Using BioSense Data for Monitoring Influenza Activity

Jerome I. Tokars, MD, MPH
BioSense System, CDC

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Outline

- Introduction
  - Standard influenza surveillance
- Initial approach to monitoring influenza with BioSense data
  - ICD-9 diagnosis code 487 (influenza)
  - Comparison of BioSense with Standard Surveillance
- Additional possibilities
  - Evaluation of additional ICD-9 codes
  - Potential if new data sources received

Introduction

- Estimates: influenza infects 10-20% of US population and causes an average of 36,000 deaths per year
- Period of peak influenza activity varies from year to year
- Heightened interest in monitoring influenza
  - Fall 2004: the potential vaccine shortage
  - The possibility of a pandemic of avian influenza (H5N1)

Standard Influenza Surveillance 7 Components

- Collaborating Laboratories
- Influenza Sentinel Providers Surveillance Network
  - About 2000 healthcare providers report the # and % of visits for influenza-like illness (ILI; temp >100 F with either a cough or sore throat)
- 122 Cities Mortality Reporting System
- State and Territorial Epidemiologists Reports
- Influenza-associated pediatric mortality
- Emerging Infections Program
- New Vaccine Surveillance Network

http://www.cdc.gov/flu/weekly/fluactivity.htm

The BioSense System
Current Data Sources

- Department of Defense (DOD) outpatient clinics (n=355)
  - ICD-9 CM diagnosis codes
  - CPT procedure codes
- Veterans Affairs (VA) outpatient clinics (n=849)
  - ICD-9 CM diagnosis codes
  - CPT procedure codes
- LabCorp
  - Preliminary diagnosis
  - Diagnostic test orders

Purposes of Monitoring Influenza Using the BioSense System

- Distinguish expected yearly increases in influenza from other outbreaks
- Promote multiple uses of data received by public health
- Supplement standard surveillance to enable tracking of influenza at granular (county, zip code) level

Initial Approach to Monitoring Influenza, BioSense System

- ICD-9 CM code: 487 (Influenza)
  - 487.0 With pneumonia
  - 487.1 With other respiratory manifestations
  - 487.8 With other manifestations
- Methods
  - Remove records with mention of vaccination
  - VA and DOD data combined
  - Influenza reports intranet site created

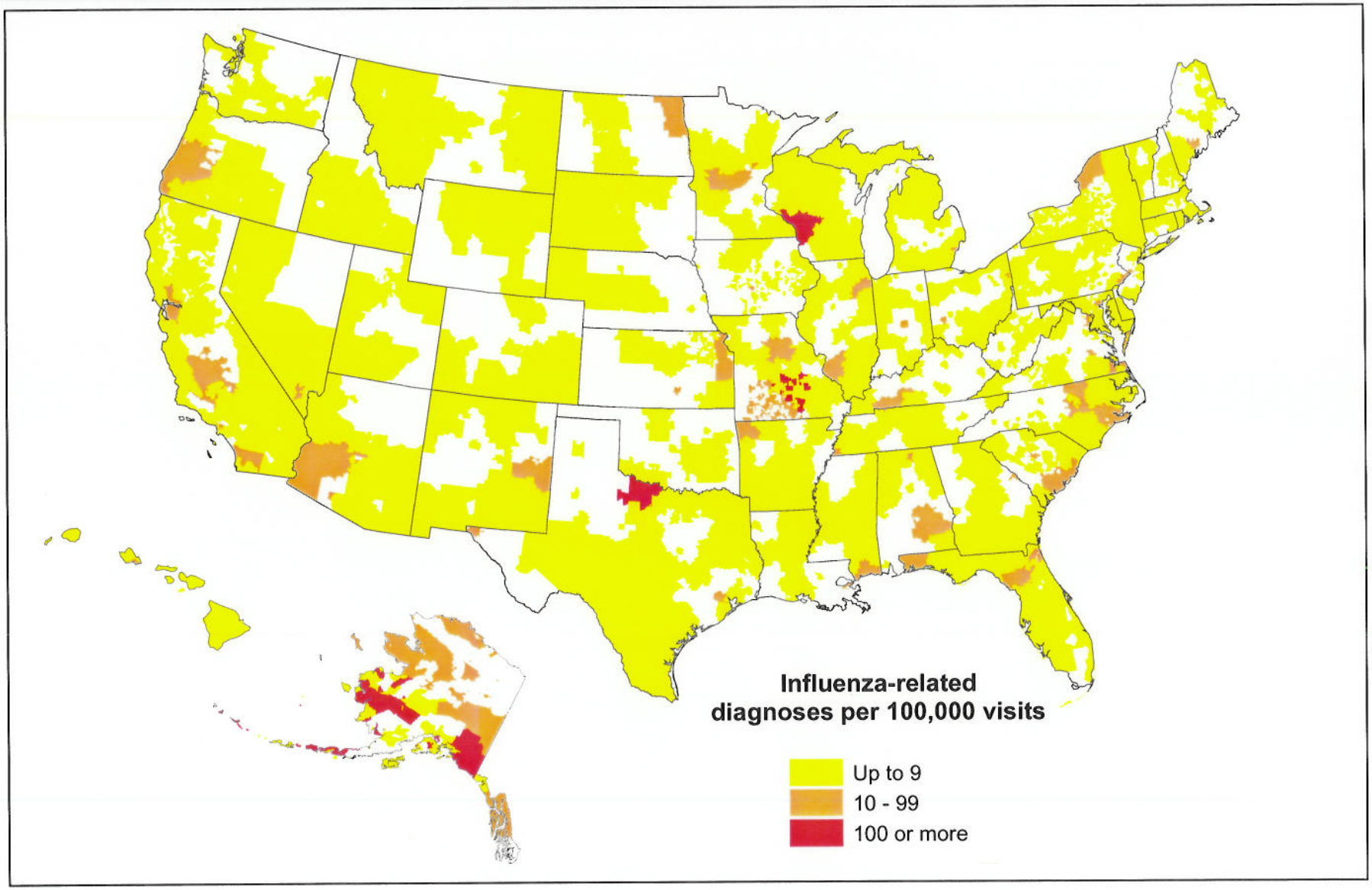
Records Received by the BioSense System (Mean Weekly Counts)

