

Determining ROI for Public Health IT Systems



UNC
SCHOOL OF MEDICINE

Amy Ising, MSIS
Department of Emergency Medicine,
University of North Carolina at Chapel Hill School of Medicine

Tuesday, September 22, 2009, 9:30 to 10:20 am EDT

Session Objectives

- Describe use of IT in public health.
- Describe the value of several different public health IT exemplar systems.
- Understand US policy as it relates to public health IT and investment in public health infrastructure.
- Understand global perspective of public health IT systems, including the WHO International Health Regulations.

Presentation Overview

- Background: Public Health IT
- Federal health IT initiatives and role of PH IT systems
- The challenge: determining ROI for public health
- Value of PH IT exemplar systems
- The Global Perspective

Acknowledgements

- HIMSS Public Health Davies Award Winners
 - Michael Toedt, Cherokee Indian Health Authority
 - Simi Octania-Pole, NJ CDRSS
- NACCHO Webinar on Public Health Informatics:
<http://www.naccho.org/topics/infrastructure/informatics/training.cfm>

Defining Public Health

- “Public health is the practice of preventing disease and promoting good health within **groups of people**, from small communities to entire countries.” (APHA, “What is Public Health”)
- “Protect. Promote. Prevent” (NACCHO)
- “Health care is vital to all of us some of the time, but public health is vital to all of us all of the time.” – C. Everett Koop

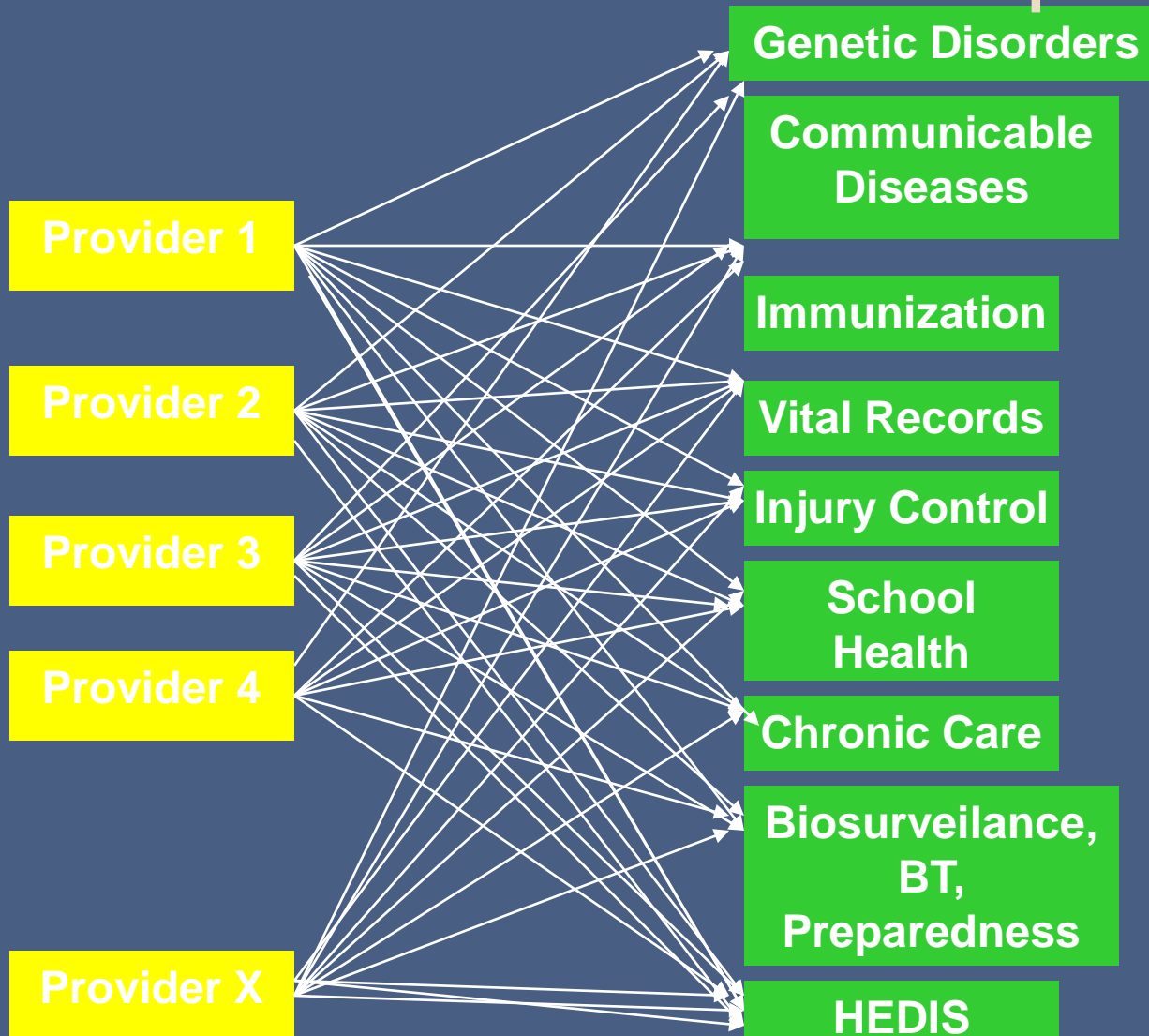
Responsibilities of *Local* PH Agencies: 2003

Personal Health Services	(%)	Population Level Services	(%)
Adult Immunizations	91	Communicable Disease Control	94
Childhood Immunizations	89	Health Education	87
Tuberculosis Testing	88	Epidemiology and Surveillance	84
STD Testing and Counseling	65	High Blood Pressure Screening	81
HIV Testing and Counseling	64	Tobacco Use Reduction	68
EPSDT (Medicaid screenings)	59	Cancer Screening	58
Family Planning	58	Diabetes Screening	53
WIC	55	Cardiovascular Disease Screening	50
Prenatal Care	41	Injury Control	37
Dental Care	30	Violence Prevention	22
HIV Treatment	25	Occupational Safety and Health	13
Primary Care	18		

Source: Scutchfield, F.D., & Keck, C.W. Principles of public health practice, 2nd ed. 2003, Thomson/Delmar Learning: Clifton Park, NY. ; slide from NACCHO Webinar on Public Health Informatics

Public Health IT Systems: Current State

Public Health Data Reporting



On average
49% of cases
got reported
(CDC, 2006).

Public Health IT Systems: National initiatives to improve data sharing

Pandemic and All-Hazards Preparedness Act

*“The Secretary, in collaboration with State, local, and tribal public health officials, shall establish a near real-time electronic nationwide public health situational awareness capability through an **interoperable network of systems... Such network shall be built on existing State situational awareness systems or enhanced systems that enable such connectivity.**”*

