

BioSense Overview

Centers for Disease Control and Prevention, National Center
for Public Health Informatics, Division of Emergency
Preparedness and Response, Atlanta, GA

June 11, 2007



SAFER • HEALTHIER • PEOPLE



Overview

- BioSense vision and approach
- Initial data sources
- Hospital data, analysis, and visualization
- BioIntelligence Center
- BioSense Application demonstration



BioSense Vision

- Provide local, state, and national health situational awareness for suspect illness and cases of disease before, during, and after a health event
- Help confirm or refute the existence of an event; monitor its size, location, and rate of spread



BioSense Approach

- Real-time delivery of healthcare data to BioSense from hospitals, labs, ambulatory care settings, and other health data sources
- Electronic “views,” analytics, and reports for national, state, and local public health, contributing healthcare organizations



BioSense - Major Functions

- Create a “system of systems”
 - Link state and local biosurveillance systems
 - Co-display data from other systems (e.g., Flu Division, Poison Control Centers)
 - Provide a unified national view
- Provide data to state and local health departments
- Promote the use of technology standards
- Advance knowledge through external grants and in-house research/development



Initial Data Sources

- National daily batched data
- Department of Defense (DoD) (n=466)
 - ICD-9-CM diagnosis codes
 - CPT procedure codes
- Veterans Affairs (VA) (n=905)
 - ICD-9-CM diagnosis codes
 - CPT procedure codes
- LabCorp
 - Reason for test orders (ICD-9-CM)
 - Diagnostic test orders

