

Using Decision Support for Public Health Alerting

HIMSS Interoperability Showcase

Leslie A. Lenert, MD, MS, FACMI
National Center for Public Health Informatics
Coordinating Center for Health Information and Service
Centers for Disease Control and Prevention
April 7, 2009



EHR Opportunities for Public Health

- Exchange patient/ population data for surveillance, reporting & alerting
 - Using Standards for Information Exchanges e.g. HITSP T81, T63/C82 & RDF
- Improve quality by disseminating guidelines & protocols at the point-of-care

If EHRs are to catalyze quality improvement and cost control, physicians and hospitals will have to use them effectively. That means taking advantage of embedded clinical decision supports that help physicians take better care of their patients. (David Blumenthal, NEJM, March 25, 2009)





Considerations for Public Health Alerting

- **Dynamic in nature**
 - Urgency
 - Multiple alerts, same problem
 - Changing landscape of problem e.g. new cases, new locations
- **Scope of information**
 - Population vs. patient specific
- **Multi-stakeholder response/involvement**
 - CDC
 - State & Local Health Department
 - Healthcare Providers
 - Other federal agencies e.g. FDA



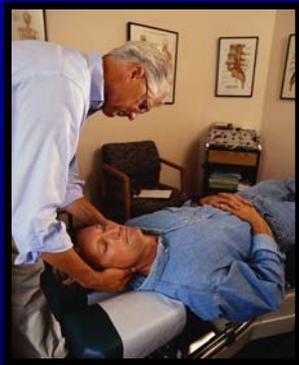
Information Exchange



State
Public
Health

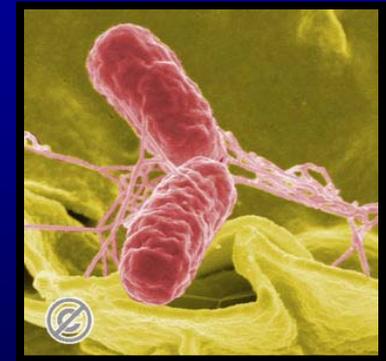
Local
Public
Health

How can providers
be alerted of
outbreaks relevant
to their patient at the
time of care



Patient presents to
clinic exhibiting
gastrointestinal
symptoms

States/CDC
monitoring public
health identify a
Salmonella
outbreak



EHR Public Health Alerting Project



An Example Public Health Problem (Foodborne Diseases)

