Discovering the New Frontier of Syndromic Surveillance: A Meaningful Use Dialogue- Department of Veterans Affairs Implementation

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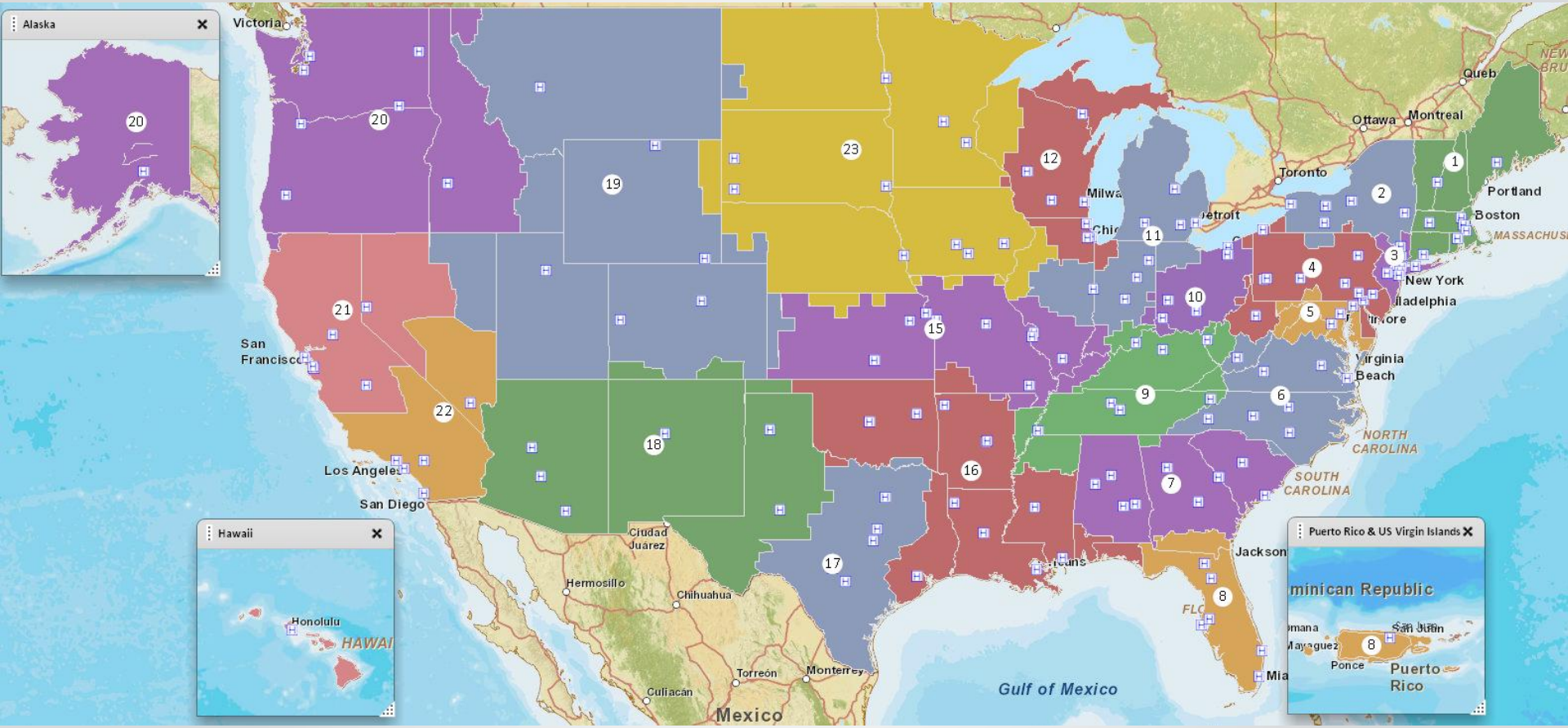
HAIISS Healthcare Associated Infection & Influenza Surveillance System

VA HEALTH CARE Defining EXCELLENCE in the 21st Century

Veterans Health Administration (VHA)

- Nation's largest health care system, largest provider of graduate medical education and major contributor to medical research
- Current FY medical budget is $51.5 billion
- FY10: 8.34 million enrollees; 6 million uniques treated; over 75 million outpatient visits; ~680,000 inpatient admissions, 260 million lab tests
- VHA has 277,000 employees (including over 20,000 MDs and 53,000 RNs)

VA Acute Care Hospitals



VHA currently has 152 medical centers, 974 outpatient clinics, 98 residential rehabilitation programs and 133 Community Living Centers (nursing homes)

VHA Office of Public Health Surveillance & Research (OPHSR)

- ✓ Public Health/Epidemiologic Investigations
- ✓ Surveillance
  - ✓ Situational awareness for field staff, VA leadership, CDC and DoD partners
- ✓ Development of software for electronic Healthcare-Associated Infection and Influenza Surveillance System (HAIISS)
  - ✓ Includes two software applications: ESSENCE biosurveillance system and QC Pathfinder Healthcare-associated infection surveillance system
  - ✓ Designed to meet the needs of both national level users & facility-level clinical users (IPs, Hospital epidemiologists, ID physicians, pharmacists)

Benefits of HAIISS

- ✓ Provides VA an enterprise solution for monitoring healthcare acquired infections, biosurveillance, antimicrobial resistance and stewardship
- ✓ Provide frontline users with real time tools to improve Veterans' care
- ✓ Reduces or eliminates need for manual surveillance and allows for surveillance in additional clinical settings (outpatient, general medicine wards) with current staffing resources
- ✓ Provides aggregated data to facilitate quality improvement initiatives
- ✓ Satisfies Meaningful Use criteria for public health reporting; and HSPD-21 for linkage of federal agency biosurveillance capabilities; links and aligns VA infection surveillance with DoD and HHS-CDC

Syndromic Surveillance in VHA

- First version of VA ESSENCE launched in 2005 but not widely used
- OPHSR became stewards of VA ESSENCE in 2007 as part of the HAIISS program and has been working with JHUAPL to make enhancements and upgrades on a regular basis
- Currently in beta testing at 8 sites and bringing additional national users on board

VA ESSENCE Data Domains

- ✓ Majority of existing ESSENCE data elements come from VistA (VA electronic medical record system)
  - ✓ Outpatient and Emergency Department data
  - ✓ Inpatient data
- ✓ Telephone call center data

Ambulatory Data

Currently Available Ambulatory Data Elements

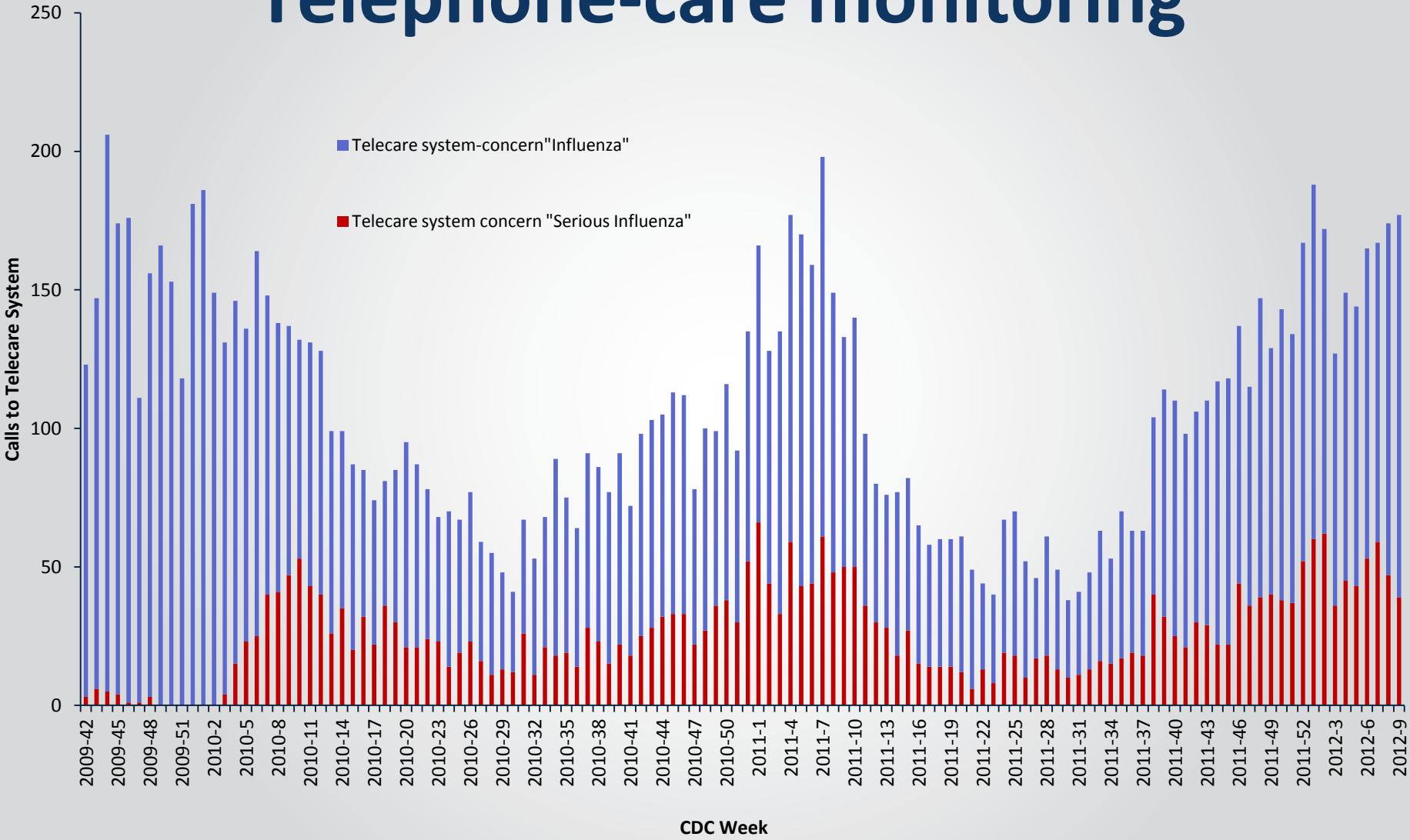
- Patient demographics (e.g. age, sex, eligibility, homelessness, death indicator)
- Visit information (e.g. ICD-9 diagnosis codes, E&M codes, CPT procedure codes, clinic designation, appointment type)
- Telephone call center (start and end chief complaint, system-designated concern and ICD-9 code, recommended follow-up interval and point of service)
- Time/Space (e.g. visit or call date/time, facility/region, patient zip, etc.)