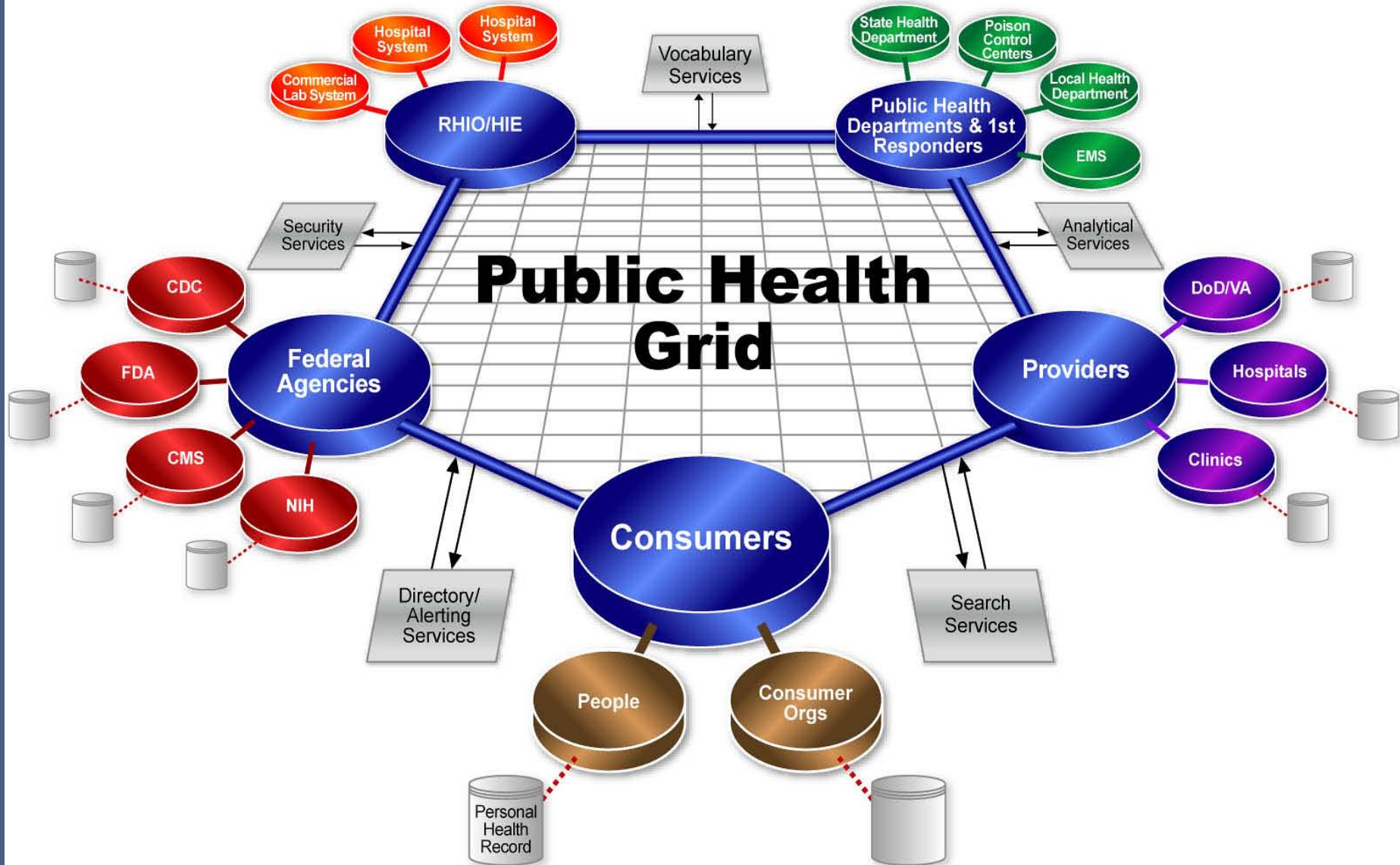
109th Congress of the United States, Amendment to the Public Service Act.
Pandemic and All-Hazards Preparedness Act. (2006). Pub L No. 109-417, 101 et seq.

Presidential Directive (HSPD-21)

*“The Secretary of Health and Human Services shall establish an operational national epidemiologic surveillance system for human health, with international connectivity where appropriate, that is predicated on State, regional, and community-level capabilities and **creates a networked system to allow for two-way information flow between and among Federal, State, and local government public health authorities and clinical health care providers.**”*

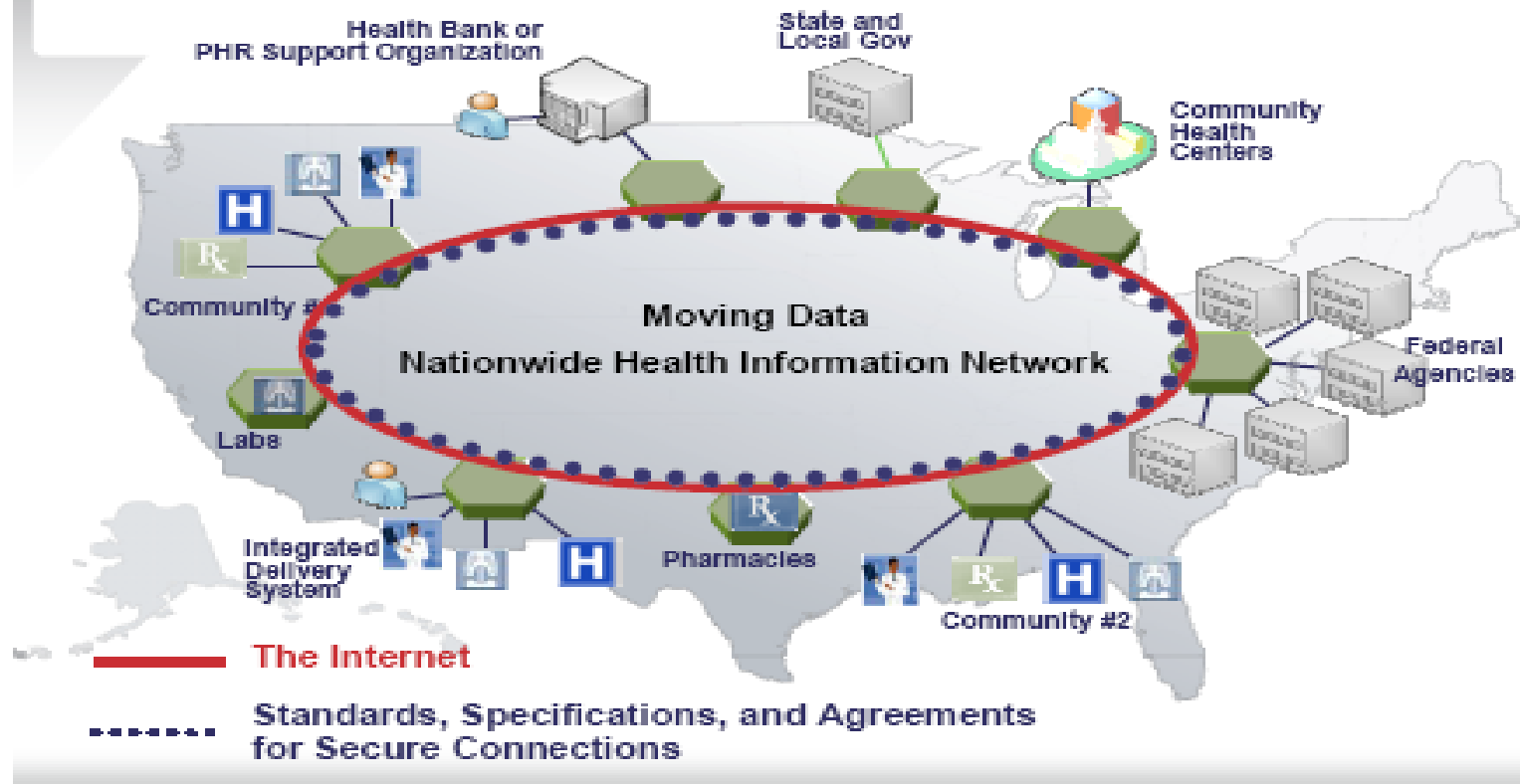
<http://www.fas.org/irp/offdocs/nspd/hspd-21.htm>

Public Health GRID



ONC HIT Strategic Plan, 2008-2012

Using the Power of Health IT to Transform Health and Care



http://healthit.hhs.gov/portal/server.pt/gateway/PTARGS_0_10731_848084_0_0_18/HITStrategicPlanSummary508.pdf