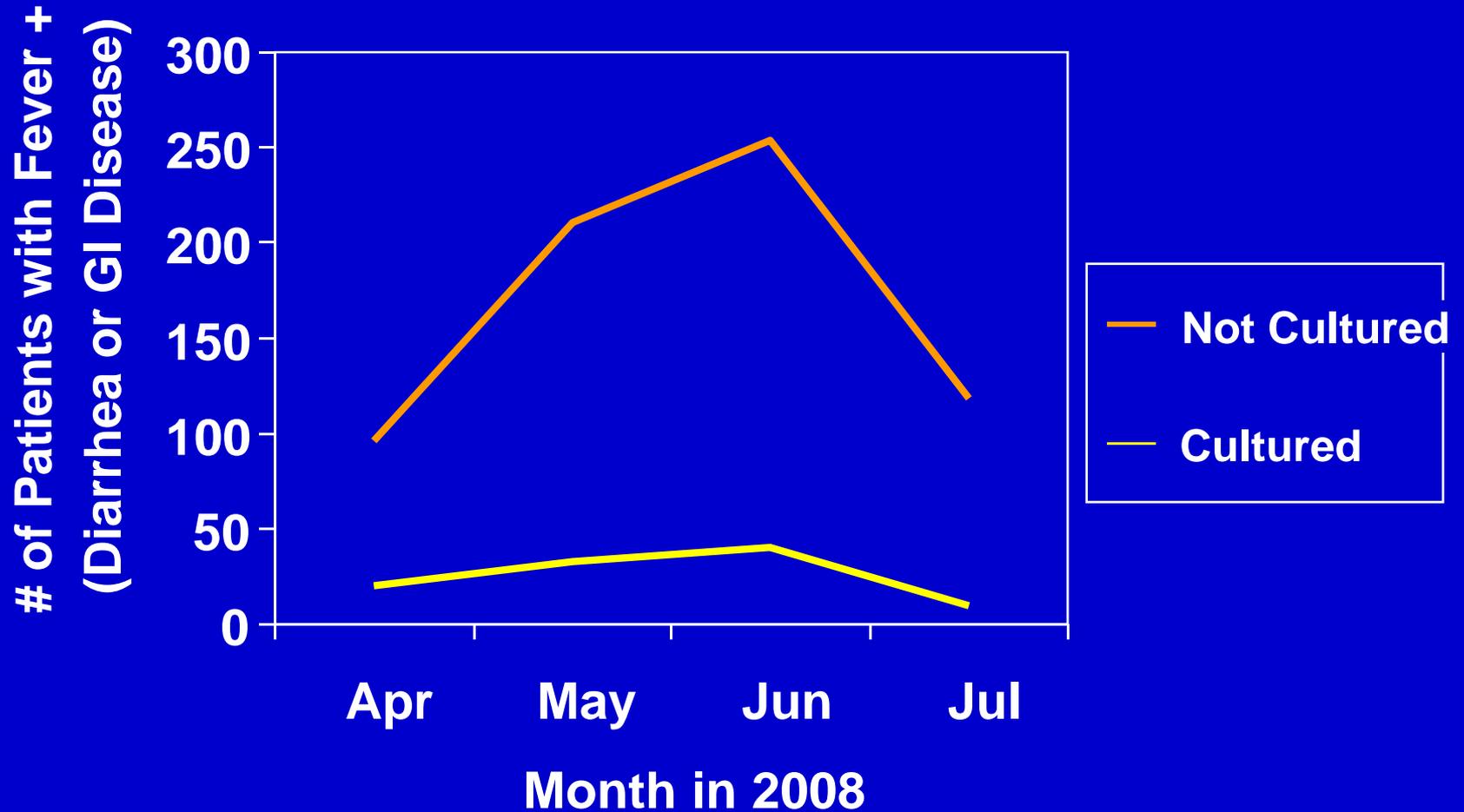
- 350 million episodes per year
- 75 million foodborne illnesses per year
 - ◆ Average person has foodborne illness every 3-4 years
 - ◆ 1 in 1000 Americans hospitalized each year
 - ◆ 5,000 deaths
 - ◆ \$6.5 billion in medical and other costs
 - ◆ Salmonella most frequent – 14.8%
- Outbreak epidemiology changing
 - Centralization, industrialization, globalization
 - Number of outbreaks has increased
- Effective investigations and communication key to reducing burden of foodborne disease