Some Uses of Ambulatory/ED Data

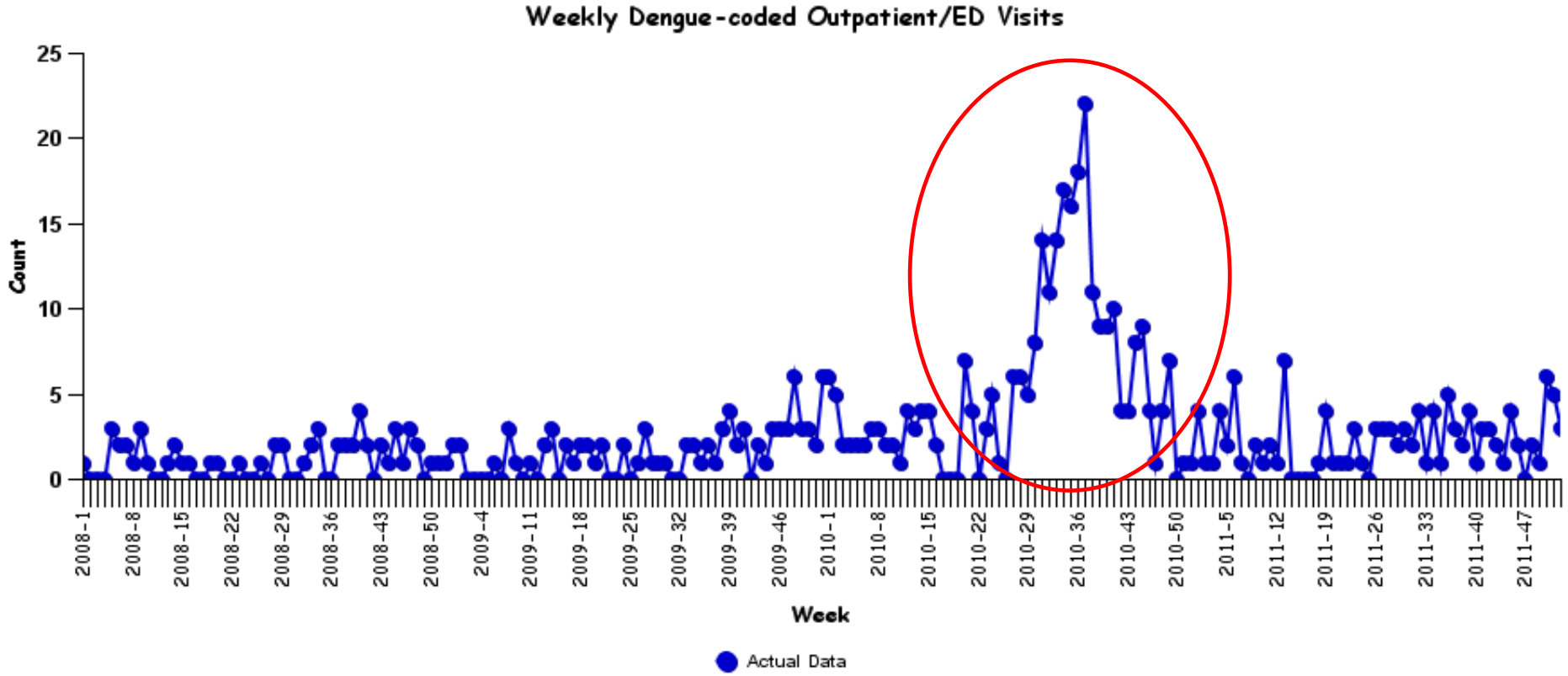
- Routine infectious disease surveillance (e.g. influenza)
- Create line listings/reports of patients with a specific diagnosis or procedure
- Tracking & situational awareness of emerging diseases and organisms of epidemiologic significance
- Outbreak/event detection/special analyses (patients and employees)
- Examine information related to disease severity and unusual clusters
- Vaccination monitoring
- Reportable Communicable Disease (RCD) identification
- GIS mapping & data visualization

VA Outpatient/ED Visits for Influenza-like Illness (ILI), 2008-2009 through 2011-2012 Influenza Seasons

Telephone-care monitoring

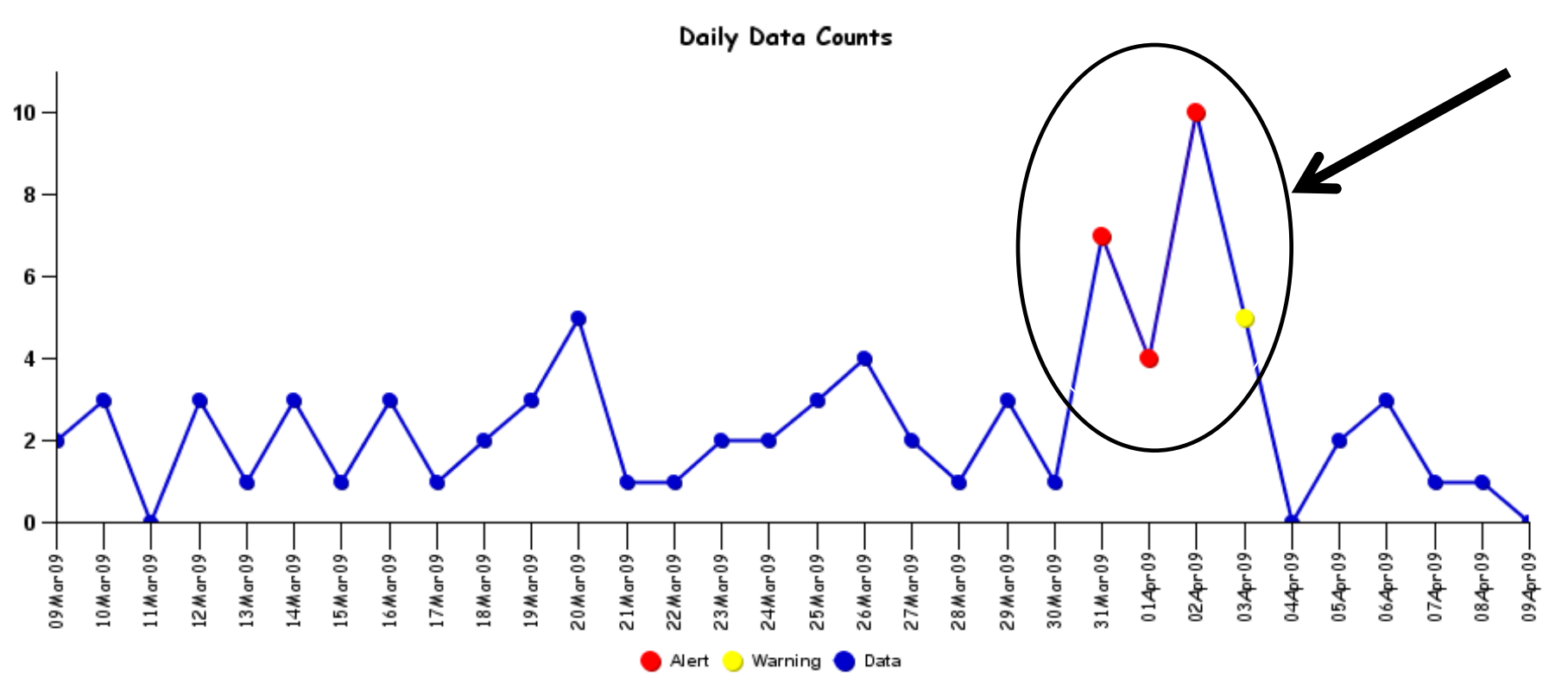


Dengue surveillance



Outpatient/ED Dengue-coded visits Jan 2008-Dec 2011

Detection a GI syndrome outbreak among Veterans attending a VA Winter Sports Clinic