June 16, 2009 Meaningful Use Matrix (HITECH)

Health Outcomes Policy Priorities	Care Goals	2011 Objectives <i>Goal is to electronically capture in coded format and to report health information and to use that information to track key clinical conditions</i>	2011 Measures	2013 Objectives <i>Goal is to guide and support care processes and care coordination</i>	2013 Measures	2015 Objectives <i>Goal is to achieve and improve performance and support care processes and on key health system outcomes</i>	2015 Measures
Improve quality, safety, efficiency, and reduce health disparities	<ul style="list-style-type: none"> • Provide access to comprehensive patient health data for patient's health care team • Use evidence-based order sets and CPOE • Apply clinical decision support at the point of care • Generate lists of patients who need care and use them to reach out to patients (e.g., reminders, care instructions, etc.) • Report to patient registries for quality improvement, public reporting, etc 	<ul style="list-style-type: none"> • Use CPOE for all order types including medications [OP, IP] • Implement drug-drug, drug-allergy, drug-formulary checks [OP, IP] • Maintain an up-to-date problem list [OP, IP] • Generate and transmit permissible prescriptions electronically (eRx) [OP] • Maintain active medication list [OP, IP] • Maintain active medication allergy list [OP, IP] • Record primary language, insurance type, gender, race, ethnicity [OP, IP] • Record vital signs including weight, weight, blood pressure [OP, IP] • Incorporate lab-test results into EHR [OP, IP] • Generate lists of patients by specific condition to use for quality improvement, reduction of disparities, and outreach [OP] • Send reminders to patients per patient preference for preventive /follow up care [OP, IP] 	<ul style="list-style-type: none"> • Report quality measures, including: <ul style="list-style-type: none"> - % diabetics with A1c under control [OP] - % hypertensive patients with BP under control [OP] - % of patients with LDL under control [OP] - % of smokers offered smoking cessation counseling [OP, IP] • % of patients with recorded BMI [OP] • % eligible surgical patients who received VTE prophylaxis [IP] • % of orders entered directly by physicians through CPOE • Use of high-risk medications in the elderly [OP, IP] • % of patients over 50 with annual colorectal cancer screenings [OP] 	<ul style="list-style-type: none"> • Use evidence-based order sets [OP, IP] • Record clinical documentation in EHR [IP] • Generate and transmit permissible prescriptions electronically [IP] • Manage chronic conditions using patient lists and decision support [OP, IP] • Provide clinical decision support at the point of care (e.g., reminders, alerts) [OP, IP] • Report to external disease (e.g., cancer) or device registries [OP (esp. specialists)] [IP] • Conduct medication administration using bar coding [IP] 	<ul style="list-style-type: none"> • Additional quality reports using HIT-enabled NQF-endorsed quality measures [OP, IP] • % of all orders entered by physicians through CPOE [OP, IP] • Potentially preventable Emergency Department Visits and Hospitalizations [IP] • Inappropriate use of imaging (e.g. MRI for acute low back pain) [OP, IP] • Other efficiency measure (TBD) [OP, IP] 	<ul style="list-style-type: none"> • Achieve minimal levels of performance on quality, safety, and efficiency measures • Implement clinical decision support for national high priority conditions [OP, IP] • Medical device interoperability [OP, IP] • Multimedia support (e.g. x-rays) [OP, IP] 	<ul style="list-style-type: none"> • Clinical outcome measures (TBD) [OP, IP] • Efficiency measures (TBD) [OP, IP] • Safety measures (TBD) [OP, IP]

How do you determine PH IT ROI, value, best practices?

Traditional Means:

- Cost Savings: Does the IT system save us money (eventually)?
- “Soft” ROI: Are lives saved? Is quality of life improved? Is there an overall reduction in morbidity and mortality? Can people do their jobs more effectively and efficiently? Can they do their jobs better?

Guidelines for evaluating PH IT

- *WHO: Evaluating the costs and benefits of national surveillance and response systems. Ways to measure benefits:*
 - Numbers of cases and deaths averted
 - DALYs = Disability Adjusted Life Years
 - Cost of illness
 - Willingness to pay
 - Contingency valuation
 - Legal compensation benefits
 - Avoidance of disruption
 - Health security
 - Secondary uses of surveillance data

Guidelines for evaluating PH IT

- *CDC: Framework for Evaluating Public Health Surveillance Systems (for Early Detection of Outbreaks)*
 - Timeliness
 - Validity
 - Data quality
 - Usefulness
 - Flexibility
 - Acceptability
 - Portability
 - Stability
 - Costs

The Challenge: ROI & Public Health IT

- Public Health IT systems support “Public Goods,” e.g. clean air, clean water
 - Cannot restrict use to those who pay
 - Use of the good by one does not reduce its use by others
- Confounding factors
- Quantifying the “unobserved counterfactual,” e.g. the prevented heart attack, the non-transmission of HIV.

Public Health IT Value Success Stories

- Recent HIMSS Davies Public Health Award recipients:
http://www.himss.org/davies/pastRecipients_ph.asp
 - Cherokee Indian Hospital Authority (CIHA)
 - NJ CDRSS
- Status of NC EDSS & NC DETECT
- Global Perspective

Cherokee Indian Hospital Authority (CIHA)