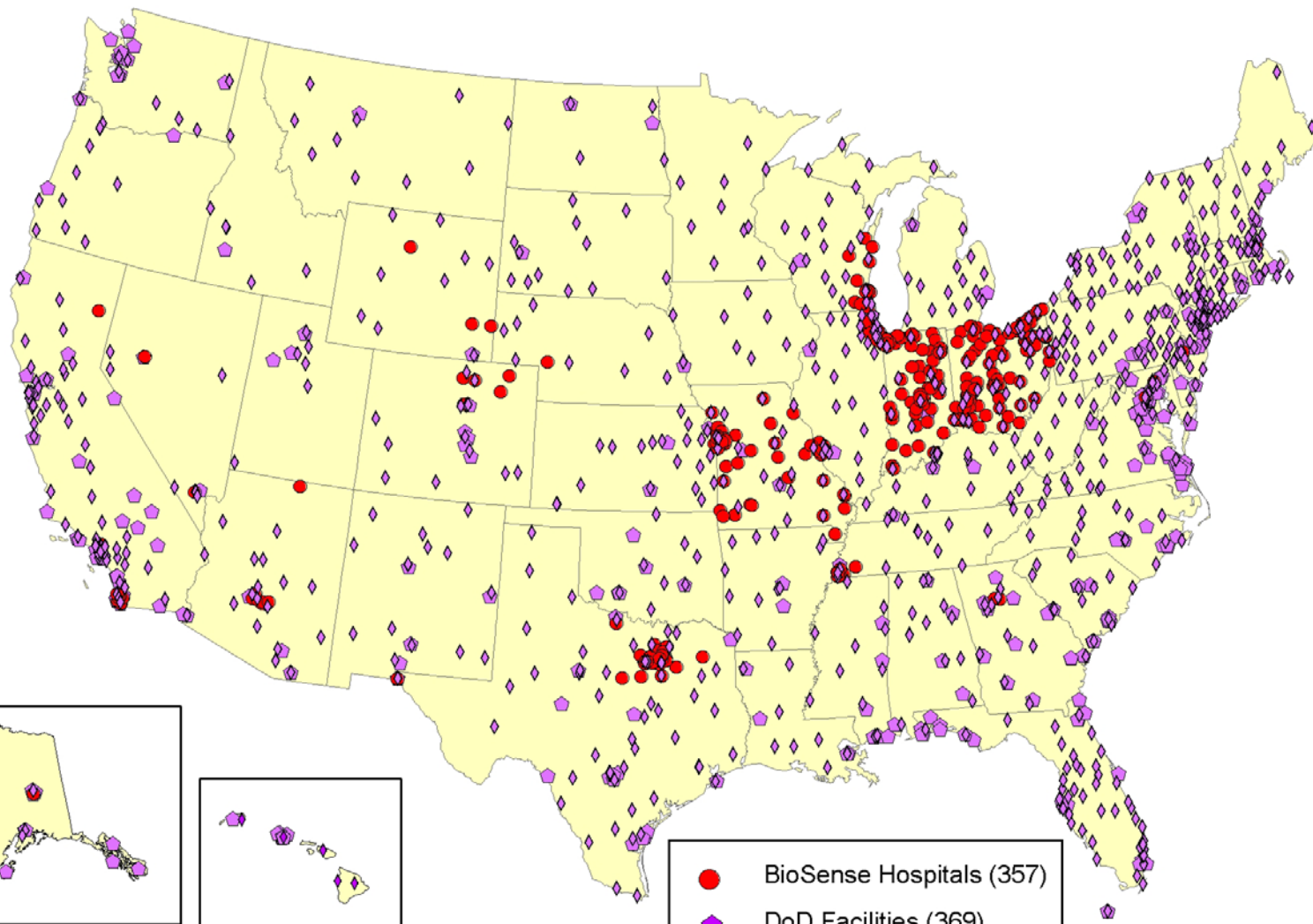


Hospital Data

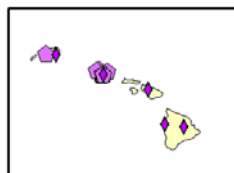
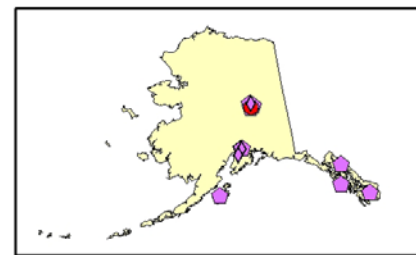
- N=366 hospitals
- **Foundational:** demographics, chief complaint, final diagnoses, disposition, hospital utilization
- **Clinical:** vitals, triage notes, working diagnosis, discharge summary
- **Laboratory:** microbiology orders and results
- **Pharmacy:** medication orders
- **Radiology:** orders and interpretation results



Current BioSense Facilities - June 2007 -



- BioSense Hospitals (357)
- ◆ DoD Facilities (369)
- ◆ VA Facilities (893)



BioSense
Division of Emergency Preparedness and Response
Centers of Disease Control and Prevention
June 2007

Disease Indicators

- First generation
 - 11 syndromes (e.g., respiratory, gastrointestinal)
 - Created by working group in 2002 as bioterrorism (BT) indicators
- Second generation
 - 78 sub-syndromes (e.g., pneumonia, URI)
 - More specific concepts for BT and non-BT
- Future: laboratory, radiology, pharmacy data



Data Analysis

- W2 (modified CUSUM)
 - Current data compared to 7 day moving average with a 2 day lag
 - Weekdays compared to weekdays, weekends compared to weekends
- Empiric recurrence interval
- Units of analysis
 - Facility
 - Combining data for all facilities within a metro area or state
- Additional data analysis methods being developed
 - Spatio-temporal analysis (SaTScan)
 - Several regression methods being compared



BioSense Application

- Jurisdiction-specific access granted to local/state/federal public health authorities and hospital users
- 5 core functions
 - Identify statistical data anomalies
 - Provide long term data trends
 - Drill down on individual patients
 - Map disease over space and time
 - Descriptive analyses



Hospital Data Patient ID for State and Local Public Health Follow-Up

- BioSense Patient ID
 - Used to distinguish a patient uniquely across all visits to a single facility, or across all visits to a healthcare system when a common patient identification system is used
 - Can be used by the healthcare facility to associate BioSense patient data to the patient's medical record
- No personally identifiable information



BioSense Application Development Activities

- Migrating VA and DoD data to the hospital data modules so all data are analyzed and displayed in the same way
- Providing capabilities for custom queries
- Providing an application via the CDC Secure Data Network that will display BioSense flu data alongside traditional flu surveillance data sources



BioIntelligence Center

- Initiated June 2004
- Dedicated analysts use BioSense system daily
 - Characterize data anomalies
 - Analyze data in relation to known public health events
 - Provide support for state and local PH and hospital users
 - Identify problems and enhancements



BioSense

Example Screen Shots



SAFER • HEALTHIER • PEOPLE



Home Page



BioSense

[Help](#)

[Home](#)

[VA, DoD, & Lab Test Order Data](#)

[Real-time Hospital Data](#)

[Negative BioWatch Results](#)

[Contact Us](#)

VA, DoD, & Lab Test Order Data*

[Analytic Home Page](#)

Analytical results for all syndromes displayed in summarized format, maps, graphs, and tables.

[Consolidated Line Graphs](#)

Time series graph display with all data sources plotted on each syndrome graph.

[Syndrome Specific Line Graphs](#)

Time series graph display with separate data source graphs for a single syndrome.

[Syndrome Specific Maps](#)

Map display with separate data source maps for a single syndrome.

[Syndrome Specific Tables](#)

Tabular display with access to detailed line lists of records for a single syndrome.