Deepwater Horizon Oil Spill Analysis

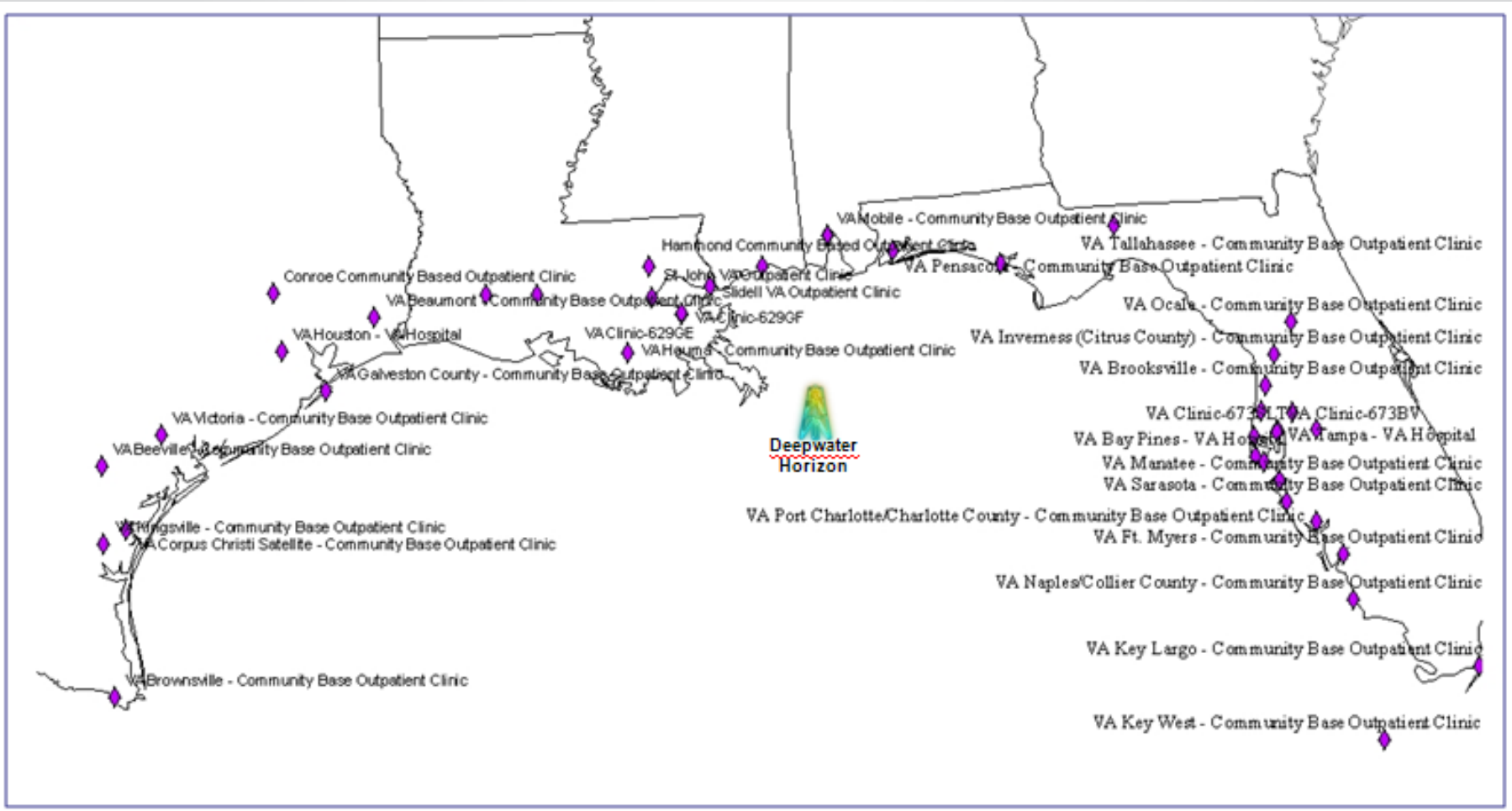


Figure 1. Department of Veterans Affairs, Veterans Health Administration health care facilities along the US Gulf Coast

Gulf Oil Spill Analysis

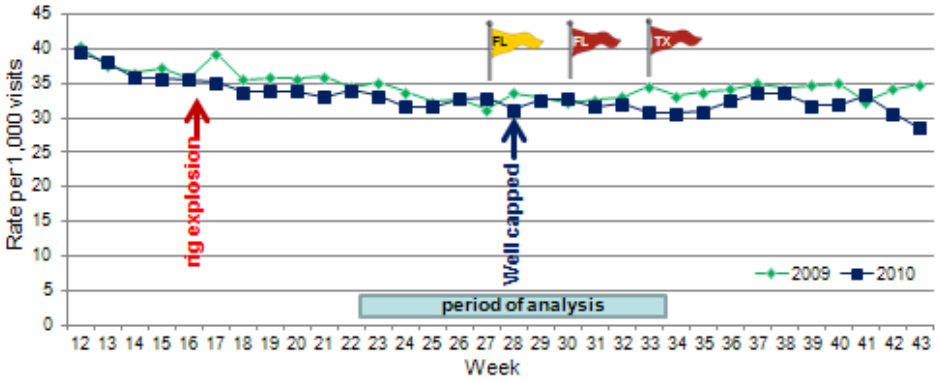


Figure 2. Rate of diagnosis of respiratory conditions- (excluding asthma)