Recipient of the 2008 Nicholas E.
Davies Award of Excellence for
Public Health

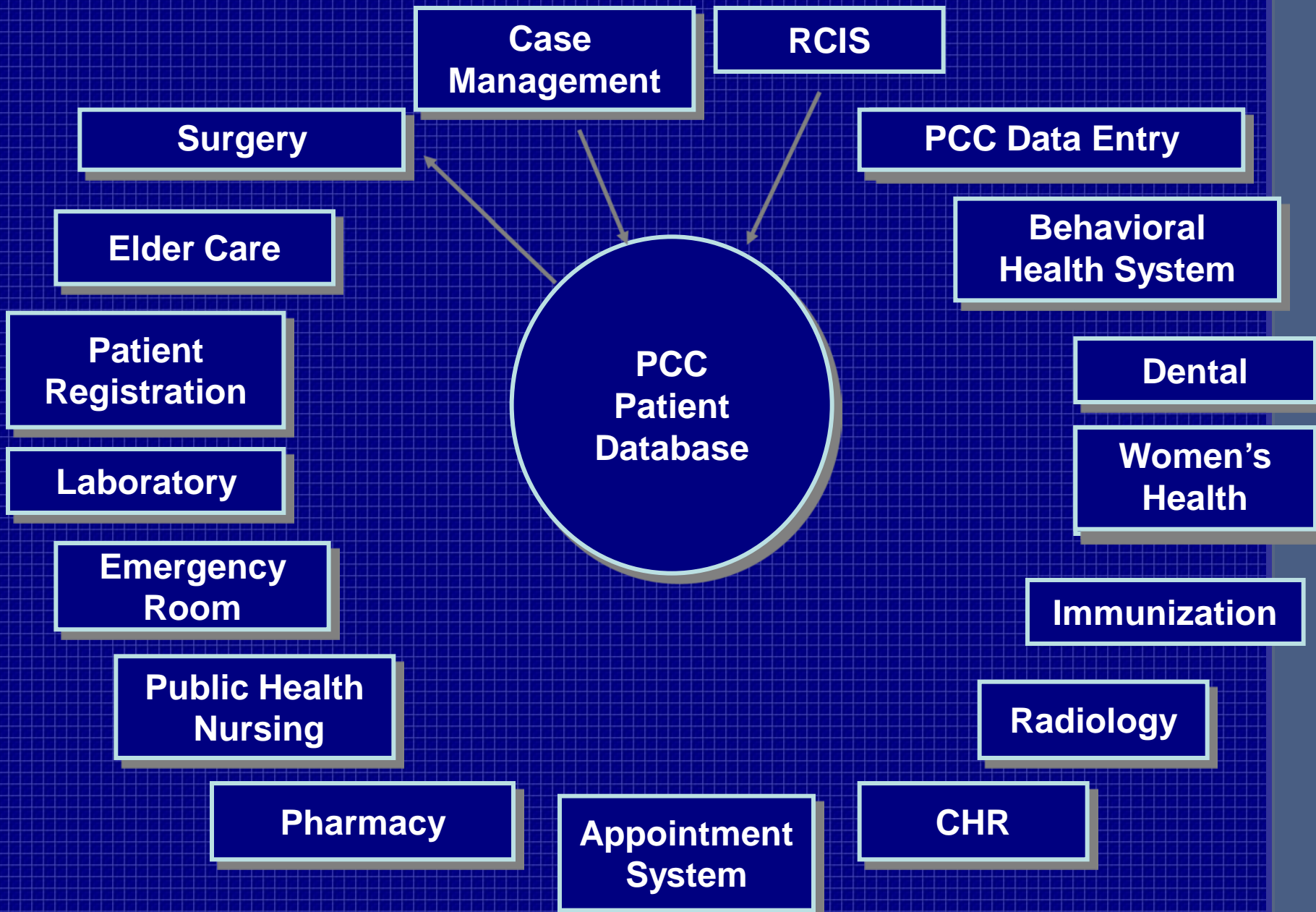
CIHA

- Former IHS Hospital – Became an independent entity of the Eastern Band of Cherokee Indians in 2002
- Integrates with other Tribal Programs including
 - Women's Wellness
 - Diabetes Clinic
 - Teen Clinic
 - Community Health Nursing
 - Public Health Nursing

CIHA: RPMS

- Resource Patient Management System (RPMS) as the database for patient information.
 - Developed in the 1970s
- The Patient Care Component (PCC) and the Indian Health Service Electronic Health Record (EHR) are tools to enable the entry of patient data into the database.
 - PCC developed in the 1980s
- A number of packages have been added to improve the functionality of the RPMS system.





Source: Michael Toedt, Cherokee Indian Hospital Authority

Non-RPMS Systems Integration

- RPMS server / Local Network / EHR
- VISTA imaging – scanned documents
- Phillips PACS – radiology
- Quest – lab package
- NC Immunization Registry
- NC Controlled Substances Registry
- WNC Datalink – 16 WNC Hospitals
- Clinical References / Decision Support

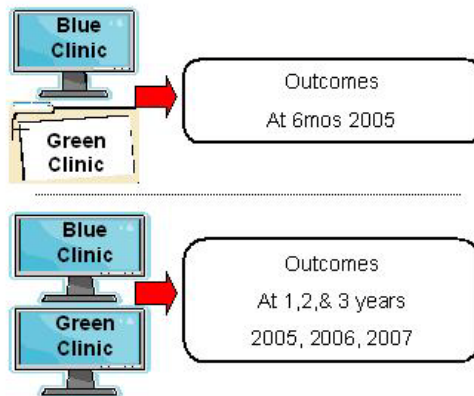
Improvements in Screening Rates, Immunization Rate, and Clinical Outcomes using an Electronic Health Record

BACKGROUND

- User population of 10,000 patients
- 1,800 outpatient clinic visits per month
- Patients empanelled to one of two clinics:
 - Blue clinic - began EHR January 2005
 - Green clinic - began EHR July 2005

METHODS

- Selected 10 standardized process measures
- Measured retrospectively at:
 - Baseline (2004)
 - 6 months (June 30, 2005)
 - 1 year (2005)
 - 2 years (2006)
 - 3 years (2007)



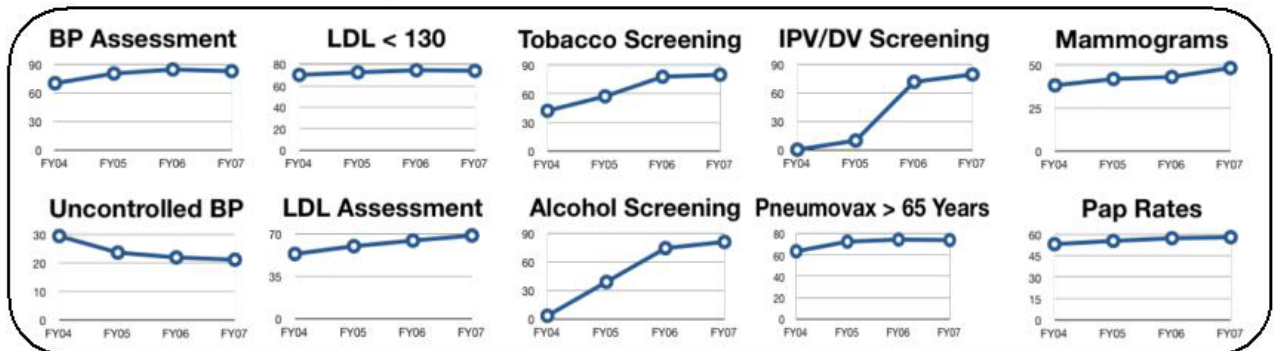
RESULTS - Six Months after EHR

- Blue (EHR) clinic improved process measures
- Improvements exceeded the Green (paper) clinic



RESULTS - One, Two, & Three Years after EHR

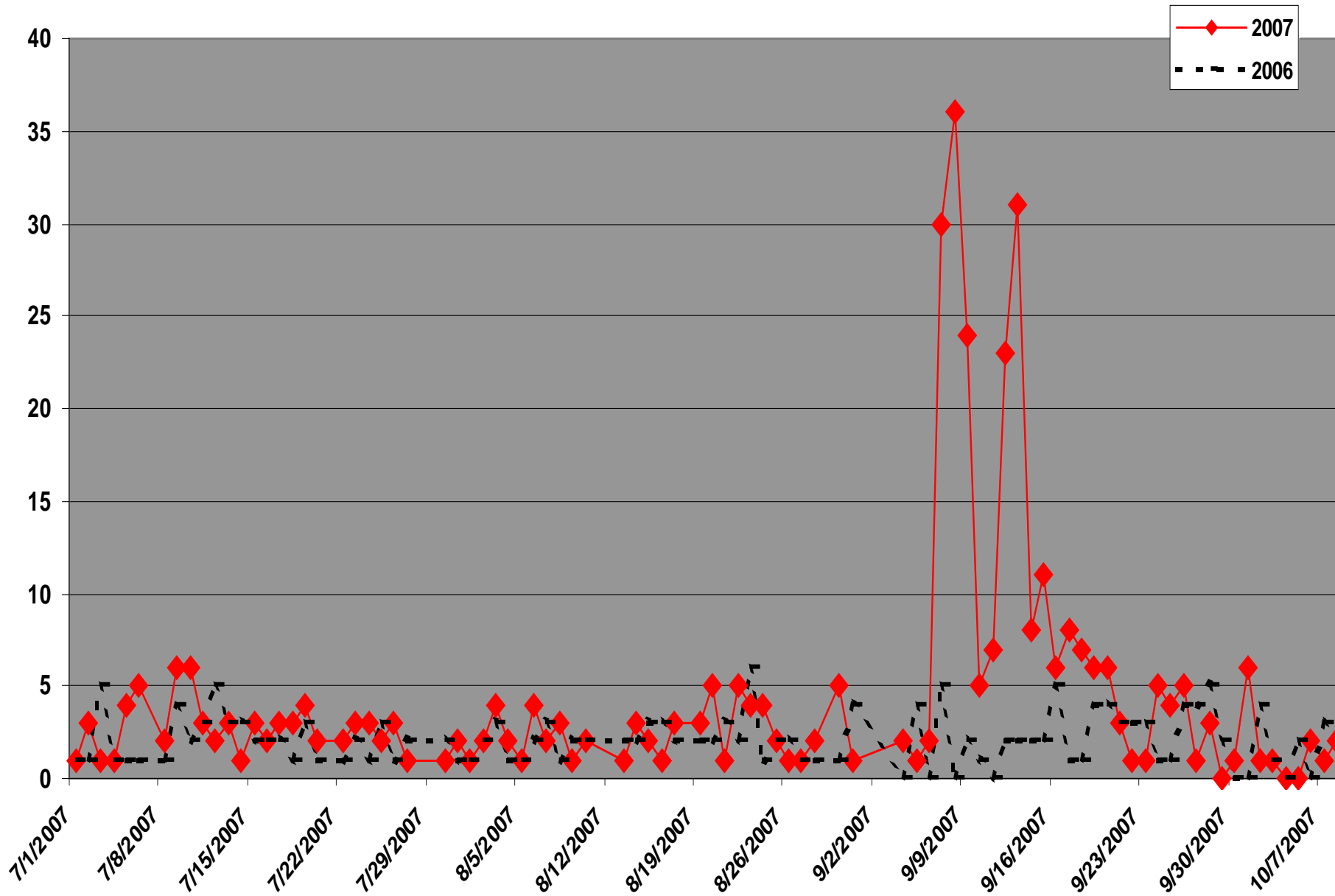
- Blue and Green clinic both use EHR
- Rates are equivalent
- Rates are sustained at 2 and 3 years