Mead et al. EID 1999 & UpToDate 2008



Clinicians Often Ignore Public Health Issues

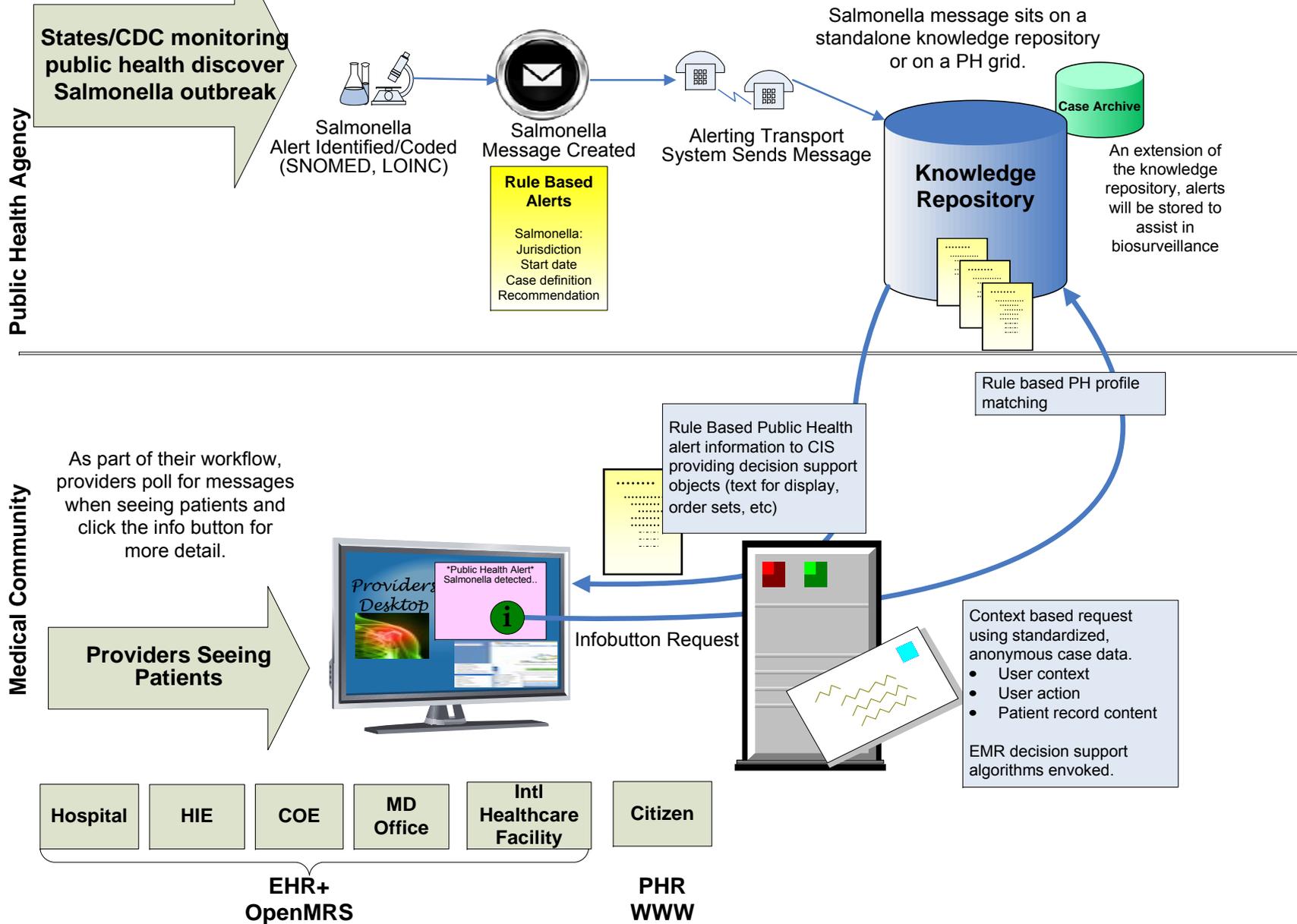


Public Health - EHR Alerting (Long Term Objectives)

- To demonstrate the transmission & integration of public health information into the clinical workflow.
- To determine if public health alerting systems can be leveraged to identify specific patients with risk factors related to the health condition identified in the alert.
- To evaluate the impact using qualitative approaches on clinicians' behaviors.
- To determine if this functionality should be considered as a criterion for EHR certification.



EHR Alerting Concept Diagram



Key Components

- EHR-friendly Message
- Central Alert Repository or Knowledge Base
- Standards based Information Retrieval Mechanism
(EHR to Repository) e.g. *Infobutton*
- Other uses (PHRs, Quality)



EHR Message Components

- **Message data elements:**
 - Disease History/background
 - **Symptoms**
 - **Patient demographics**
 - Characteristics of agent
 - Clinical features of disease
 - Number of cases
 - **Location, jurisdictions or geographic region of outbreak/cases**
 - Dates of outbreak/illness
 - Case definition
 - **Recommendations:**
 - ▲ **Diagnosis: lab testing identification**
 - ▲ **Reporting**
 - ▲ **Treatment**
 - ▲ **Prevention and education**
 - Alert identifier
 - Date of last update
 - Expiry date



EHR Friendly Message

Salmonella PH Alert Message

Message ID #: 2345643

As of 9/20/08, 100 persons with Salmonella have been reported to CDC from two states, Ohio and Pennsylvania. Onset dates range from 9/21/08 – 9/30/08. Illness possibly linked to chicken wings.