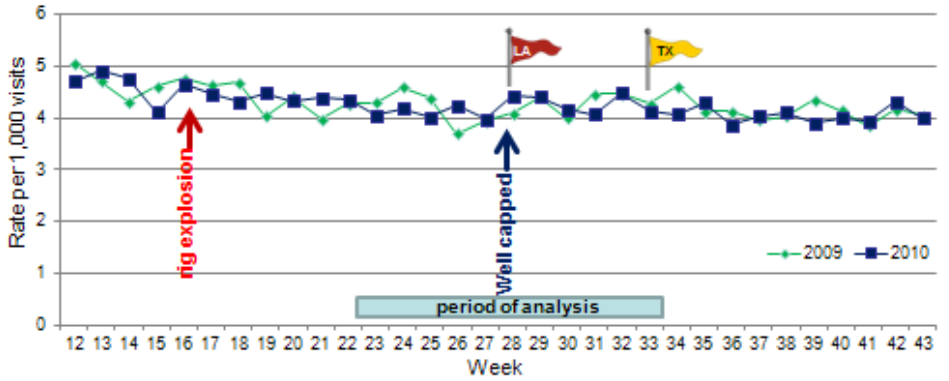


Figure 3. Rate of diagnosis of asthma related conditions

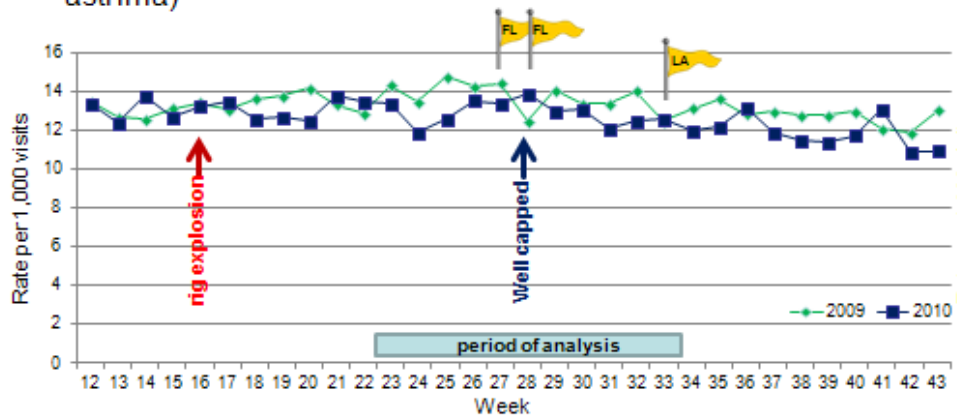


Figure 4. Rate of diagnosis of gastrointestinal related conditions

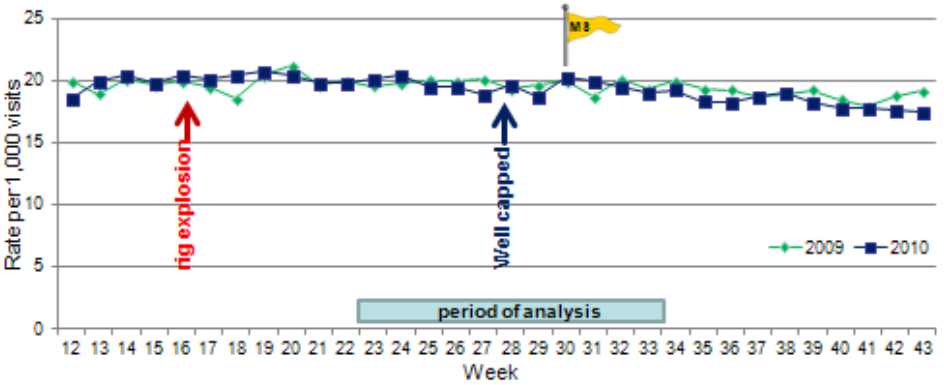
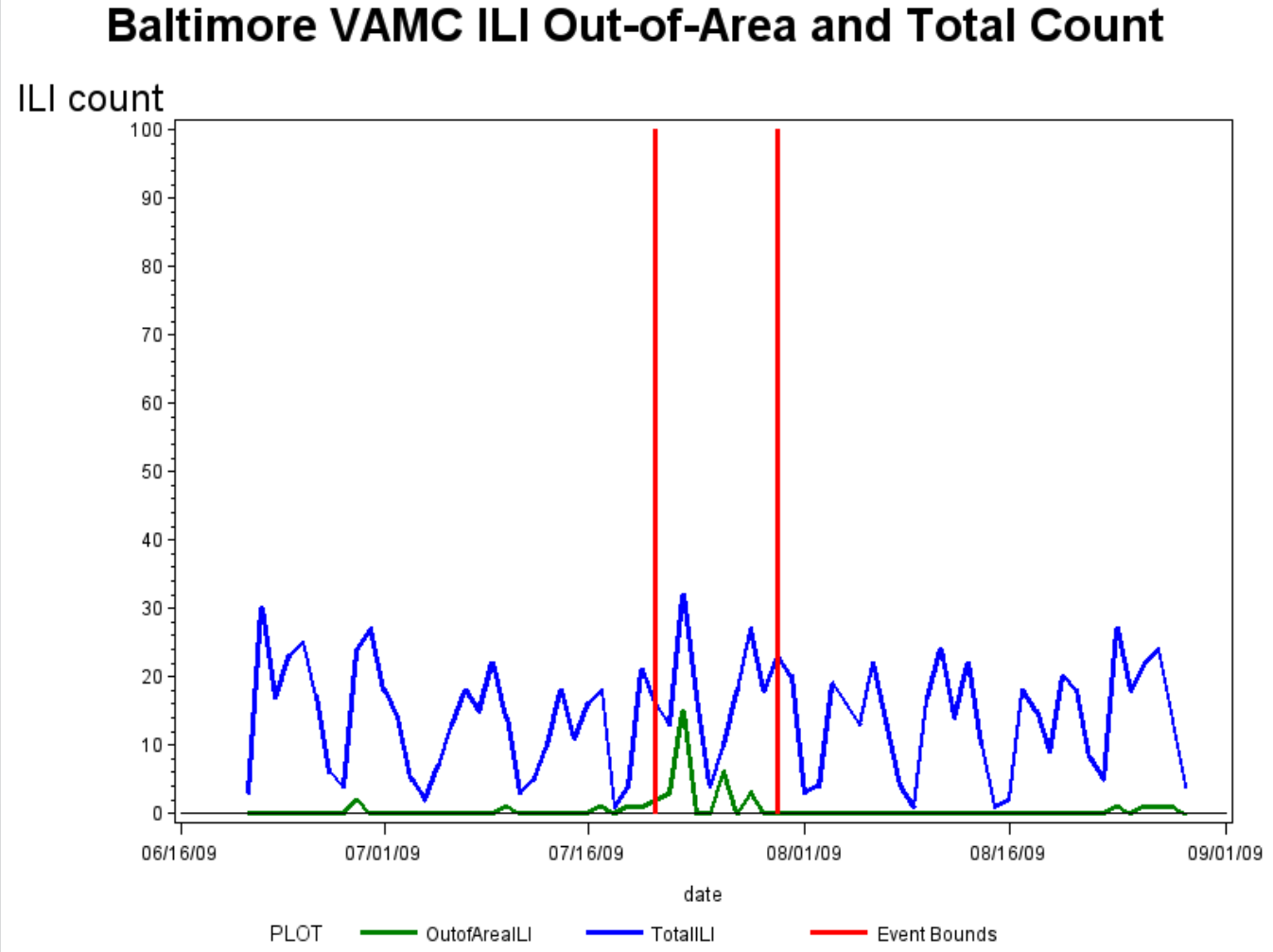
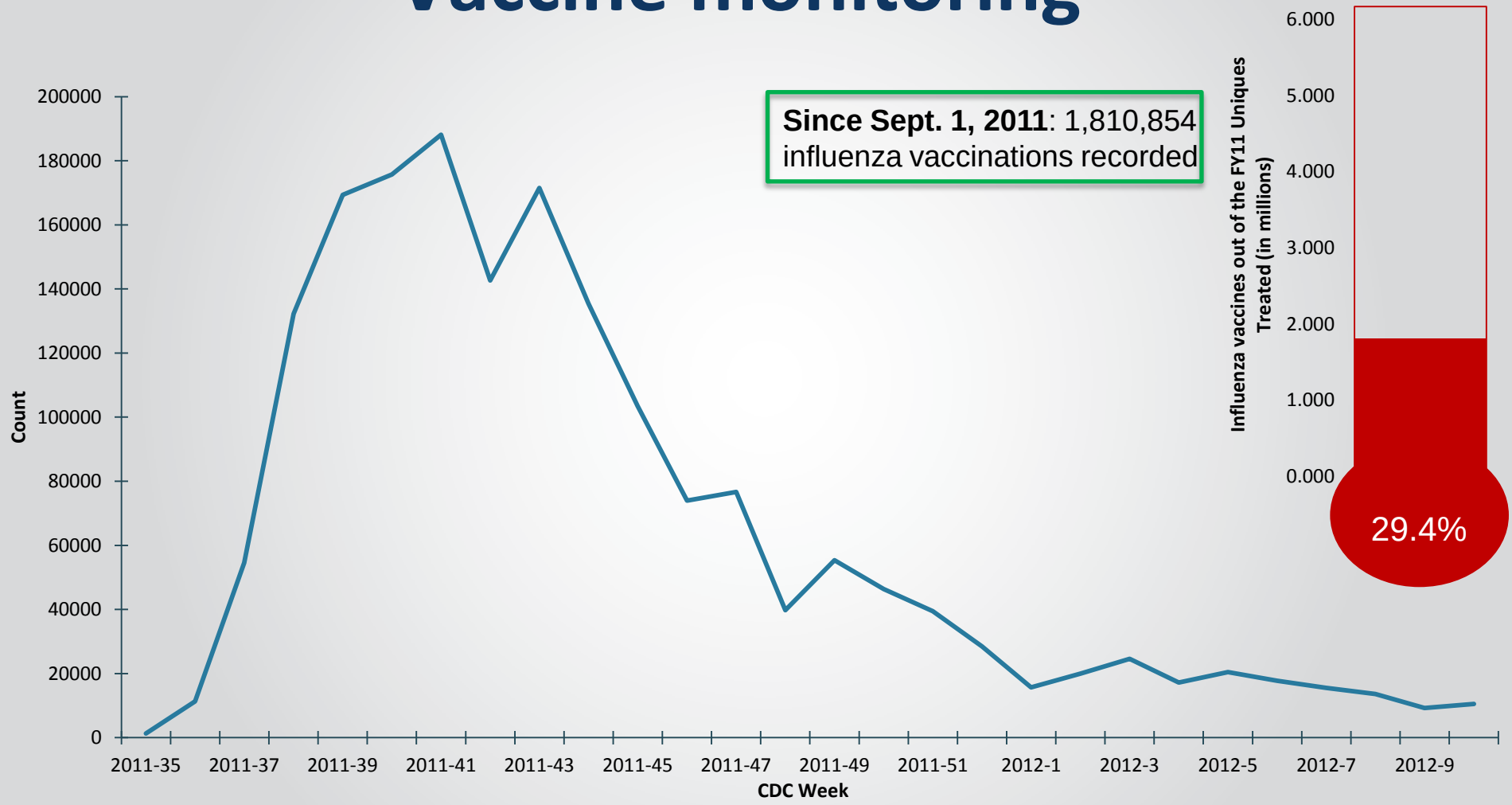