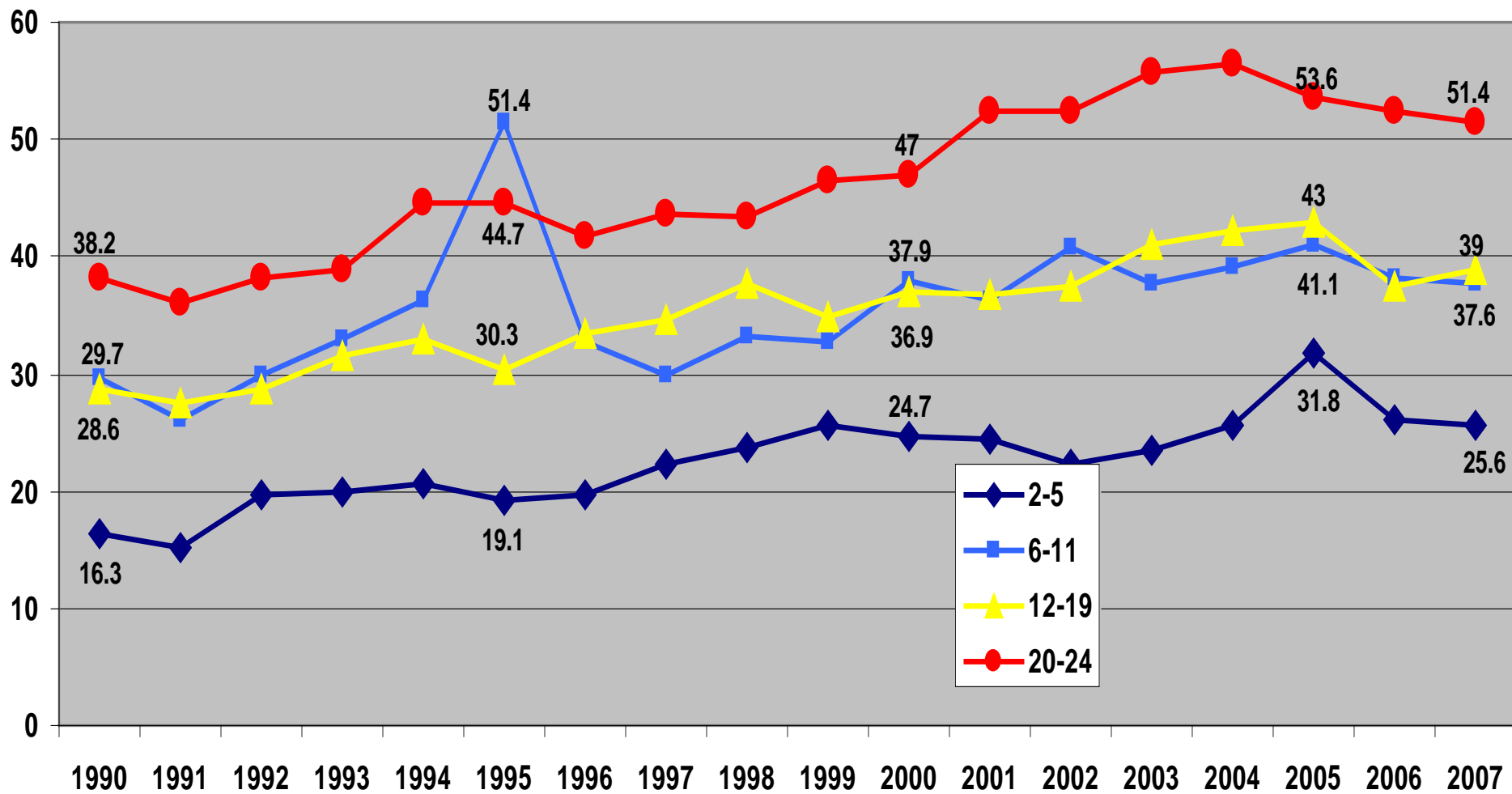
DISCUSSION

- Implementation of the EHR in the outpatient clinics increased documentation rates and improvements in all ten of the reported outcome measures.
- Measures improved shortly after implementing the EHR
- Increases remain sustained after three years, despite an increasing user population and staff turnover.
- A number of factors may have resulted in the improved documentation after implementation of the EHR
 - Provision of clinical decision-making tools
 - Notifications
 - Improved documentation ease
 - Improved documentation awareness
 - Elimination of unclear documentation
 - Elimination of illegible documentation