Symptoms:

Diarrhea
Fever
Abdominal Cramps

Patient Demographics:

Ages: all
Gender: all
Race: all

Jurisdiction:

Zip codes: 30308, 30331, 32098
45693, 42532, 44523

Recommendations:

Diagnosis by culture of a stool sample
Report positive findings to local health dept
Treatment: Fluids via ORS, Pedialyte, Gatorade
Antibiotic treatment for severe cases only
Prevention: Thoroughly wash and cook foods

Date of last update: 10/1/08

Expiration date: 11/1/08



Alert Knowledge Repository

- **Supports:**
 - **Authoring/editing alerts**
 - **Maintaining alerts**
 - **Archiving Alerts**
 - **Archiving Cases**
- **Interacts with chief complaint parser**
- **Supports matching algorithms**



Public Health Alert Repository

The screenshot shows a Windows Internet Explorer browser window with the address bar displaying https://infoshare.jhuapl.edu/emr_infoshare/ECSMain.gsp. The page title is "Information Exchange - Welcome David Cummo". The interface includes a "Create Event" button and a "Search Criteria" section with a tree view of categories: Cryptosporidium, Pertussis, Salmonella, and Tularemia. A modal dialog box titled "Enter the Alert's Details" is open, showing a form with the following fields:

- Disease/Condition:
- Urgency/Severity: A dropdown menu with options: Information, Not Concerned, Monitoring, Investigating, Responding.
- Issue Date:
- Expiration Date:
- Title:

Below the form is an "Event description" text area. To the right of the form, a table displays a list of alerts:

modified	Syndrome
2009 11:26:15 PM	Salmonella
2009 03:52:33 PM	Salmonella
2009 02:36:07 PM	Salmonella
2009 04:28:14 PM	Salmonella

The browser's taskbar shows the system tray with the Internet icon and a 100% zoom level. The DC logo (Duke University Center for Global Health) is visible in the bottom right corner.



Information Retrieval Mechanism

- **Infobutton: automatic or manual**
 - T81 Infobutton standard
- **Alternative standards**
- **Long term goal:**
 - Vocabulary Service
 - Natural Language Processing (NLP)



Profile Matching (EHR and Knowledge Repository)

Salmonella PH Alert Message

Message ID #: 2345643

As of 9/20/08, 100 persons with Salmonella have been reported to CDC from two states, Ohio and Pennsylvania. Onset dates range from 9/21/08 – 9/30/08. Illness possibly linked to chicken wings.

Symptoms:

Diarrhea MATCH
Fever
Abdominal Cramps MATCH

Patient Demographics:

Ages: all MATCH
Gender: all MATCH
Race: all MATCH

Jurisdiction:

Zip codes: 30308, 30331, 32098 MATCH
45693, 42532, 44523

Recommendations:

Diagnosis by culture of a stool sample
Report positive findings to local health dept
Treatment: Fluids via ORS, Pedialyte, Gatorade
Antibiotic treatment for severe cases only
Prevention: Thoroughly wash and cook foods

Date of last update: 10/1/08

Expiration date: 11/1/08

EHR Anonymous Patient Profile Message

Chief Complaint(s):

Diarrhea
Abdominal Cramps

Patient Demographics:

Age: 25
Gender: Male
Race: Caucasian

Jurisdiction:

Zip code: 30331

Public Health on the Clinician Desktop

C:\Documents and Settings\lna4\Desktop\classifieds_video_with_audio\emr_vid2\emr_vid2_skin.swf - Windows Internet Explorer prov

C:\Documents and Settings\lna4\Desktop\classifieds_video_with_audio\emr_vid2\emr_vid2_skin.swf

File Edit View Favorites Tools Help

InfoButton to InfoShare Public Health Alerts Demo - Windows Internet Explorer

https://infoshare.fhuapl.edu/emr_infoshare/InfoButtonRequest

File Edit View Favorites Tools Help

Google Search Bookmarks Find Check AutoFill Sign In

InfoButton to InfoShare Public Health Alerts Demo

GE Healthcare The University of Utah Biomedical Informatics

CDC Centers for Disease Control and Prevention Your Online Source for Credible Health Information

APL The Johns Hopkins University APPLIED PHYSICS LABORATORY

Current Public Health Alerts for:

- Chief Complaint: Diarrhea abdominal pain
- Service Delivery ZIP: 60513
- Patient ZIP: not specified
- Patient Gender: Male
- Patient Age: 44
- Encounter Date: Mon Sep 29 21:40:37 EDT 2008

Foodborne Outbreak of Salmonella in Two States
Investigating | Salmonella | 9/25/08 - 11/7/08

Public health officials in two states, with the assistance of the Centers for Disease Control and Prevention, are investigating a large outbreak of Salmonella Tennessee infections. As of September 20, 2008, 100 persons with lab confirmed illness have been reported to CDC from two states, Illinois and Indiana. Patients' addresses fall in B-123 jurisdictions and clinician locations fall in A-211 jurisdictions. State public health officials continue to investigate cases of illness. Among 100 patients for whom clinical information is available, 25 (25%) were hospitalized. There have been no reports of deaths attributed to this infection. Onset dates, which are known for 100 patients, ranged from September 21, 2008 to September 30, 2008.