	2003-2004 (34 weeks) Oct 2003-May 2004	2004-2005 (28 weeks) Oct 2004-April 2005
Total records		
VA	1,167,000	1,375,000
DOD	405,000	547,000
ICD 487		
VA	290	245
DOD	350	466

BioSense Influenza Reports Intranet Site

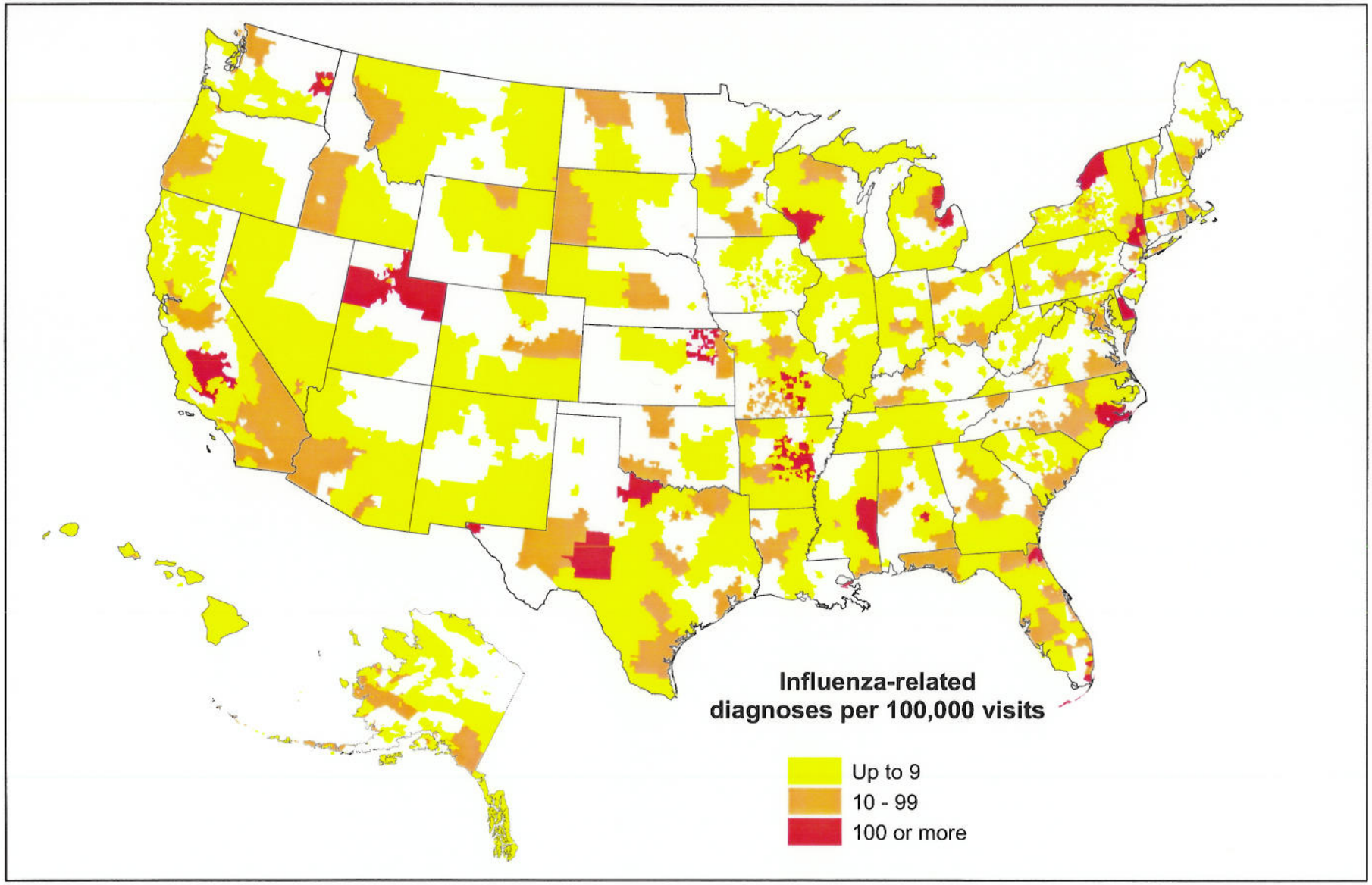
- Maps of ICD 487 activity
  - 2-week periods
  - Zip3 areas (first 3 digits of zip code)
- Counts and plots of activity per week
- Age breakdown
- State-specific reports