Figure 5. Rate of diagnosis of environmental exposure related conditions

Unusual cluster detection

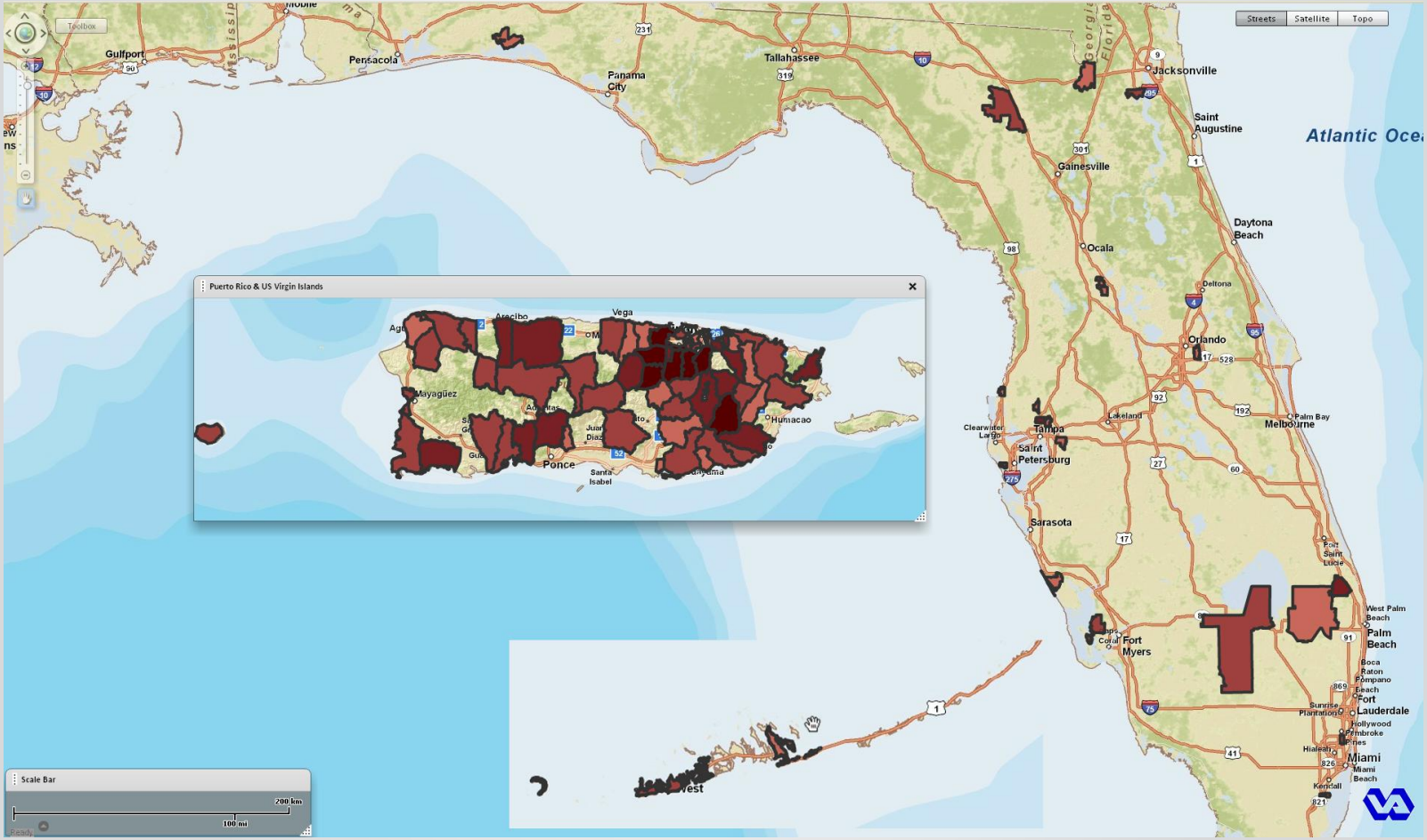


Vaccine monitoring

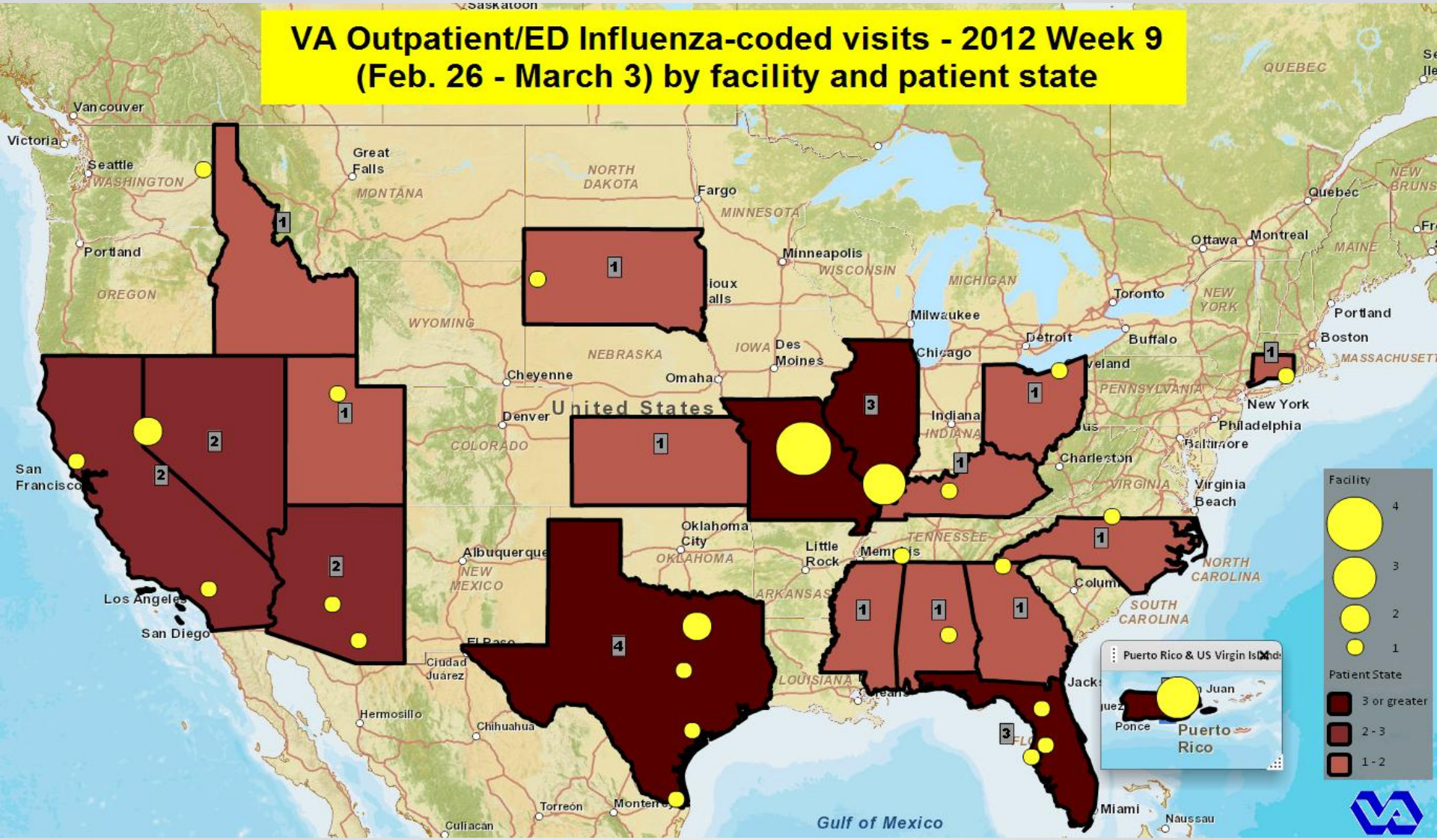


Mapping & Data Visualization

Outpatient/ED Dengue-coded visits by patient zip code, VISN 8, July 2010-Jan 2012



VA Outpatient/ED Influenza-coded visits - 2012 Week 9 (Feb. 26 - March 3) by facility and patient state



VA Telephone Care Influenza-coded calls - 2012
Week 9 (ending March 3) by patient zip code

Enhancing ambulatory data

- Severity alerts (e.g. bounce-backs, severe E&M codes, extreme spikes)
- Unusual cluster detection (employee & out of catchment clusters)
- Time of arrival alerts
- Hierarchical alert filters & user customizations
- Limiting rare syndrome alerts to ED/urgent care settings

Future ambulatory data elements

- Vitals (partial, in testing)
- Pharmacy (partial, in testing)
- Laboratory (partial, in testing)
- Radiology
- Kiosk data

Inpatient Data

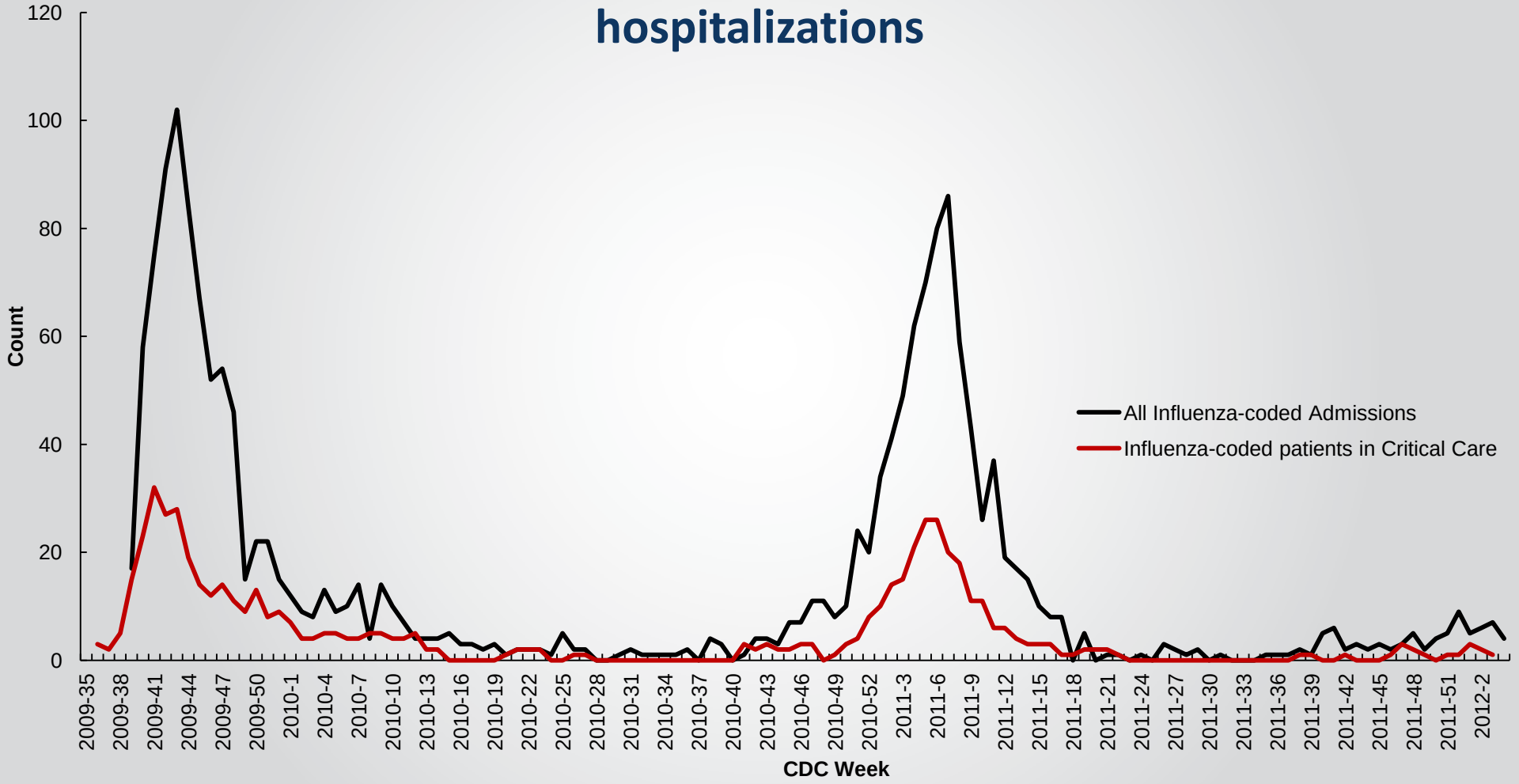
Currently Available Inpatient Data Elements

- Patient demographics
- Acute, Observation, Extended Care & some non-VA
- Diagnosis information (admitting ICD-9 code, principal & up to 13 discharge diagnosis codes, DRGs)
- ICD-9 Surgery & procedure data
- Bedsection (i.e. ward location)
- Time/Space (e.g. admission/discharge date & time, length of stay, facility/region, patient zip, etc.)
- Disposition

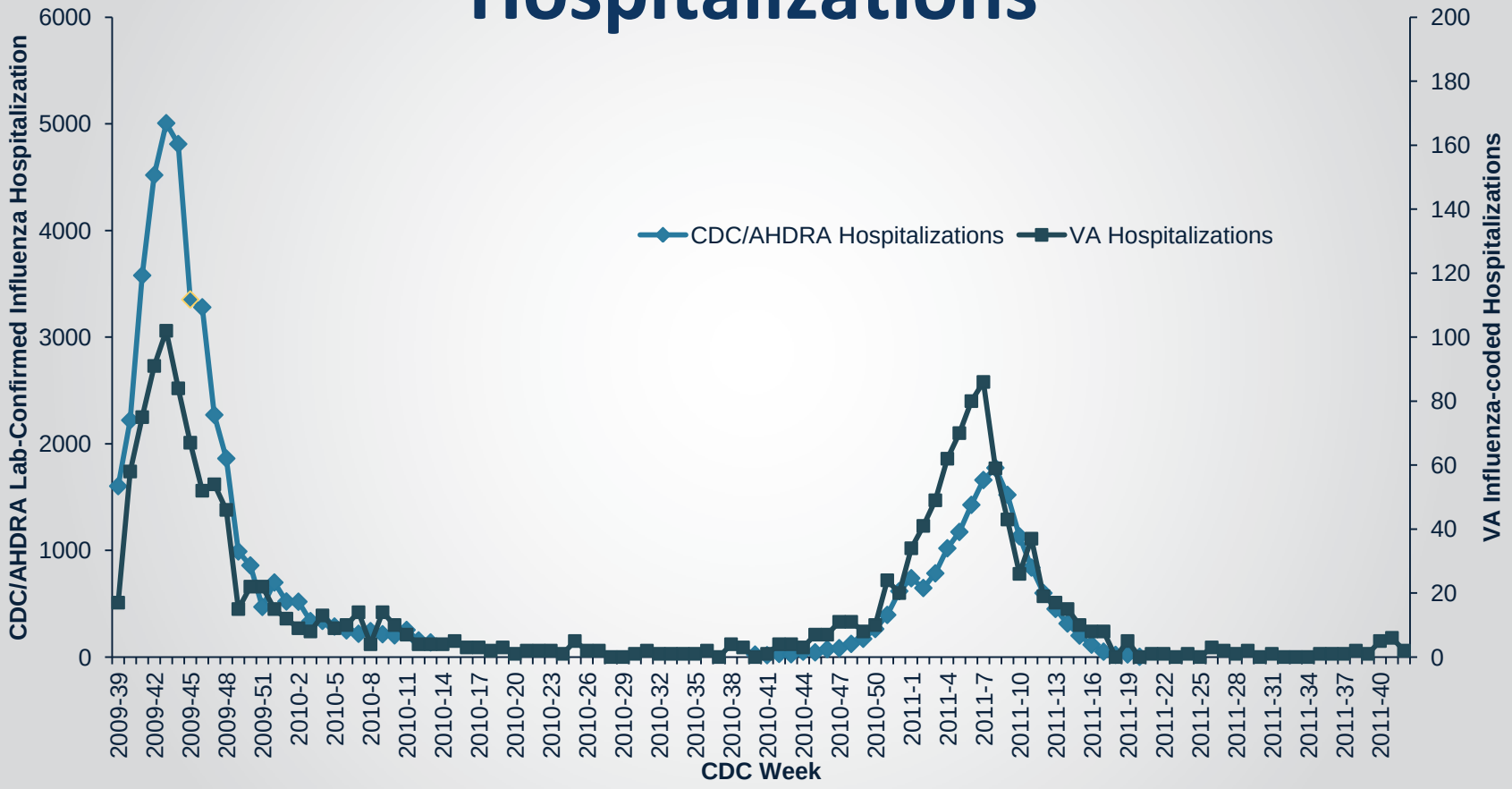
Some Uses of Inpatient Data

- Routine infectious disease surveillance (e.g. influenza)
- Examine information related to disease severity
- Tracking & situational awareness of emerging diseases and organisms of epidemiologic significance
- Create line listings/reports of patients with a specific diagnosis
- Monitoring surgeries and procedures of interest
- RCD identification
- GIS mapping & data visualization