+ Show/Hide Details

start

Internet 100%

CDC SAFER • HEALTHIER • PEOPLE



Next Steps

- Evaluate use with multiple standards
- Test implementation in different/multiple environments
 - Health Information Exchanges
 - Personal Health Records
- Promote within NHIN environment
- Implement at pilot sites





Sticky: All Portal Users

Map

Shared: All Portal Users

U.S. Influenza Sentinel Providers Surveillance Network Data, Influenza-Like Illness, United States, January 4 - 10, 2004, Shaded By: Facility

Select Data:

- DoD/VA Diagnosis
- BioSense Hospitals Diagnosis
- BioSense Hospitals Chief Complaint
- Sentinel Providers**
- WHO/NREVSS Labs
- State and Territorial Epidemiologists

Map of:

- United States**
- State
- Health District
- County

Shade by:

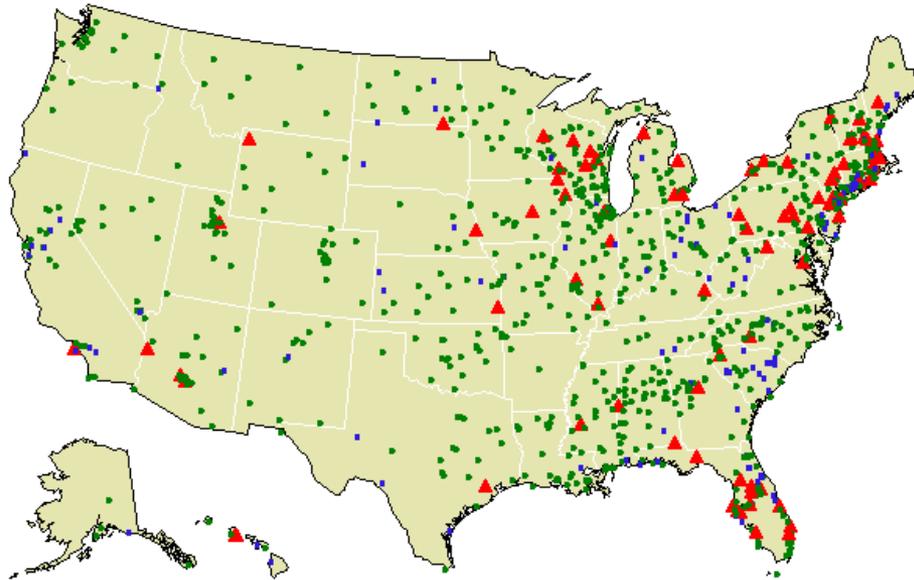
- Federal Region
- Census Division
- Facility**