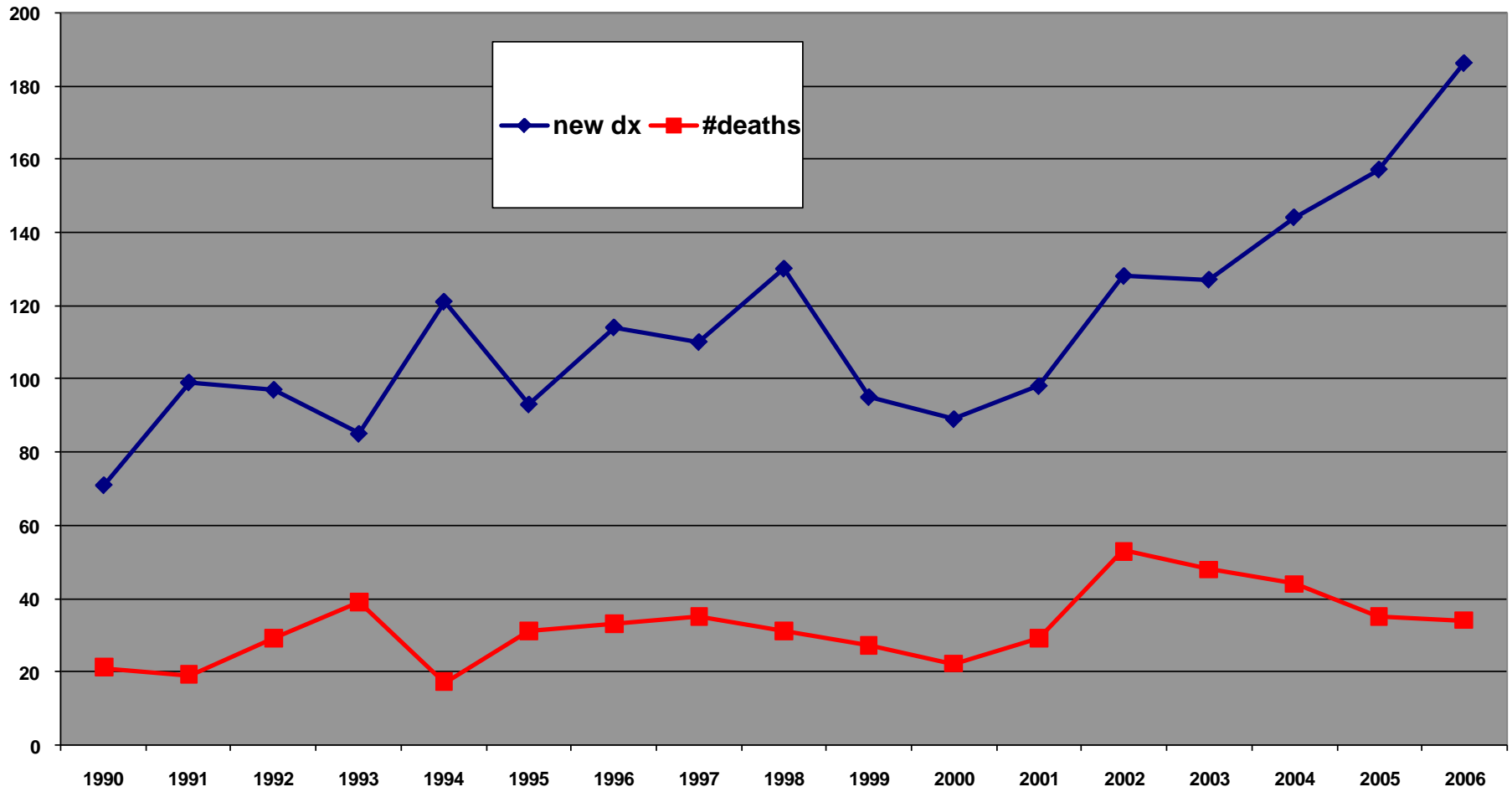
Number of Visits to OPD and ER with Diarrhea-Gastroenteritis Type Visit Codes



**Percentages of Active Clinical Users Per Age Group
Defined as Obese per Standard Tables and Definitions
1990 - 2007**



Number of Patients with New Diabetes Diagnoses
and Number of Diabetes Patient Deaths Per Year
1990-2006



Source: Michael Toedt, Cherokee Indian Hospital Authority

The New Jersey Communicable Disease Reporting and Surveillance System (CDRSS)

Recipient of the 2008 Nicholas E.
Davies Award of Excellence for
Public Health

The State

- Population: 8.7 million (2006 U.S. Census)
- 21 counties
- 566 municipalities
- 114 local health departments
- 74 acute care facilities



The Stakeholders

Over 1200 users representing the following

- ❑ New Jersey Department of Health and Senior Services (NJDHSS) – nurses, epidemiologists clerks and lab staff
- ❑ Local Health Departments (LHDs) – health officers, nurses, epidemiologists and clerks
- ❑ Hospital – Infection control professionals (ICPs), lab staff
- ❑ Commercial labs

All entities are required to collaborate and report as per New Jersey Administrative Code

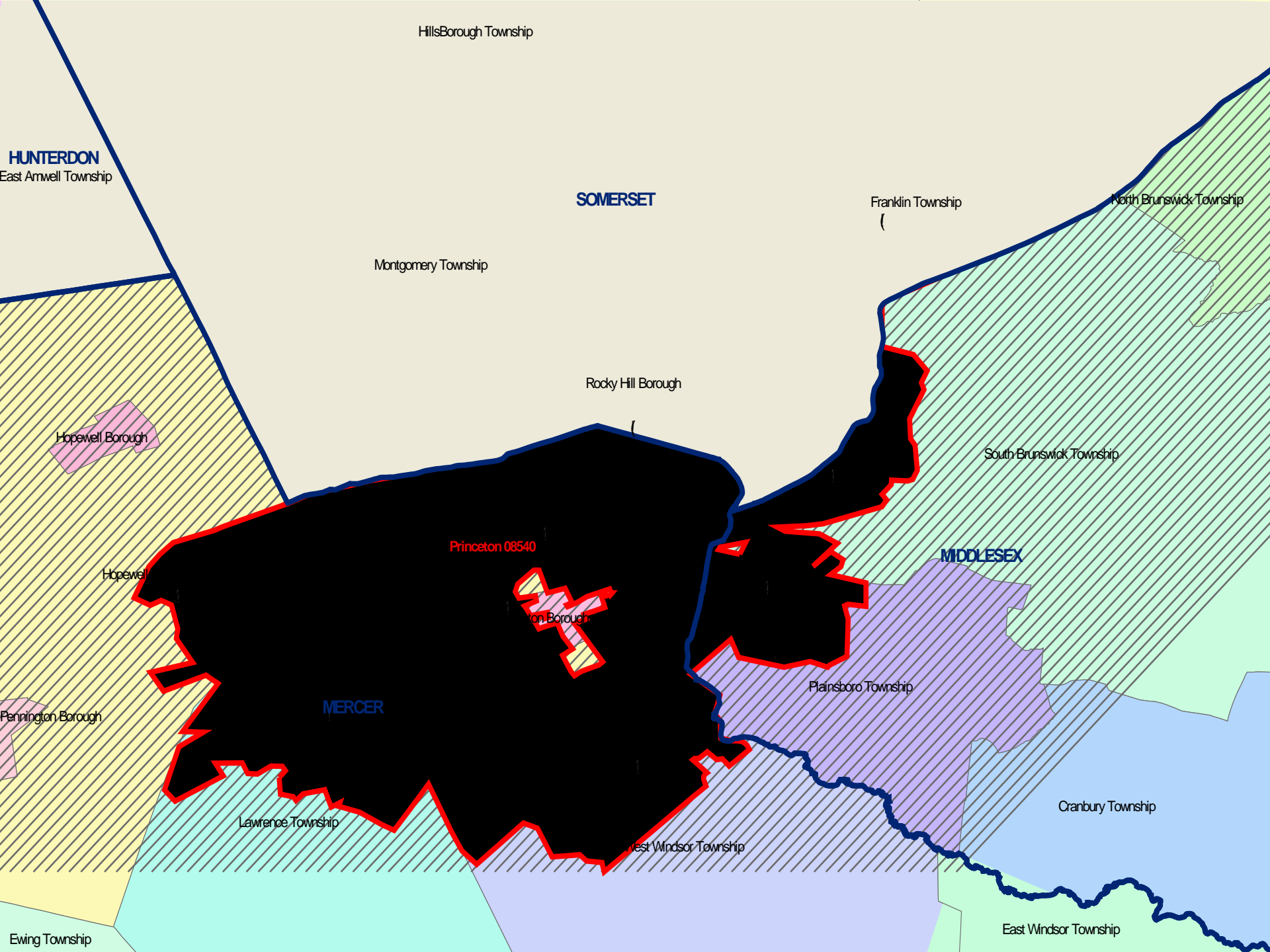
CDRSS Highlights

- Patient-centric, web-enabled, PHIN-compliant
- Integrated electronic laboratory reporting (ELR)
- Extensive fields for case and outbreak management
- Integrated analysis, visualization and reporting tools
- Modules for reporting aggregate data for:
 - Influenza-like illness
 - Antimicrobial resistance
- Built-in administrative flexibility to add and manage diseases, dropdown values, reporting criteria, etc.