Inpatient Influenza Surveillance – Influenza-coded hospitalizations

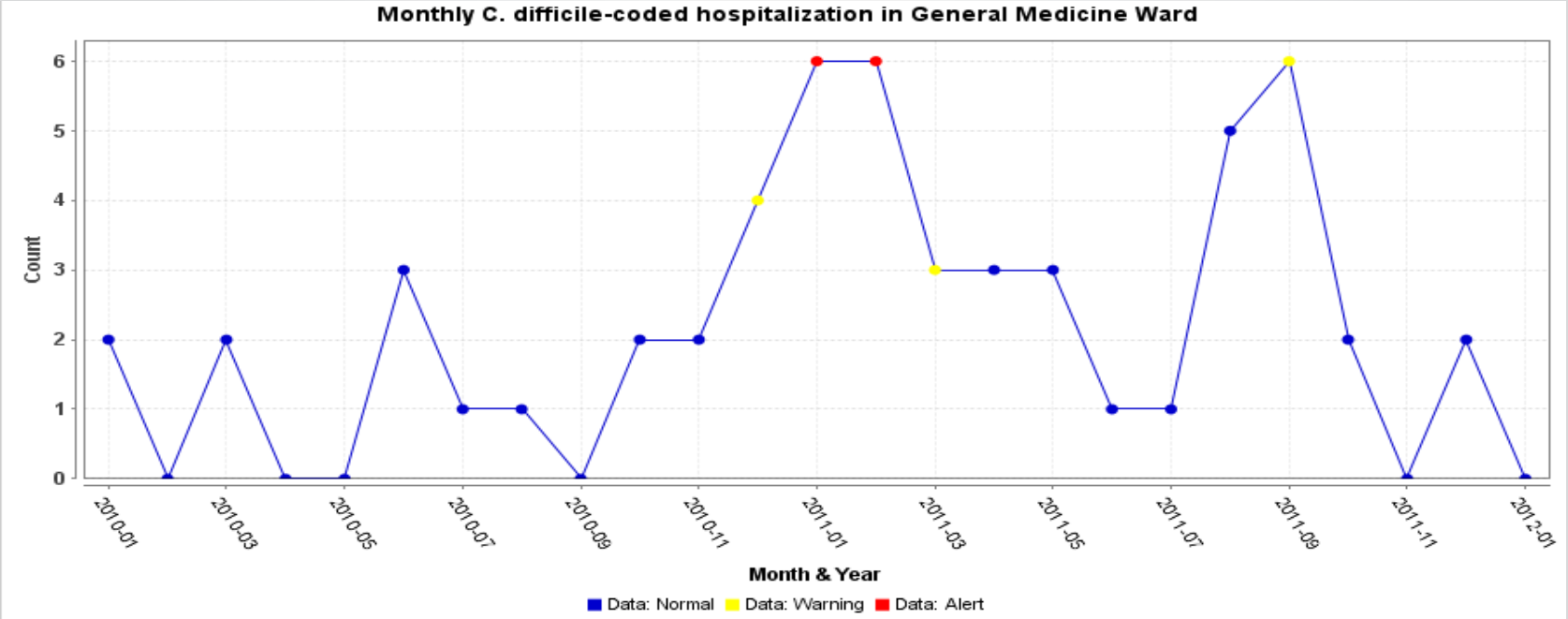


Comparison of VA and CDC/AHDRA Influenza Hospitalizations



Peak activity correlated well temporally between the two systems

C. difficile Hospitalizations at a VA Hospital

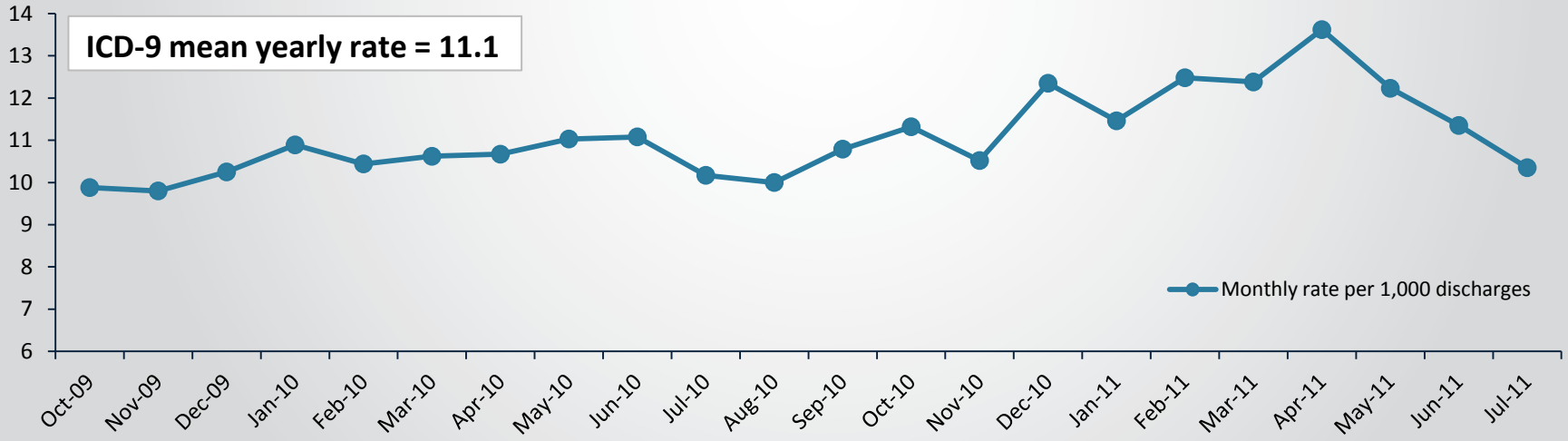


Data Details

Date	Age	Sex	BedSectDesc	Date of Discharge	TypeofDischargeDesc
23Aug11	85	Male	GEN(ACUTE) MED	2011-08-30 00:00:00.0	DEATH NO AUTOP
22Feb11	56	Male	GEN(ACUTE) MED	2011-03-10 00:00:00.0	DEATH NO AUTOP
24Feb11	72	Male	GEN(ACUTE) MED	2011-03-08 00:00:00.0	DEATH NO AUTOP
22May11	66	Male	GEN(ACUTE) MED	2011-05-28 00:00:00.0	IRREG
09Dec11	64	Male	GEN(ACUTE) MED	2011-12-21 00:00:00.0	REG
10Dec11	65	Male	GEN(ACUTE) MED	2011-12-15 00:00:00.0	REG
05Oct11	41	Male	GEN(ACUTE) MED	2011-10-07 00:00:00.0	REG