Influenza-related Diagnoses from Ambulatory Care Sites
October 10-23, 2004



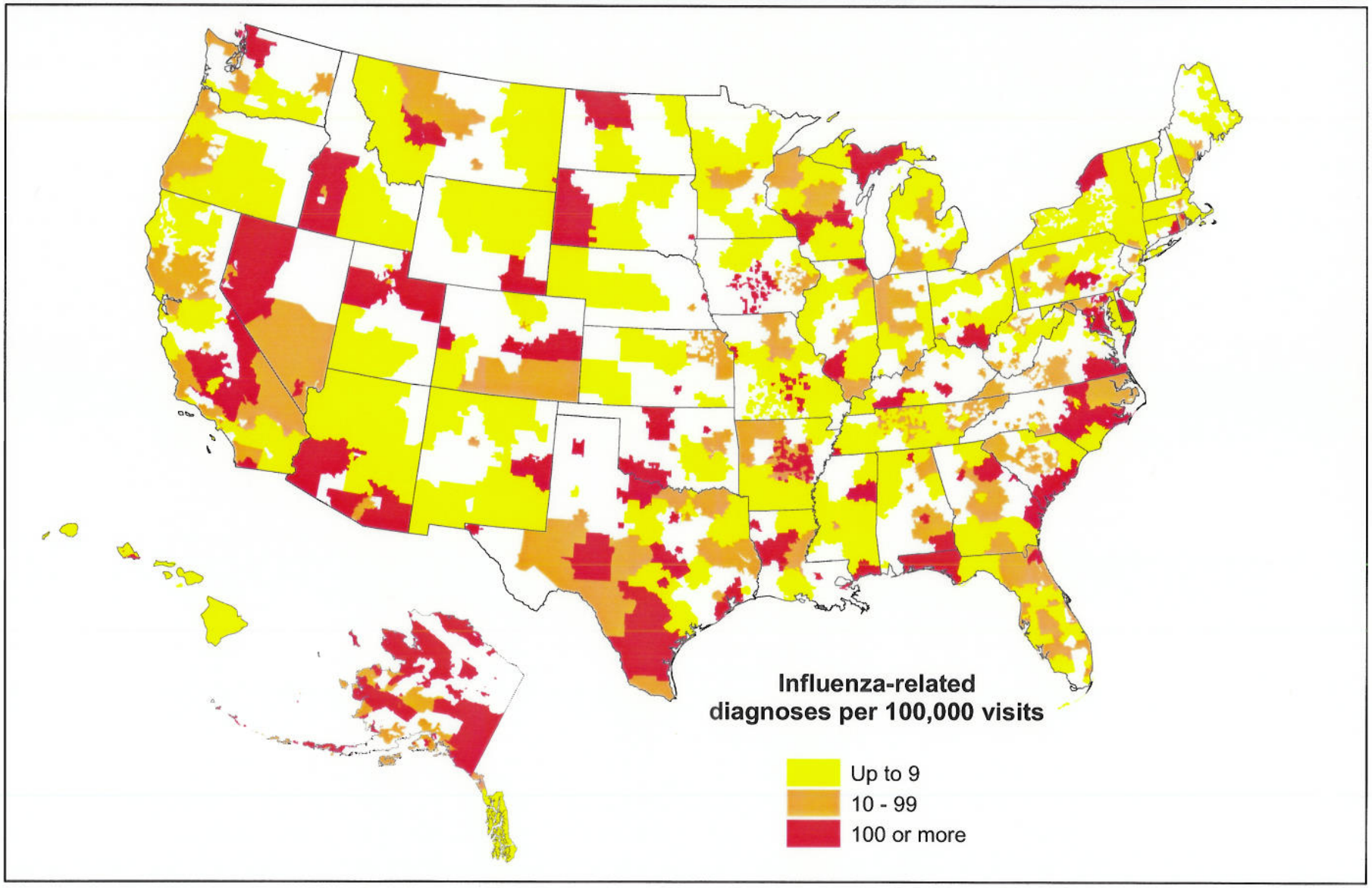
Influenza-related Diagnoses from Ambulatory Care Sites
January 2 - 15, 2005