Real-time Hospital Data

[Chief Complaint/Diagnosis](#)

Syndrome counts for patient chief complaint and physician diagnosis.

[Statistical Anomalies](#)

List of statistical anomalies for syndrome counts and rates.

[Time Series](#)

Time series graph of user-selected data, including statistical analyses.

[Describe](#)

Descriptive statistics of user-selected data, including ability to create subsets.

[Census](#)

Display of hospital census data.

[National Map](#)

Map of the United States displaying national distribution of disease indicators.

Negative BioWatch Results

BioWatch laboratory test results for environmental air samplers within your jurisdiction(s).

**Data not currently available in real-time.*

[Home](#)

[VA, DoD, & Lab Test Order Data](#)

[Real-time Hospital Data](#)

[Negative BioWatch Results](#)

[Contact Us](#)

[Help](#)

[CDC Home](#)



SAFER • HEALTHIER • PEOPLE



Chief Complaints and Diagnoses Summary (Demonstration Data)

Hospital Chief Complaints and Diagnosis

Atlanta-Sandy Springs-Marietta, GA, 06/07/2007

Analysis: W2, 100 Days Recurrence Interval Threshold.

Date:

[Print](#)

Syndrome	Patient Class								
	Outpatient			Emergency Department			Inpatient		
	Reason for Visit	Working Diagnosis	Final Diagnosis	Chief Complaint	Working Diagnosis	Final Diagnosis	Reason for Admit	Working Diagnosis	Final Diagnosis
Botulism-like	0	0	0	0	0	0	0	0	0
Fever	1	0	0	3	0	0	0	0	0
Gastrointestinal	2	0	0	1	0	0	0	0	0
Hemorrhagic Illness	0	0	0	1	0	0	0	0	0
Localized Cutaneous Lesion	0	0	0	0	0	0	0	0	0
Lymphadenitis	0	0	0	0	0	0	0	0	0
Neurological	1	0	0	2	0	0	1	0	0
Rash	0	0	0	0	0	0	0	0	0
Respiratory	7	0	0	3	0	0	2	0	0
Severe Illness or Death	0	0	0	0	0	0	0	0	0
Specific Infection	1	0	0	0	0	0	0	0	0



Statistical Anomalies

(Demonstration Data)

Statistical Anomalies

Atlanta-Sandy Springs-Marietta, GA , from 03/18/2007 to 06/11/2007
 Analysis: W2 , 50 Days Recurrence Interval Threshold.

Page 1 of 1 Go Print

Syndrome	Data Type	Patient Class	Anomaly Date	Anomaly Location	Observed Count	Recurrence Interval (Days)	Expected Count*	Obs./Exp.	Rate per 1000 Visits
Gastrointestinal	Reason for Visit	Outpatient	05/13/2007	Atlanta-Sandy Springs-Marietta, GA	5	80	0.6	8.3	76.9
Gastrointestinal	Reason for Admit	Inpatient	05/08/2007	Hospital 6	4	90	0.2	20.0	400.0
Respiratory	Final Diagnosis	Emergency Department	04/20/2007	Hospital 6	3	50	0.2	15.0	272.7
Fever	Chief Complaint	Emergency Department	04/13/2007	Atlanta-Sandy Springs-Marietta, GA	5	50	0.9	5.6	208.3

Cells highlighted if analyses were statistically significant.

U indicates that the ratio of observed to expected is undefined due to the expected count being zero.

* Expected value based on the W2 moving average.



Time Series

(Demonstration Data)

Time Series

Fever Syndrome

Emergency : Chief Complaint Data

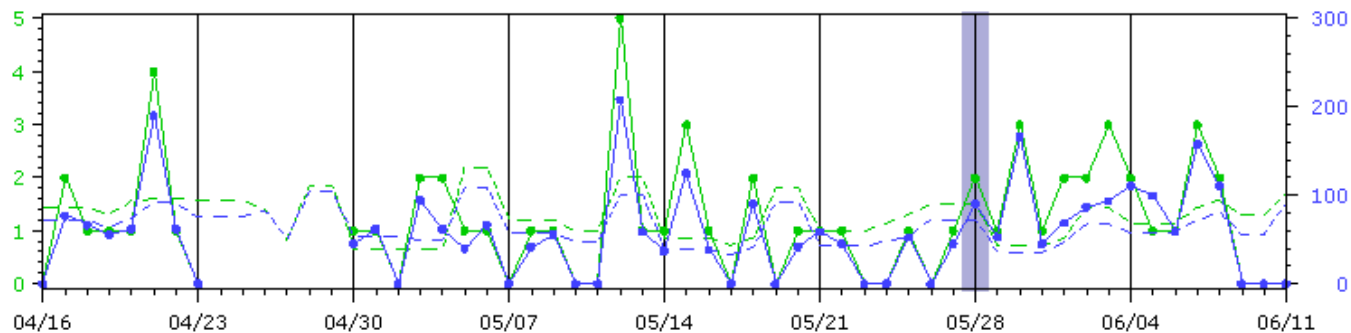
All Facilities, ATL

From 04/16/2007 to 06/11/2007

Analysis: W2, 50 Days Recurrence Interval Threshold.