Flu Season

- 2003-2004
- 2004-2005
- 2005-2006
- 2006-2007
- 2007-2008

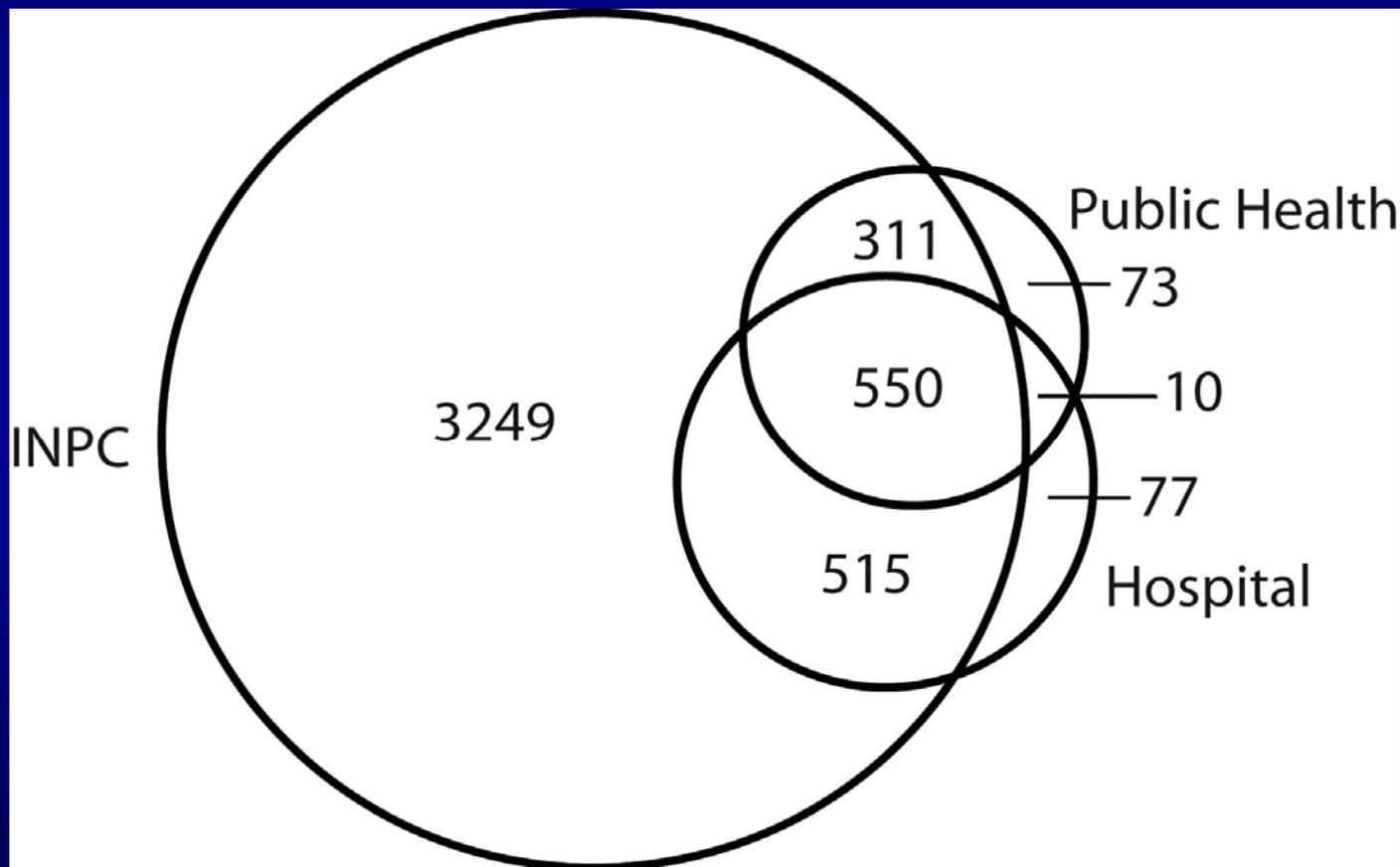
Flu Season Week

- 51 - Week ending 12/20/03
- 52 - Week ending 12/27/03
- 53 - Week ending 01/03/04
- 01 - Week ending 01/10/04**



Automated Reporting

Overlap in 4785 unique cases identified by electronic laboratory reporting (Indiana Network for Patient Care [INPC]) and passive surveillance methods (public health department and hospital laboratories): Indianapolis, Ind, 2001



Overhage J. M. et al. Am J Public Health 2008;98:344-350



Public Health Alerting in EHR Systems

**View the live demonstration at the
HIMSS Interoperability Showcase
located in Hall B1 Booth 7750**



Acknowledgements

Centers for Disease Control & Prevention

- Nedra Garrett, MS
- Charles Safran, MD, MS
- Charles Magruder, MD, MPH
- Ninad Mishra, MD, MS
- Jess Lee
- Dave Cummo
- Barb Nichols
- Bill Scott

Utah Center of Excellence

- Matthew Samore, MD
- Catherine Staes, MPH, PhD

GE Healthcare

- Keith Boone
- Mark Dente, MD
- Bill Howard

Johns Hopkins - APL

- Joseph Lombardo, MS
- Wayne Loschen
- Nathaniel 'Tabernerero
- Richard Seagraves



Contact

For more information:

Nedra Garrett

Project Lead

CDC/NCPHI

404.498.6446

NGarrett@cdc.gov