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

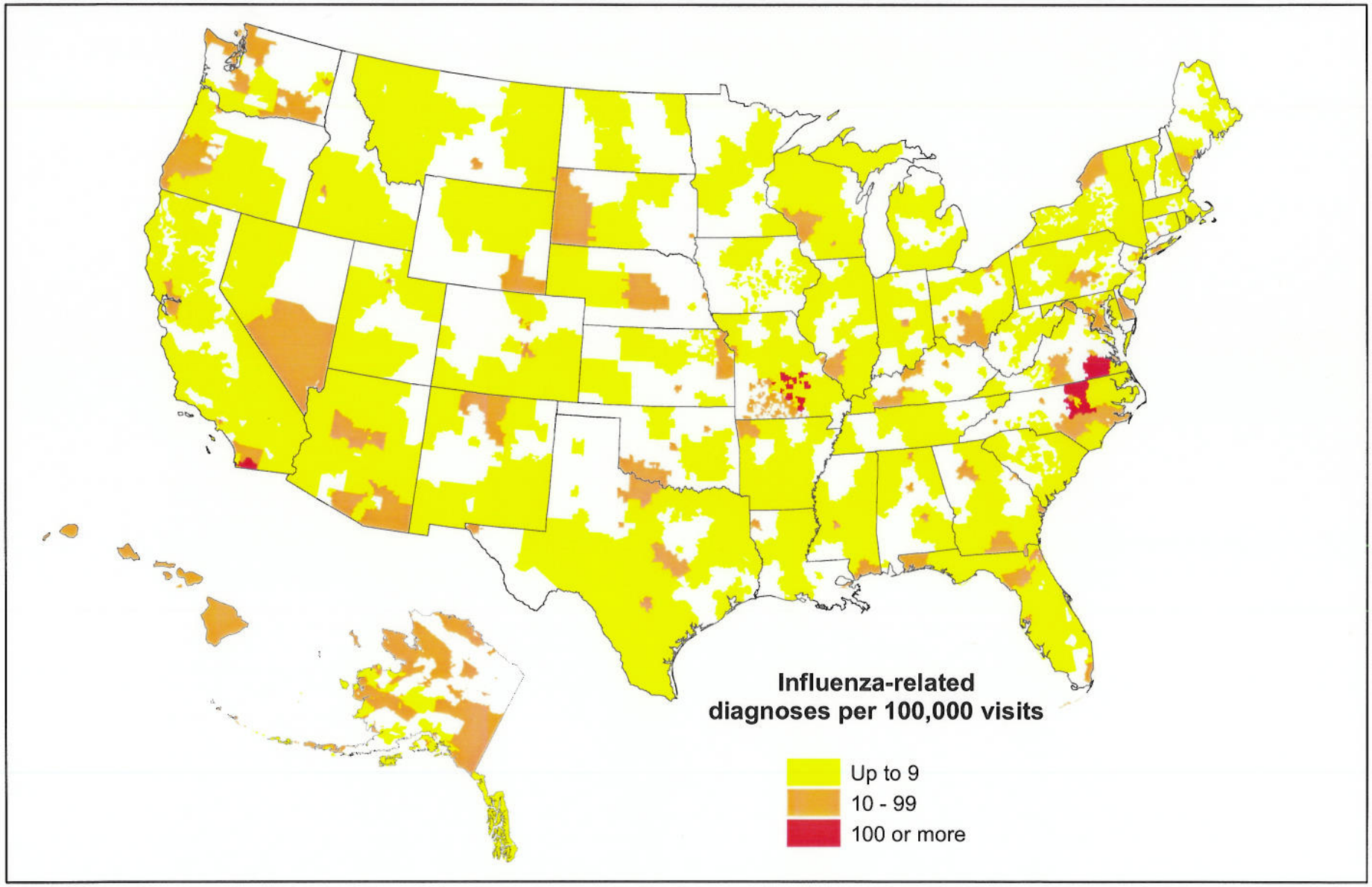


Influenza-related Diagnoses from Ambulatory Care Sites
February 13 - 26, 2005

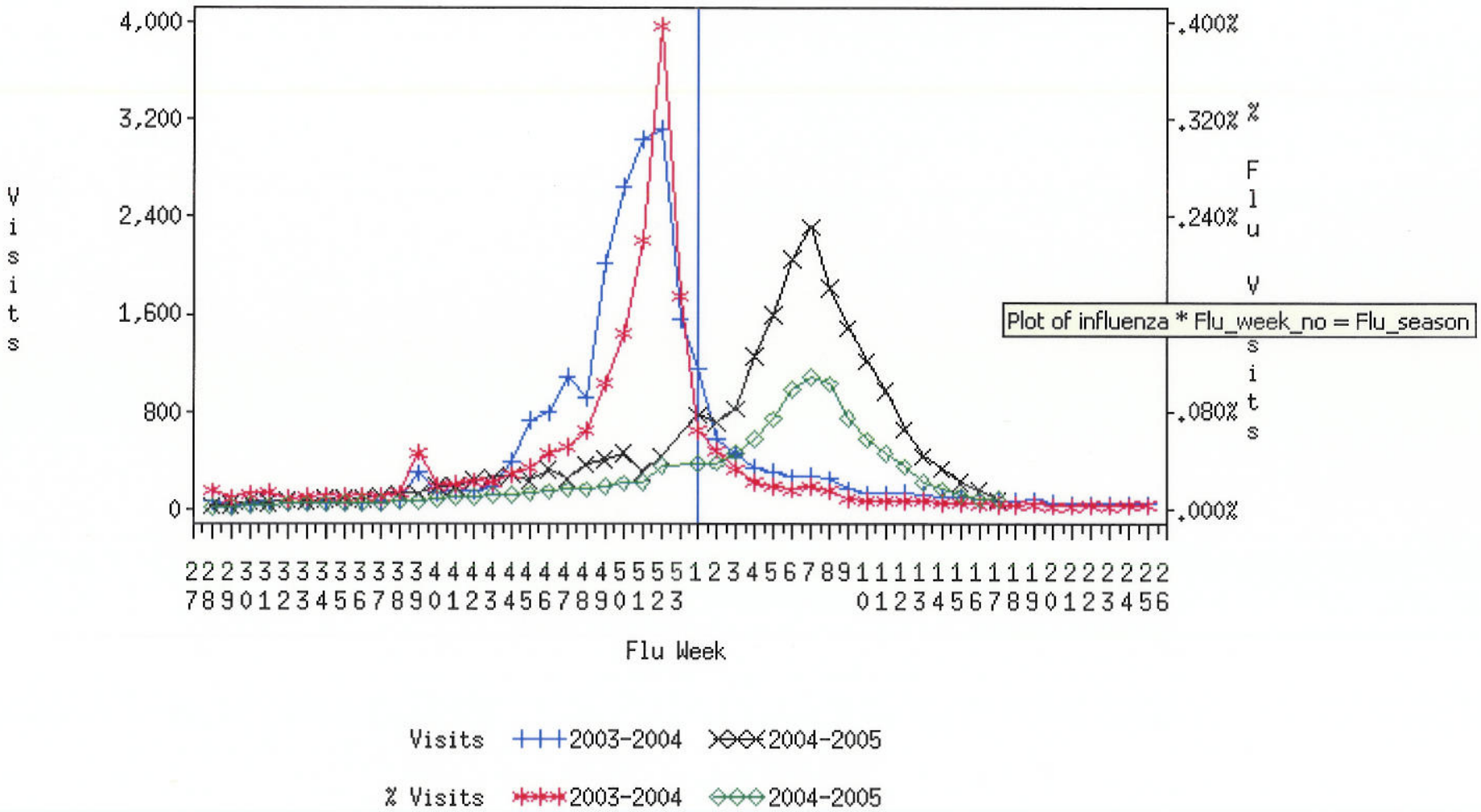
CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION



Influenza-related Diagnoses from Ambulatory Care Sites
March 27 - April 9, 2005



Influenza Related Diagnoses From Ambulatory Care Sites
By Week of Flu Season For US
Report created on May 2, 2005 (Based on MMWR Week)



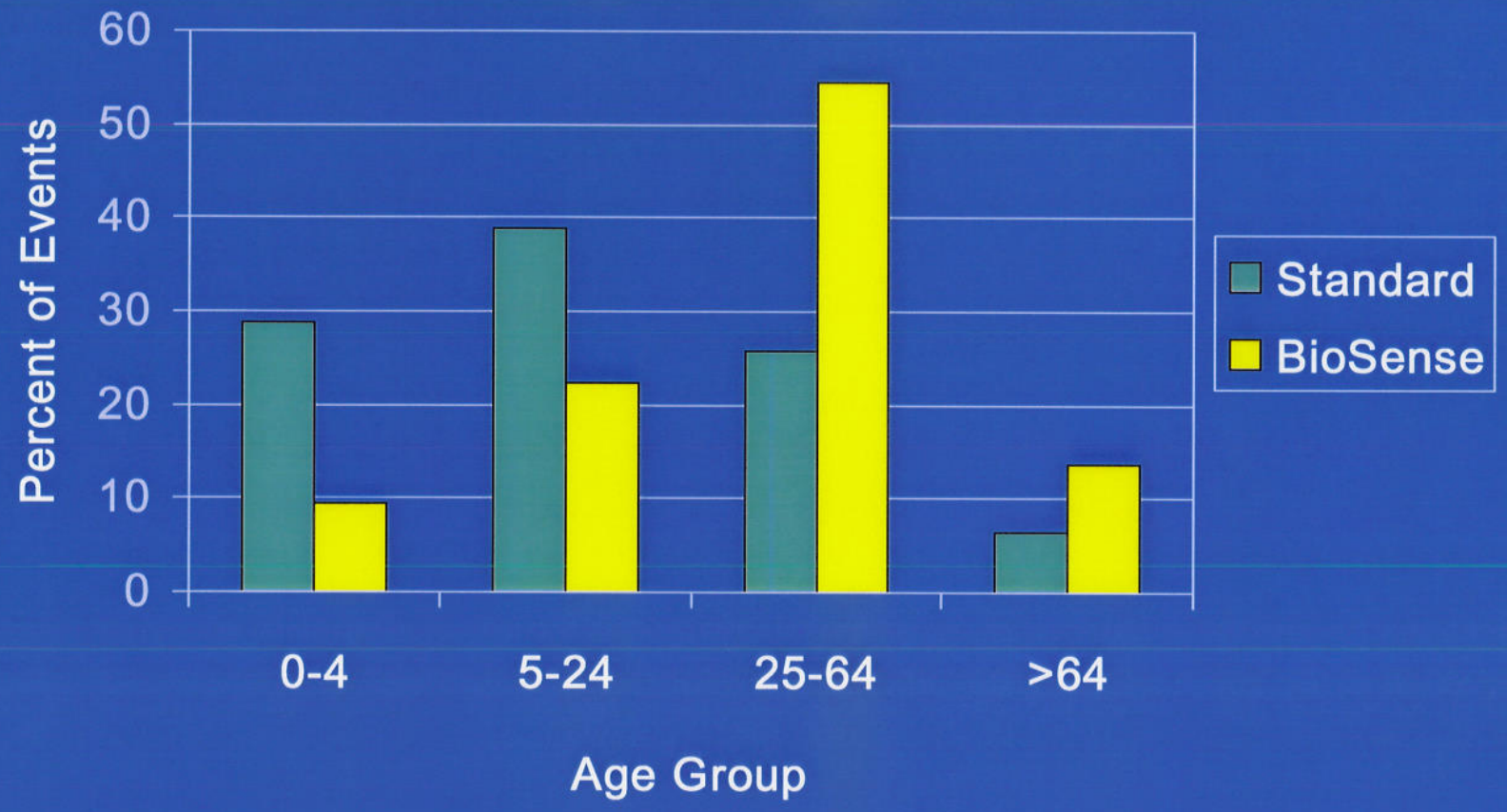
Influenza-related Diagnoses from Ambulatory Care Sites, All States
Overview of City/Districts, Facilities, Age Group/Gender
By Flu Season
Report Created on 05/01/2005

	2003-2004		2004-2005		Total	
	#	%	#	%	#	%
Total	22,997	(100.0)	21,891	(100.0)	44,888	(100.0)
Age Group						
0-4 Years	2,168	(9.4)	1,139	(5.2)	3,307	(7.4)
5-24 Years	5,128	(22.3)	5,409	(24.7)	10,537	(23.5)
25-64 Years	12,539	(54.5)	13,124	(60.0)	25,663	(57.2)
65+	3,162	(13.7)	2,219	(10.1)	5,381	(12.0)