Complicated Geography

Example

ADDRESS	CITY	ZIPCODE
30 Bayberry Rd	Princeton	08540
50 Carson Rd	Princeton	08540
62 Roszel Rd	Princeton	08540
110 College Rd	Princeton	08540
200 State Rd	Princeton	08540
50 Westcott Rd	Princeton	08540
256 Bunker Hill Rd	Princeton	08540
833 Raymond Rd	Princeton	08540
55 Truman Av	Princeton	08540



Hillsborough Township

HUNTERDON
East Amwell Township

SOMERSET

Franklin Township

North Brunswick Township

Montgomery Township

Rocky Hill Borough

South Brunswick Township

Princeton 08540

MIDDLESEX

Hopewell

Princeton Borough

Plainsboro Township

Pennington Borough

MERCER

Cranbury Township

Lawrence Township

West Windsor Township

East Windsor Township

Ewing Township

Same city name and ZIP code – Eight different Health Departments!

Municipality	County	Health Department
Franklin Twp	Somerset	Franklin Twp HD
Montgomery Twp		Montgomery HD
South Brunswick	Middlesex	South Brunswick HD
Plainsboro Twp		Middlesex County HD
Lawrence Twp	Mercer	Lawrence Twp HD
West Windsor Twp		West Windsor HD
Princeton Boro		Princeton Regional Health Commission
Princeton Twp		
Hopewell Twp		

Electronic Laboratory Reporting (ELR)

- Fully integrated ELR
- Standardized information adhering to CDC and national standards
- Administrative flexibility to assign LOINC/SNOMED codes for processing new lab results
- Error reports to track problems and streamline reporting

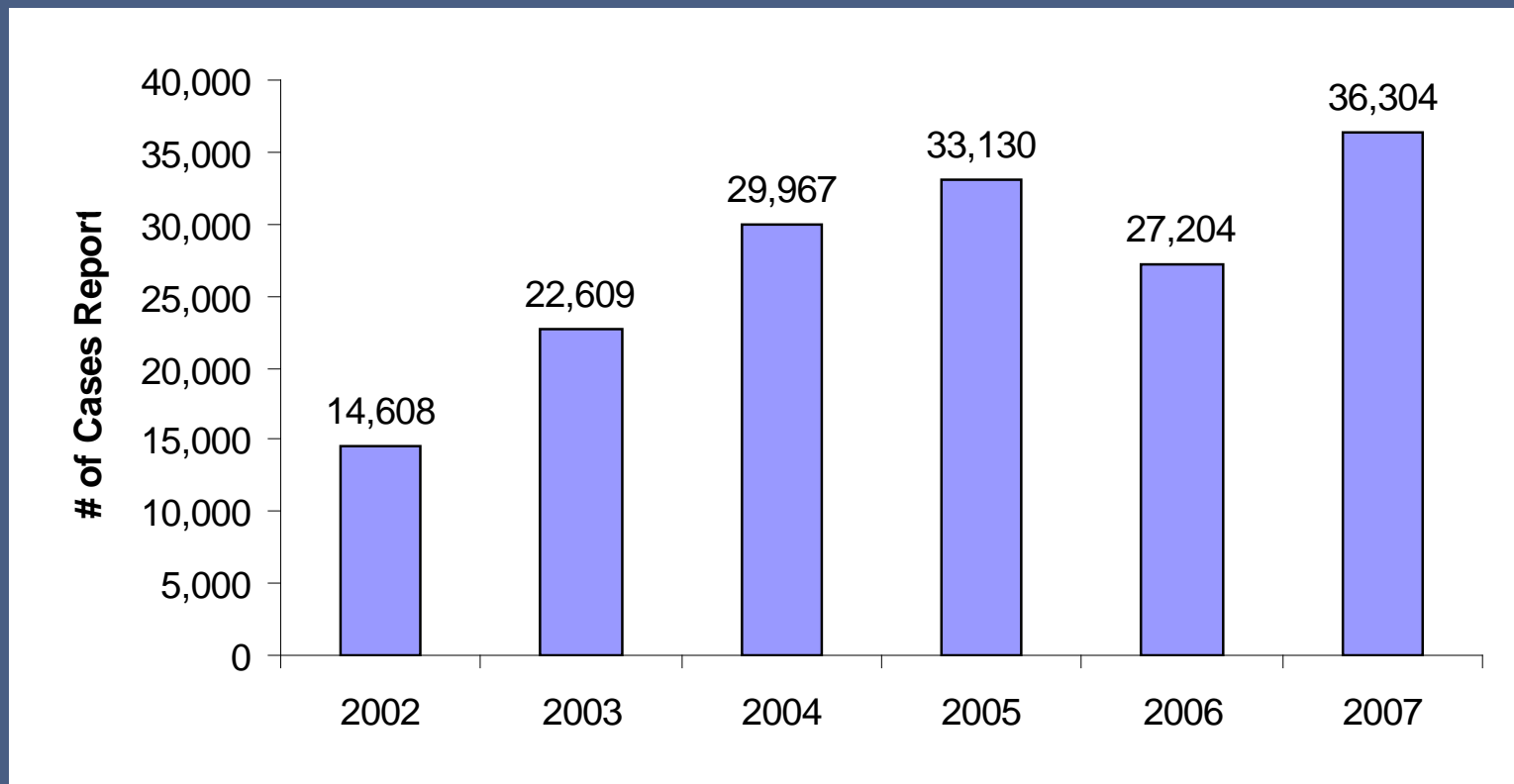
Extensive Analysis, Visualization and Reporting Tools

- Tables and lists – Over 175 reports
 - Disease / case management
 - Resource management
 - Grants / funding / presentations
 - Data analysis / research
- Maps
- Charts / Graphs

Outcome 1. Improved timeliness and response of notifiable disease reporting and follow up

- An internal study determined that users entered cases an average of 3-4 days after illness onset in 2004, compared to 28 days in 2003
- In 2004, NJ identified a multistate outbreak of *Salmonella berta*
- An internal study shows timely prophylaxis of HAV contacts from 35% in 2005 to 99% in 2007

Outcome 2. Minimized underreporting



Note: 2006 decline attributed to decrease in Lyme disease reporting

Outcome 3. Improved data quality by enhancing communication and report completeness

- **Streamlined communications for meningococcal disease follow up in a daycare attendee**
- **Enhanced hepatitis B monitoring for perinatal follow up**

Status of NC EDSS & NC DETECT

North Carolina Electronic Disease Surveillance System

Event Summary

Basic Information	Notes
Event ID:	
Disease:	
Primary Person:	
Type:	
Investigation Status:	
Linked Events/Contacts:	
Linked Exposure Sites:	
Attachments:	

[Edit Event Properties](#)

Event Information

Event Data	Lab Results	Concerns	Persons	Tasks	Event Properties	Event History
-------------------	-------------	----------	---------	-------	------------------	---------------

Question Packages

QUESTION PACKAGE	PERSON	LAST UPDATE	UPDATED BY	STATUS

[View Question Package](#)

Question Package - Details

Name:	
Description:	
Person:	
Status:	
Number of Questions:	
Incomplete Required Questions:	
Last Update:	
Updated By:	