Number of Visits = 61

[Print](#)



* Rate per 1000 visits

Date	Day	Count	Rate per 1,000 Visits	All Visits	Links	Comments
06/11	Mon	0	0.0	24	map / patient list	
06/10	Sun	0	0.0	22	map / patient list	
06/09	Sat	0	0.0	21	map / patient list	
06/08	Fri	2	111.1	18	map / patient list	
06/07	Thur	3	157.9	19	map / patient list	



SAFER • HEALTHIER • PEOPLE



Patient List

(Demonstration Data)

Patient List

Fever Syndrome
Chief Complaint Data

Emergency , All Facilities, ATL , from 04/16/2007 to 06/11/2007

Number of Visits = 61

Page 1 of 1 Go Print

Patient Visit Date	Patient Zip	Patient State	Facility	Patient ID	Age	Gender	Patient Class	Reason for Visit (Outpatient)/ Chief Complaint(ED)/ Reason for Admit(Inpatient)	Physician Working Diagnosis	Final Diagnosis
05/18/2007	30045	GA	Hospital 6	BIO-00D1E5	1 D	F	O/E	FEVER;		
05/20/2007	30518	GA	Hospital 6	BIO-003E98	20 D	M	I/O/E	FEVER/SICKLE CELL DISEAS; HC;		
05/22/2007	30045	GA	Hospital 6	BIO-003F7E	20 Y	F	O/E	FEVER;		
05/27/2007	30341	GA	Hospital 6	BIO-002F0F	76 Y	F	O/E	DIZZY/FEVER-103;		
05/28/2007	30043	GA	Hospital 6	BIO-0059CD	22 Y	F	O/E	FEVER / L EAR PAIN;		
05/28/2007	30096	GA	Hospital 6	BIO-00270A	39 Y	M	O/E	FEVER/VOMITING;		
05/29/2007	30044	GA	Hospital 6	BIO-005B5B	36 Y	M	O/E	FEVER;		
05/30/2007	30093	GA	Hospital 6	BIO-001CD3	40 Y	F	O/E	FEVER/SWEATING;		
05/30/2007	30518	GA	Hospital 6	BIO-005BDD	36 Y	F	O/E	FEVER/COUGH/CONGESTED;		
05/30/2007	30096	GA	Hospital 6	BIO-005C1D	87 Y	M	O/E	FEVER;		
05/31/2007	30523	GA	Hospital 6	BIO-005CDF	34 Y	M	O/E	FEVER HA SORE THROAT;		
06/01/2007	30045	GA	Hospital 6	BIO-005D4A	28 Y	F	O/E	FEVER; FEVER;		
06/01/2007	30045	GA	Hospital 6	BIO-005D4C	47 Y	F	O/E	FEVER;		
06/02/2007	30045	GA	Hospital 6	BIO-005D50	27 Y	F	O/E	FEVER;		
06/02/2007	30044	GA	Hospital 6	BIO-005D7F	36 Y	F	O/E	FEVER;		
06/03/2007	30078	GA	Hospital 6	BIO-006E9E	21 Y	F	O/E	FEVER;		
06/03/2007	30517	GA	Hospital 6	BIO-002F3E	49 Y	F	I/O/E	FEVER/POSS CONSTIPATION; SICK;		



Patient Detail

(Demonstration Data)

Patient Detail

BioSense Patient ID: **BIO-005CDF**

BioSense Visit ID: **878^1124**

Facility

Master Facility	Hospital Group I
Servicing Facility	Hospital 6
Address	Lawrenceville, GA 30045
Phone	555-555-5555

Patient

BioSense Patient ID	BIO-005CDF
DOB	11/1958
Gender	M Male
Race	2106-3 White
Ethnicity	
County	25
Zip Code	43064
Occupation	
Industry	