Comparison of BioSense with Standard Surveillance

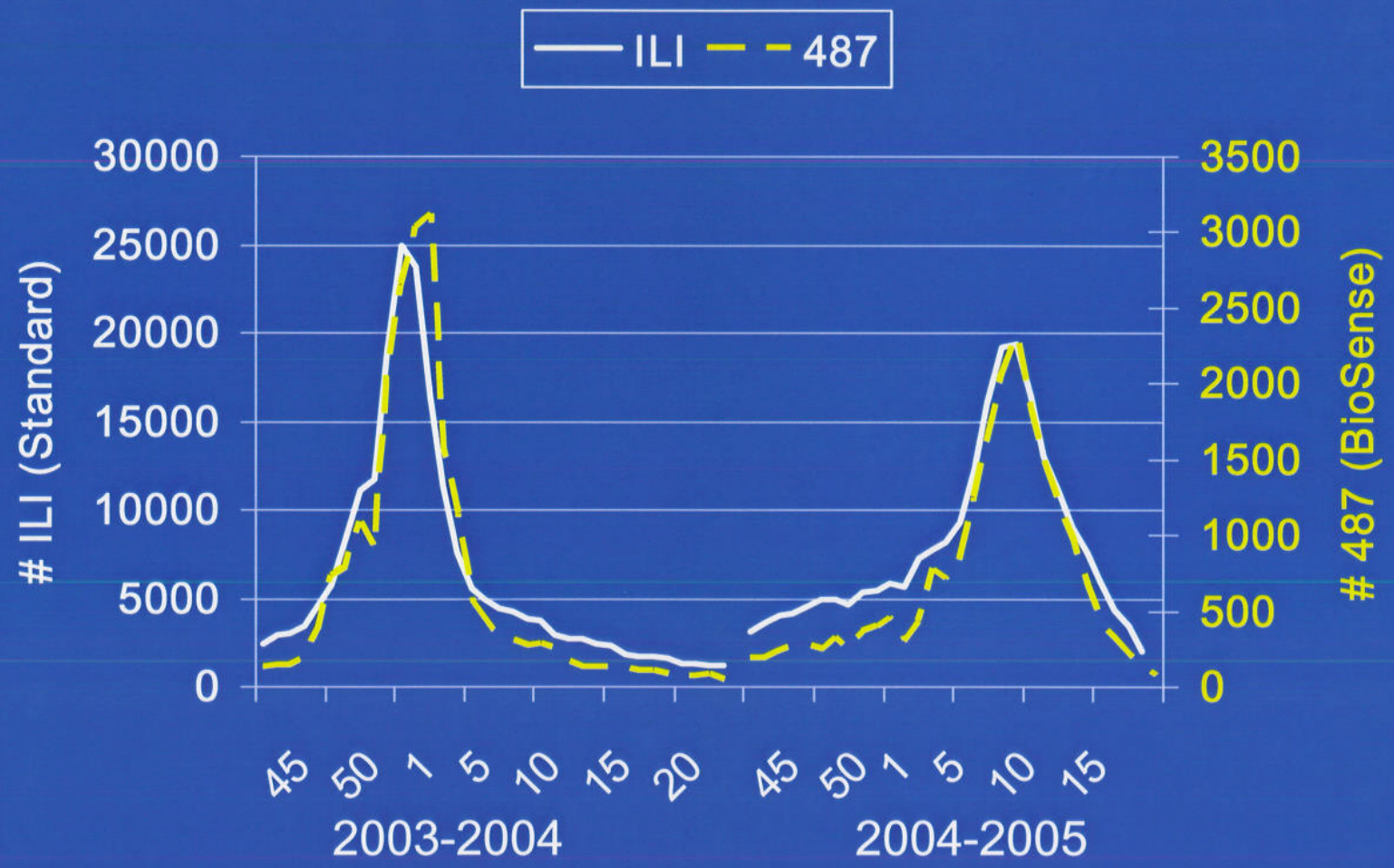
- BioSense Data
  - Number and rates of visits to VA and DOD clinics with ICD 487
- Standard Surveillance
  - Number and percent of visits to Sentinel Providers for influenza-like illness (ILI; temp >100 F with either a cough or sore throat)

Standard* Surveillance vs BioSense, by Age Groups, 2003-2004



* Sentinel Physician reports

Numbers of Events, Standard* vs BioSense Influenza Surveillance



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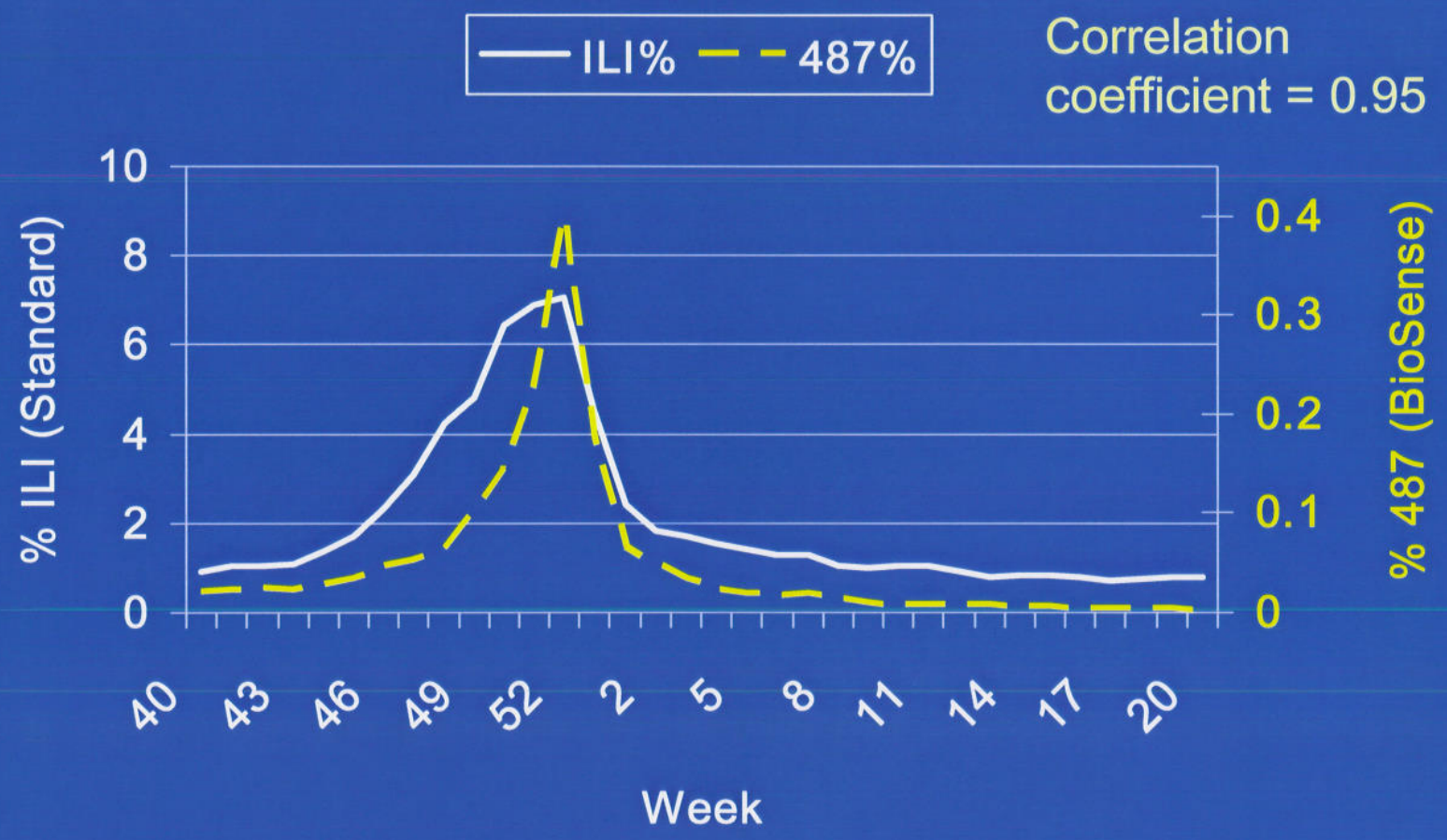
Event Rates, Standard* vs BioSense Influenza Surveillance, 2003-2004



