval Medical Research Unit (NAMRU-2), Jakarta, Indonesia
- Naval Medical Research Unit (NAMRU-3), Cairo, Egypt
- Naval Medical Research Center Detachment (NAMRCD), Lima, Peru
- US Army Medical Research Unit-Kenya (USAMRU-K), Nairobi



AFRIMS (Bangkok)

- Ongoing surveillance in Bangkok, Kamphaeng Phet, Sangkhla Buri, and Kathmandu
- Starting surveillance in Nepal (nationwide), Sri Lanka (nation wide), and Manila and provide support to Embassies/consulates in Malaysia, Myanmar, Laos, Cambodia, and China
- Outbreak investigation capability
- Lab: BSL-2, rapid bedside test, rapid RT-PCR (including H5)
 - Influenza samples submitted to AFIOH for further characterization
 - Developing cell culture (pending funding)
 - Plan veterinary diagnostics (pending funding)



NAMRU-2 (Jakarta)

- Surveillance at 20 sites in Indonesia
 - 2,182 samples, 383 positive in FY05
 - Proposal to DoD HA for additional programs in Cambodia and Laos
- Lab: BSL-2, rapid RT-PCR (including H5), serologic subtyping by hemagglutination inhibition, and cell culture
 - Isolates sent to CDC for confirmation and sequencing
- Outbreak response support to PACOM AOR, major exercises (Cobra Gold), and regional nations



NAMRU-3 (Cairo)

- Surveillance in numerous Middle Eastern, African, and Central Asian countries
 - Directly processed 3658 samples and isolated more than 750 influenza viruses, including 83 influenza A and 423 influenza B, in FY05
- WHO designated Eastern Mediterranean Region (EMRO, 23 nations) influenza laboratory
- Lab: BSL-3+, rapid RT-PCR (including H5), serologic subtyping by hemagglutination inhibition (developing microneutralization capability), molecular sequencing, and cell culture
 - Subset of positive isolates shared with CDC for confirmation and further testing
- Outbreak response support to CENTCOM AOR, major exercises (Bright Star), and regional nations



NMRC-D (Lima)

- 3,000 human specimens over last 5 years from Peru, Bolivia, Argentina, Ecuador, Colombia, and Venezuela.
- Lab: BSL-3, capability to do culture work
 - Viral isolates go to AFIOH for confirmation and sequencing



USAMRU-K (Nairobi)

- No active influenza surveillance program
 - Surveillance protocol in development
- Lab: BSL-2?, viral isolation in tissue culture, no molecular sequencing.



DOD Domestic Research Laboratory Capabilities

- Air Force Institute for Operational Health (AFIOH)
- Armed Forces Institute of Pathology (AFIP)
- Naval Health Research Center (NHRC)
- US Army Medical Research Institute for Infectious Diseases (USAMRIID)
- Walter Reed Army Institute of Research (WRAIR)
and Naval Medical Research Center (NMRC)



Antiviral Research & Development Efforts--USAMRIID

- Drug screening during SARS outbreak:
 - 350,000 compounds tested in a cell-based assay (3 months, 6 personnel)
 - 32 promising compounds identified; one taken through preclinical development by commercial partnerUSAMRIID also developed a diagnostic assay and non-human primate model for *in vivo* testing.
- Antisense technology:
 - Demonstrated *in vitro* efficacy of antisense technology
 - Highly stable backbone and genetic sequences that are highly conserved across influenza A viruses including H5N1
 - May provide broad therapeutic approach for several influenza viruses



WRAIR/NMRC

- Developing FDA approved point-of-care or hospital-based diagnostic assays for naturally occurring infectious diseases of military importance
- WRAIR chemical library of >400K compounds
- Lab: BSL-3



Lab Capability Comparison Table

	BSL	H5 PCR	HI	Sequencing	Culture
AFIP					
AFIOH	3	Y	Y	Y	Y
AFRIMS	2	Y			
NAMRCD	3				
NAMRU-2	2	Y	Y		Y
NAMRU-3	3	Y	Y		Y
NHRC	3	Y	Y	Y	Y
USAMRIID	4				
USAMRU-K	2				
WRAIR/NMRC	3				

DOD Laboratory Response Network

More Labs with Capability to ID Influenza Virus

- Walter Reed Army Medical Center (AMC), Washington, D.C.
- Dwight David Eisenhower AMC, Augusta, GA
- Brooke AMC, San Antonio, TX
- Madigan AMC, Ft. Lewis, WA
- Tripler AMC, Honolulu, HI
- Landstuhl AMC, Germany
- 121st General Hospital, Seoul, Korea
- Navy Environmental & Preventive Medicine Unit (NEPMU) 5, San Diego, CA
- NEPMU-6, Pearl Harbor, HI
- Wright-Patterson Medical Center, Dayton, OH
- Wilford Hall Medical Center, San Antonio, TX



ESSENCE

- ESSENCE = Electronic Surveillance System for the Early Notification of Community-based Epidemics
- Web-based surveillance interface developed to alert public health authorities of disease outbreaks
- Temporal/spatial analyses of outpatient health events
 - Military treatment facilities (MTF)
 - 121 Army, 110 Navy, 80 Air Force and 2 Coast Guard bases
 - Maps ICD-9-CM codes into categorical (syndrome) groupings
 - Laboratory confirmation not required
- Automatic alerts generated daily, system-wide data updated every 8 hours and available for ad hoc queries



Data Sources for ESSENCE

Garrison vs. Theater

- Ambulatory data
 - Outpatient visits to military treatment facilities
 - Both garrison and in-theater (selected sites)
 - ICD9 and CPT codes
- Pharmacy data
 - Prescriptions ordered for military beneficiaries
 - Respiratory and Gastrointestinal syndromes only
- Local civilian hospitals (9 sites only)
 - Emergency room chief complaints



Syndromic Systems Can . . .

- Provide early detection of outbreaks
 - Earlier than most existing electronic systems
- Provide epidemiologic tools to assist the outbreak investigation
- Provide information for leaders and risk communicators
- Decrease workload for labor intensive active systems
- Prompt more accurate diagnostic testing



Syndromic Systems Cannot . . .

- Detect every outbreak early, especially those with
 - Few cases, or
 - Short, explosive incubation period
- Decrease morbidity/mortality every time
 - Best for diseases with longer incubation periods where effective interventions exist
- Tell you the causative agent
 - Lots of nonspecific information will not give you specific information
- Investigate the outbreak for you
 - Public health professionals remain the important link