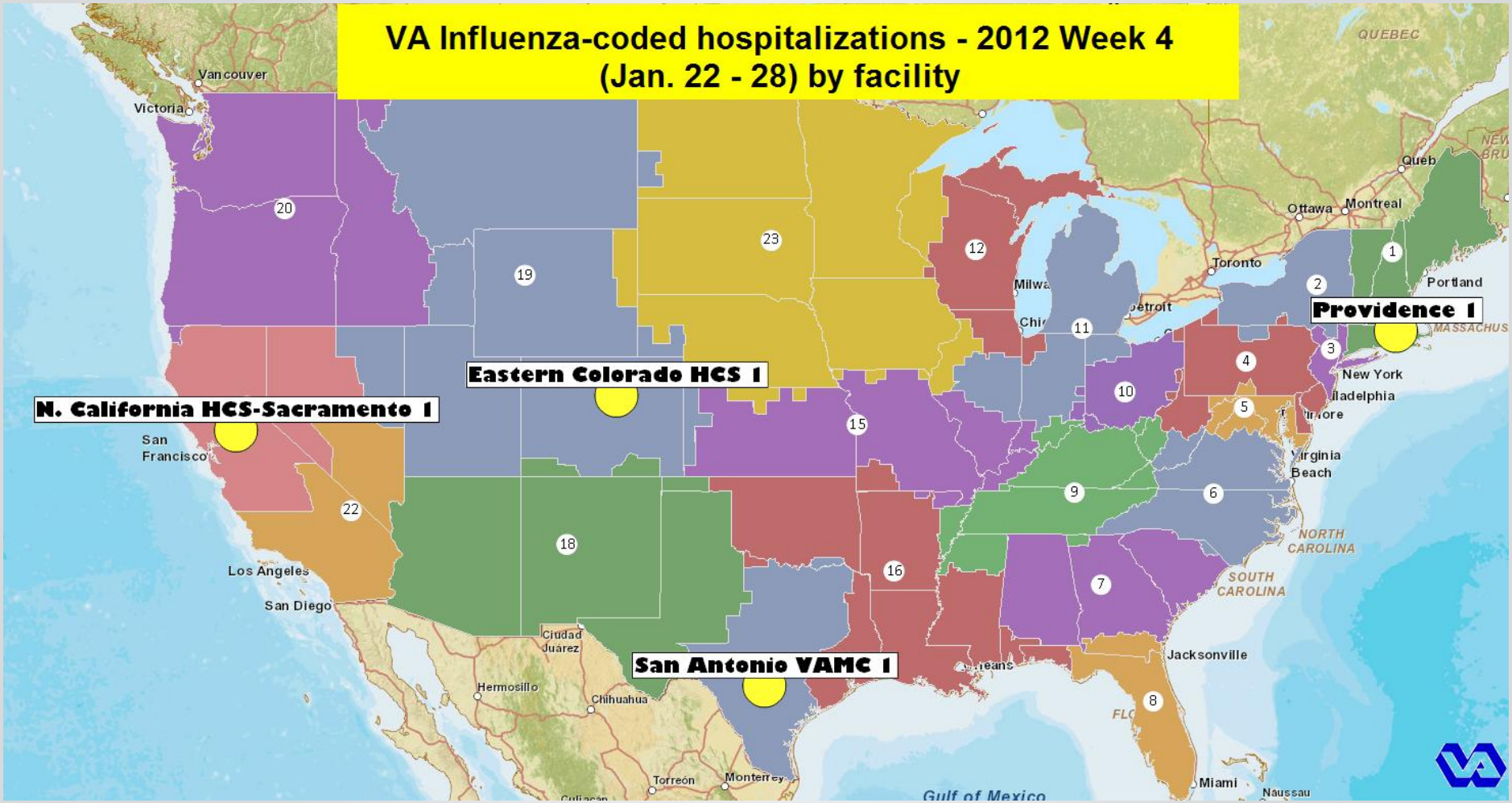
Clostridium difficile Hospitalizations

- ✓ Oct. 2009-July 2011: 12, 501 CDI-coded hospitalizations (denominator 1.13 million total hospitalizations)
- ✓ Mean rate of 11.1 per 1,000 discharges
- ✓ CDI rate for FY2010 was 108/100,000 population*



*Based on total enrollees in VA Health Care in FY10 of 6.000 million

Mapping & Data Visualization



Enhancing Inpatient Data

- In the process of developing inpatient specific algorithms
- Examining the utility of monitoring by DRGs rather than traditional syndrome groups of ICD-9 codes
- Dealing with the limitation of inpatient data timeliness

Mock up of Inpatient Dashboard

VISN 21 Inpatient Admissions, Past 14 days		Summary Measures				OPHSR DRG Categories											
Facility	Summary:	Total Inf Patient Count (adm within 14 days)	Deceased Patients	Patients with Length of Stay > 5 Days	High Severity Procedure Codes	Mech Vent/ Severe Resp	Respiratory	GI	Other/ Gen. Inf Diseases	Infectious Neuro	BSI (Blood stream Inf)	Infectious Ortho	UTI (Urinary Tract Inf)	Skin & Soft Tissue Infections	Poisoning	HIV	SSI (Surgical Site Inf)
640_VA Palo Alto HCS-VAMC Palo Alto, CA Div.	visit count																
	nr alerts																
662_SAN FRANCISCO VA Medical Center	visit count																
	nr alerts																

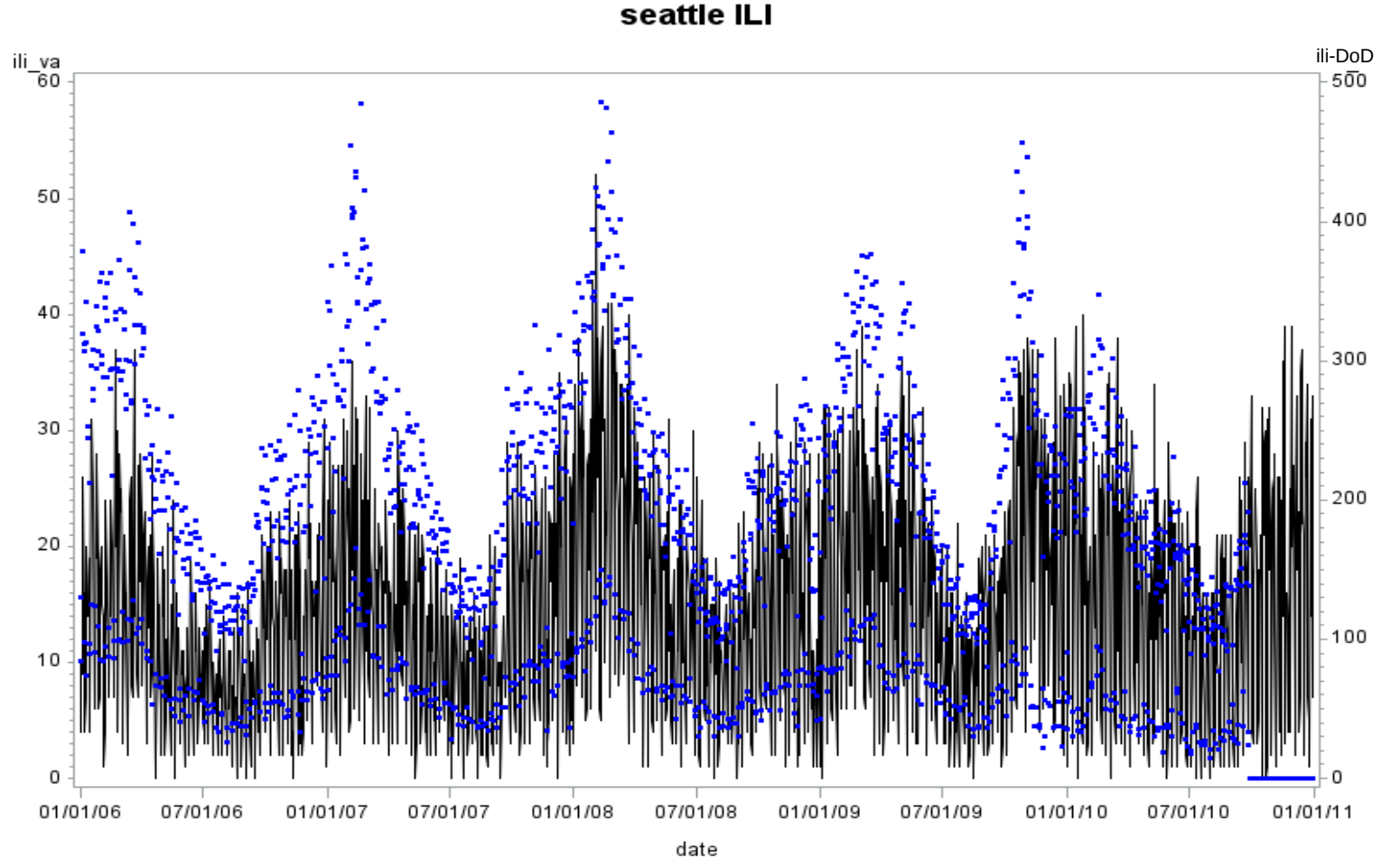
Future inpatient data elements

- Vitals
- Inpatient pharmacy/BCMA
- Laboratory
- Radiology
- ICU data (including device data)
- Hospital-level mapping

VA/DoD Joint Biosurveillance

- ✓ Joint Incentive Fund (JIF) project to link VA and DoD ESSENCE biosurveillance systems
  - ✓ Proposal approved in August 2009
  - ✓ Primary goal to create combined data set for analysis by DoD and VA public health personnel and strengthen predictive capabilities of ESSENCE for both agencies
  - ✓ Creates backup system to ensure ongoing surveillance capabilities in the event one agency's system is incapacitated
  - ✓ Contribute to attaining goals of Homeland Security Presidential Directive (HSPD-21) and Pandemic Flu Act of 2007 of information sharing between agencies