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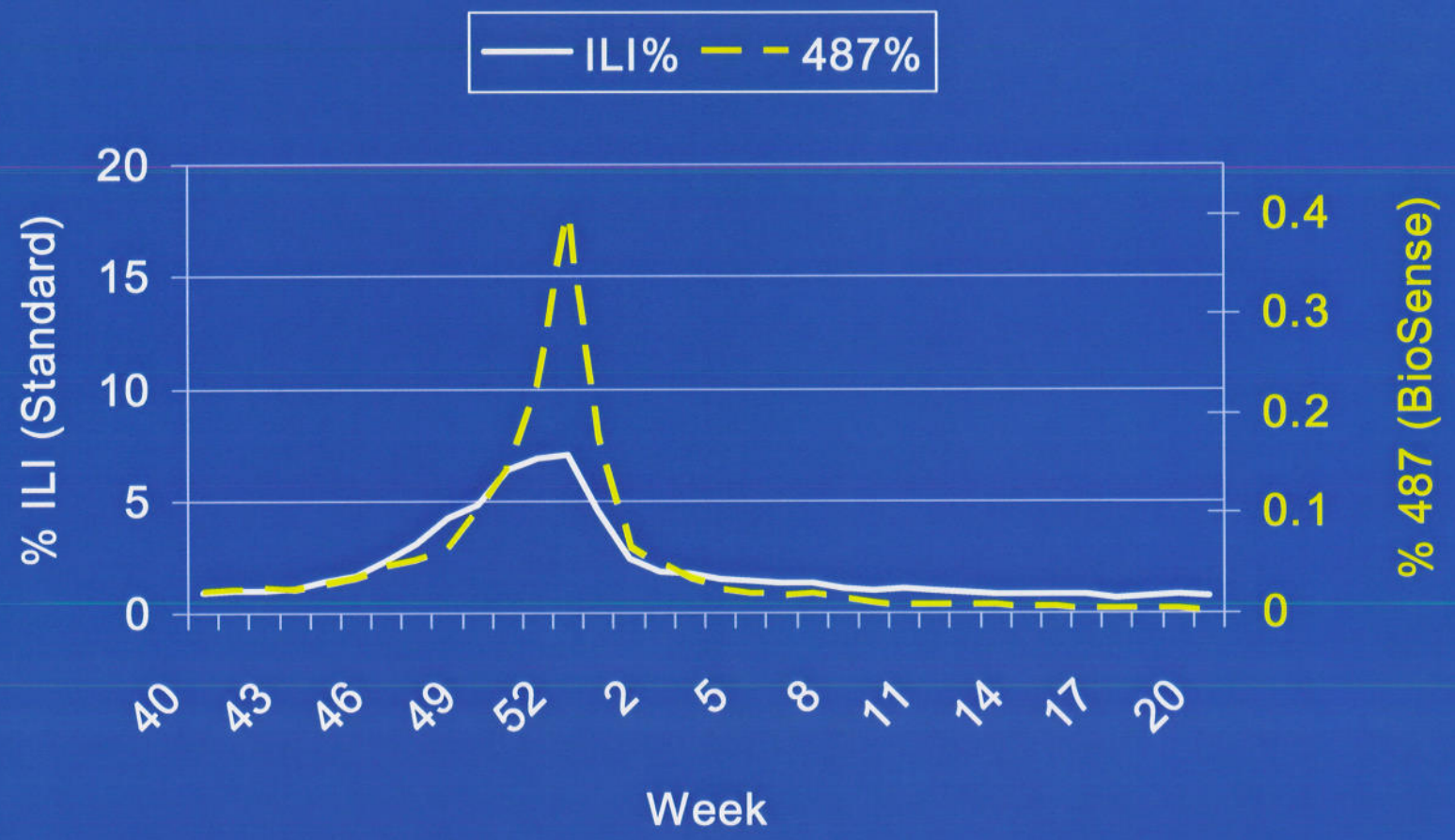