Visit

BioSense Analysis Visit ID	35981
BioSense Visit ID	878^1124
Age	18 Y
Date Admitted	04/26/2006 11:27 AM
Date Discharged	04/27/2006 06:38 PM
Hospital Department	General/family pract
Point of Care	
Date into this Location	
Patient Class	<input type="radio"/> Outpatient
Admission Type	<input checked="" type="radio"/> Emergency
Admit Source	
Admission Level	
Employment Related	
Discharge Disposition	1
Death Indicator	
Deceased Date	



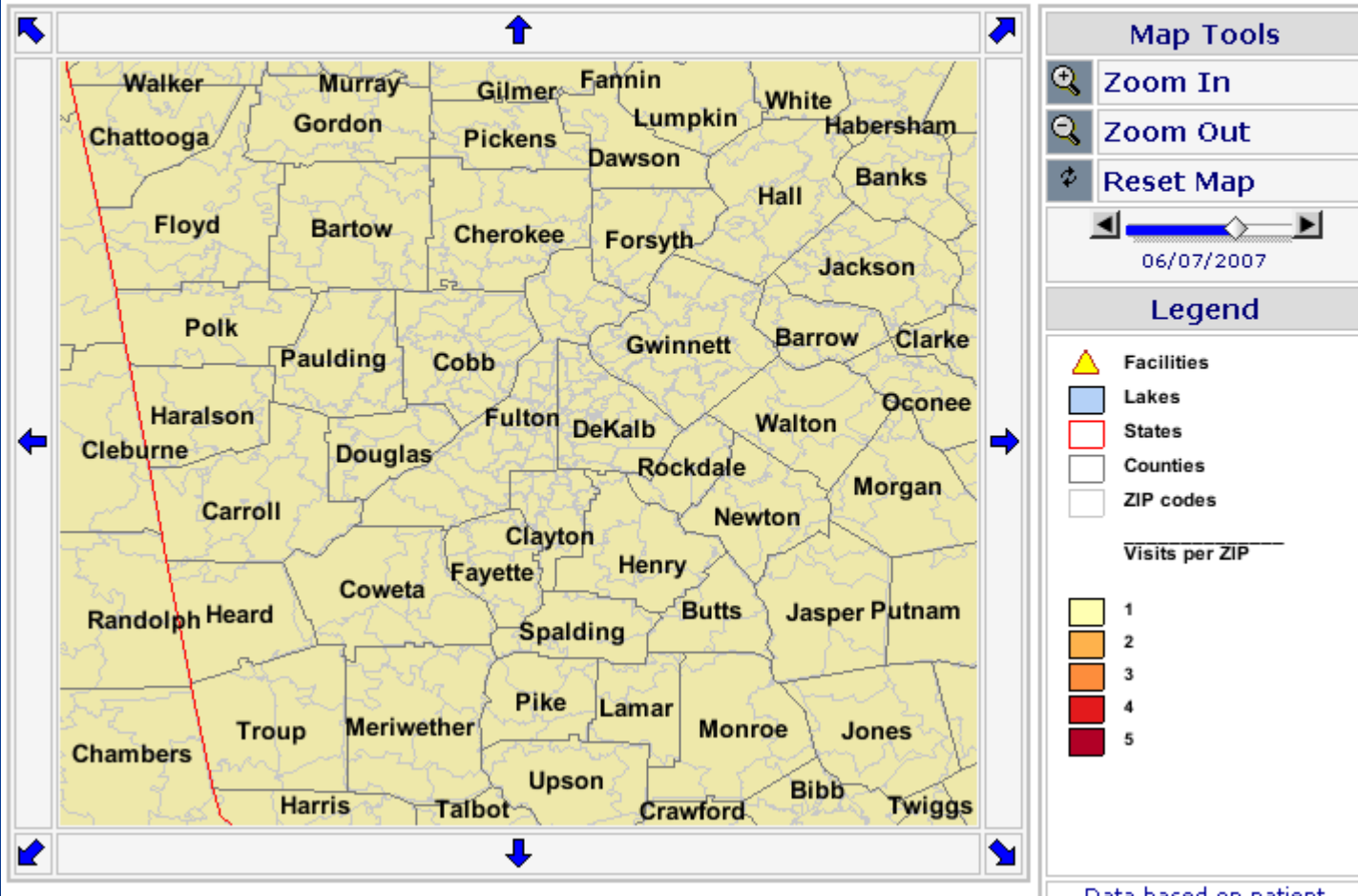
Patient Map

(Demonstration Data)

Fever Syndrome
Chief Complaint Data

Emergency , All Facilities, ATL

Date: 06/07/2007



Describe

(Demonstration Data)

Describe

Respiratory Syndrome

Emergency : Chief Complaint Data

Hospital 6, ATL

From 02/14/2007 to 02/20/2007

Number of Visits = 21

Population Description: Age Groups