Combined VA/DoD ESSENCE data for ILI



Black Line – VA, Blue Dot - DOD

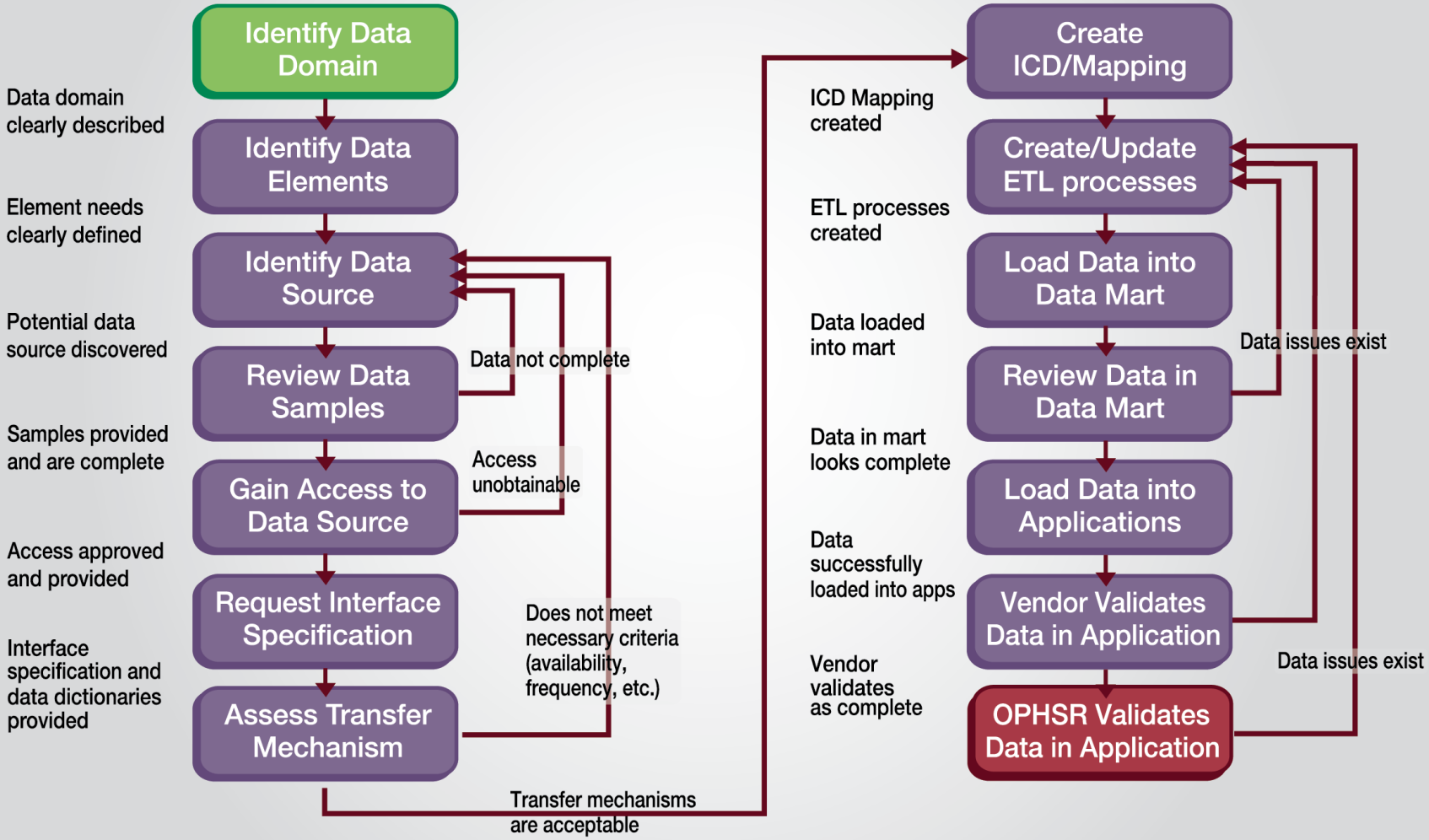
ILI Alerting Comparison VA & DoD

CBSAs with >= 10 ILI Visits per Week			
Timeliness (weeks)	"typical strong seasonal flu"	pandemic	
Number of CBSAs	2007-8 H3N2	2009 Fall H1N1	Both
Same Week Alert	3	5	8
DoD Alert Earlier	27	36	63
VA Alert Earlier	21	6	27
DoD Alert Only	0	1	1
VA Alert Only	0	1	1
No Alert	0	2	2
Grand Total	51	51	102

Data Challenges

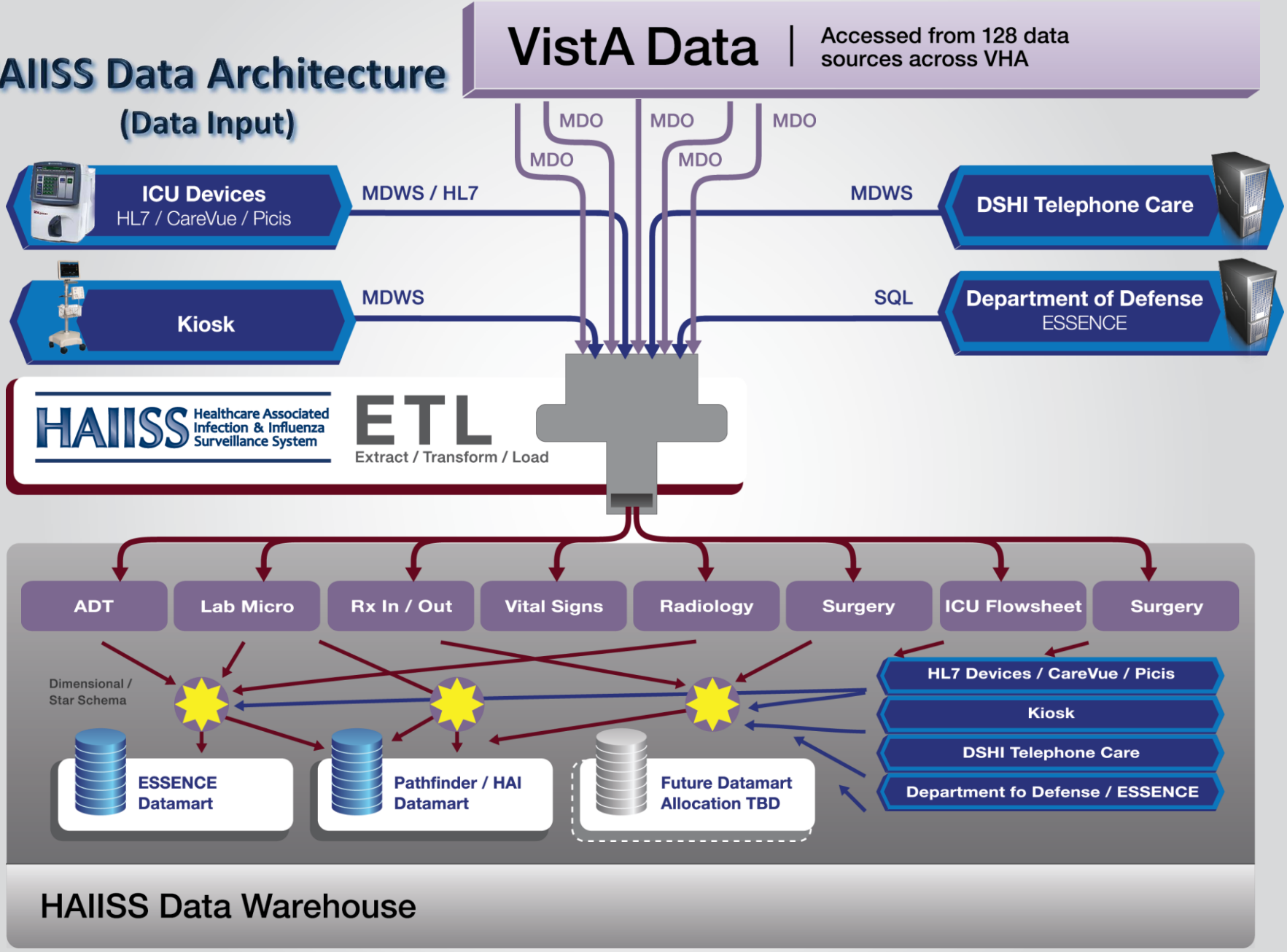
- Locating/mapping data accurately
- Lack of data standardization
- Data validation process
- Miscoding & incomplete coding
- Data timeliness
- Obtaining historical data
- Some data not routinely recorded in EHR

Data Element Life Cycle



HAIISS Data Architecture

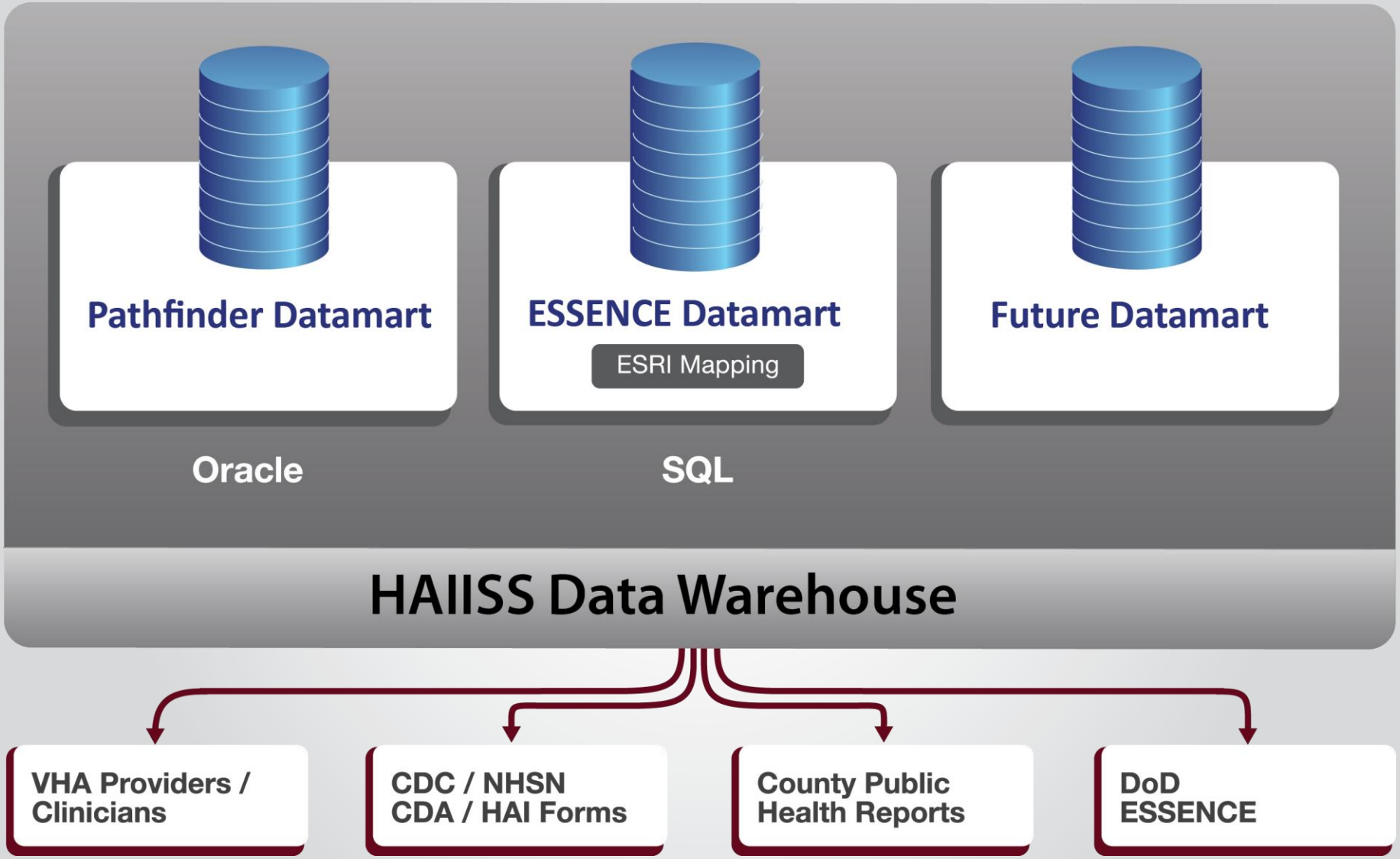
(Data Input)



Data Sharing

- Outpatient VA ESSENCE feed transmitted to CDC BioSense
- Joint VA/DoD ESSENCE biosurveillance application
- Virtual health department for simulating transfer of ESSENCE data to state HD
- Electronic transmission of device-associated HAIs and antibiotic utilization to CDC's NHSN via QC Pathfinder
- Electronic transmission of RCD reports to local HDs via QC Pathfinder

HAIISS Data Sharing



Questions?

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