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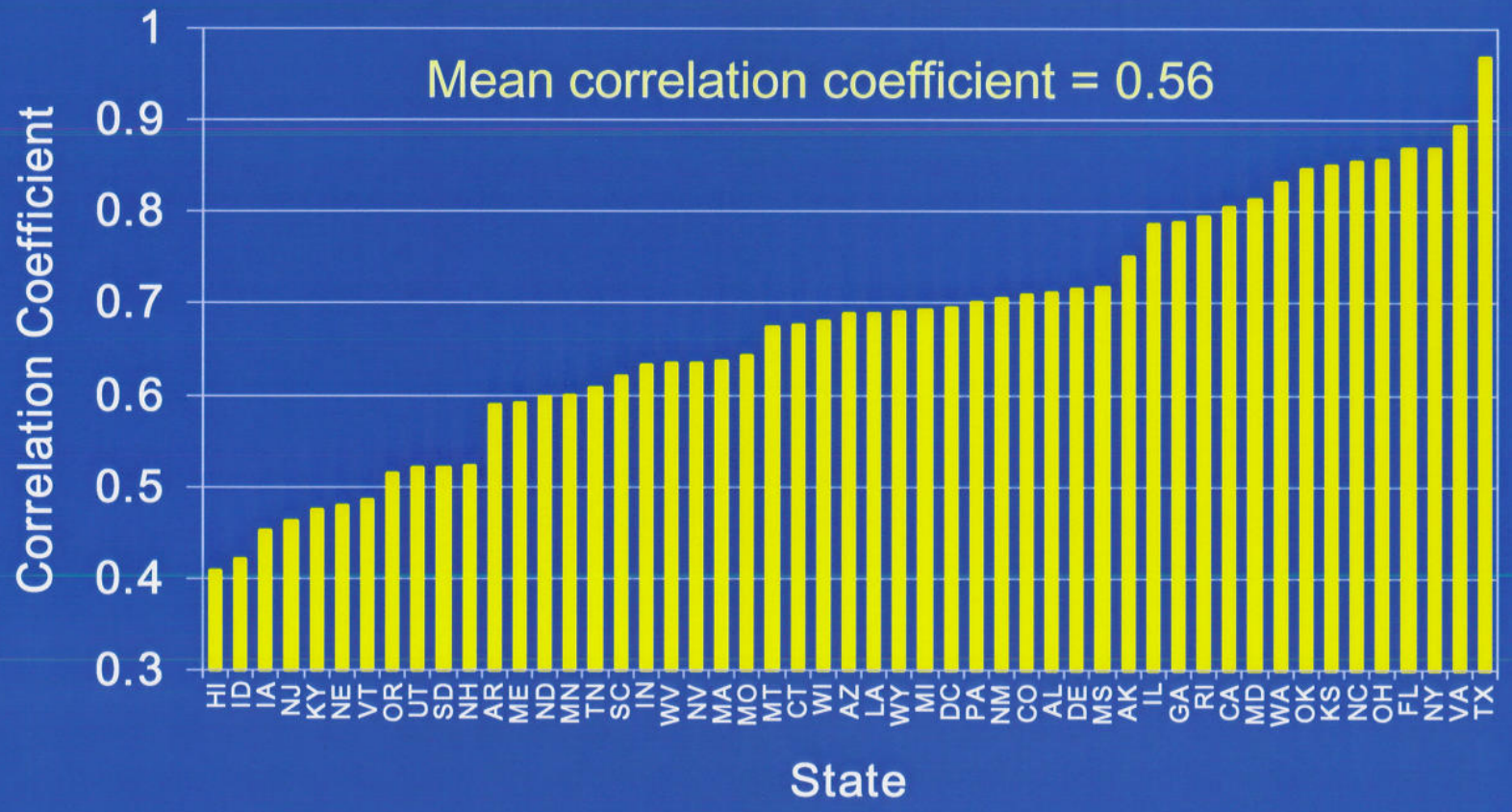
Correlation Between % ILI (Standard* Surveillance) and % 487 (BioSense), by State, 2003-2004



* Influenza-like illness reported to Sentinel Physicians

Evaluation of Additional ICD-9 Codes

- About 20,000 records with ICD 487 are received by BioSense per season
- Previous DOD study found several ICD-9 codes associated with respiratory viruses

079.99	Viral infection NOS
460	Acute nasopharyngitis
461.9	Sinusitis, acute NOS
464.00	Laryngitis, acute
465.8	URI, mult sites, NEC
465.9	URI, mult sites, NOS
466.0	Bronchitis, acute
486	Pneumonia, organism unspec
487	Influenza
490	Bronchitis, not spec
780.6	Fever
786.2	Cough

Evaluation of Additional ICD-9 Codes

- Unit of analysis: 1700 state-weeks during 2003-2004 season
- Outcome variable: influenza-like illness reported by Sentinel Physicians
- Potential explanatory variables: percent of visits with selected ICD-9 codes reported to BioSense
- Independent associations
  - 487 (Influenza)
  - 490 (Bronchitis)
  - 460 (Acute nasopharyngitis)
- However, in this preliminary analysis codes other than 487 improved the model fit marginally

Limitations and Plans

- Current limitations
  - Only ICD-9 codes are used—association with influenza requires validation
  - Includes only DOD and VA facilities
  - Duplication of records
  - Accuracy of zip code of exposure
- Plans
  - Ongoing work to eliminate duplicates and more accurately assign zip code
  - New data sources
  - Richer data sources that include fever/clinical data

Conclusions

- The current BioSense System can monitor influenza nationally and in high-volume states and zip3 areas
- BioSense data could complement standard influenza surveillance
- Additional/richer data sources will enable electronic biosurveillance for influenza at more granular levels

Acknowledgments

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