- Commercial-off-the-shelf
- Intensively Customized
- Web-based
- PHIN compliant

NC EDSS Replaces

Replaces:

- TIMS- Tuberculosis
- NETSS- General communicable diseases + VPD
- STD*MIS- STD
- Perinatal Hepatitis B Database

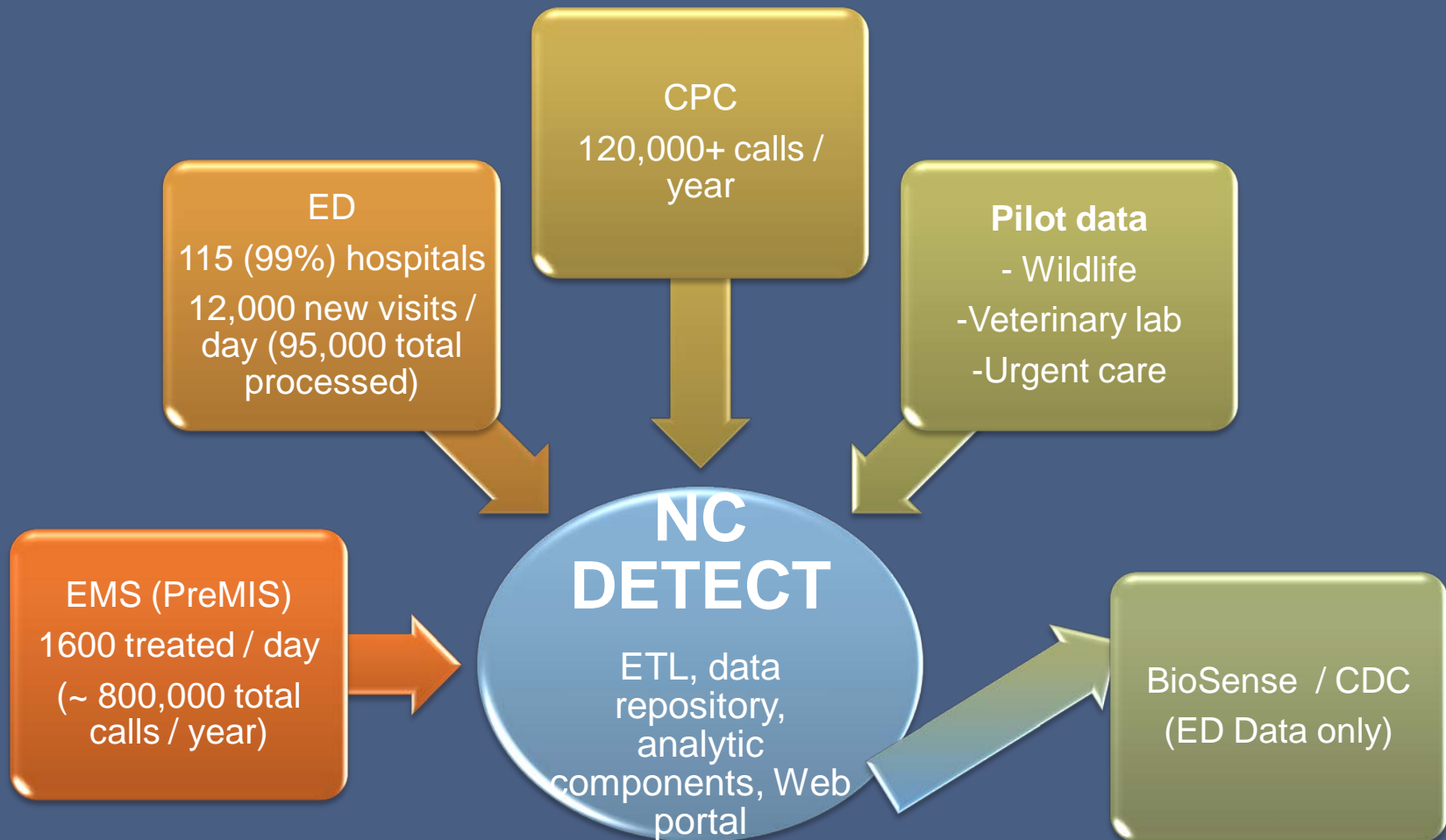
Will replace:

- NC VDRS- Violent Death Reporting
- ABLES- Adult Blood Lead (Occupational Surveillance)
- STELLAR + Other databases- Childhood Blood Lead Levels & Contaminated Property Remediation

NC EDSS Challenges

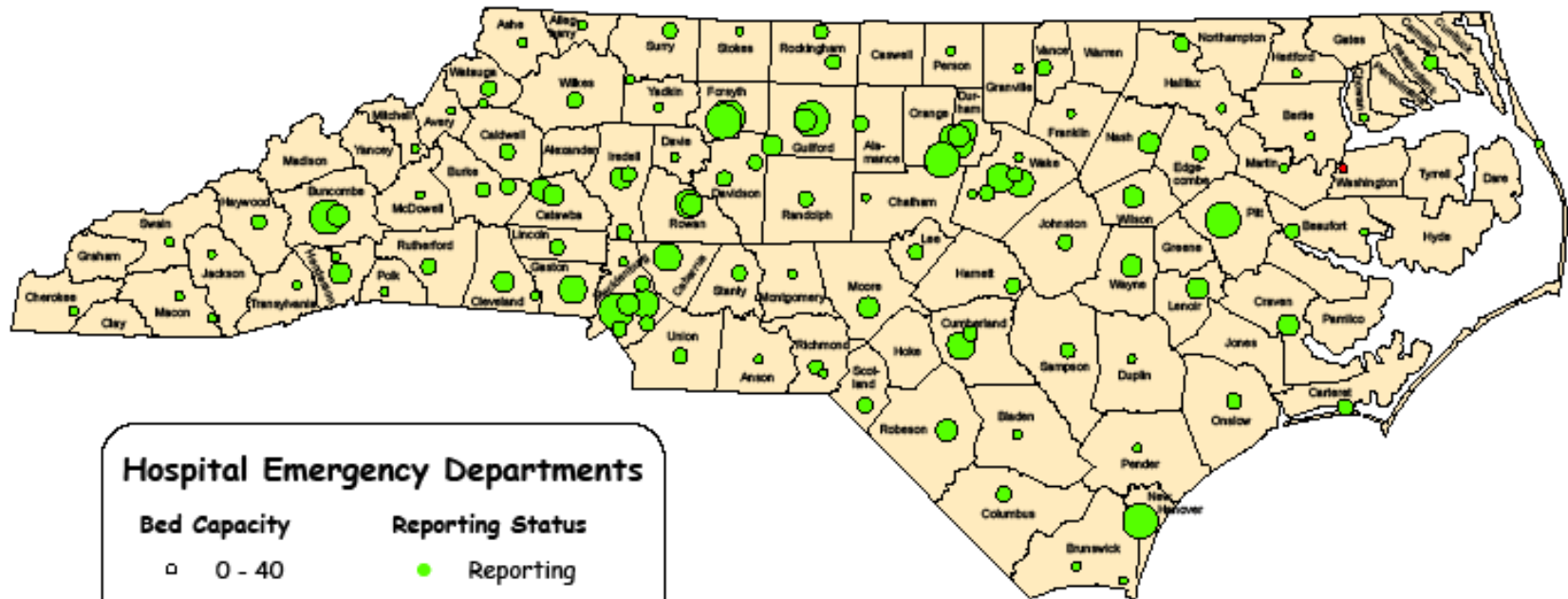
- Workforce
- ELR
 - Each hospital has custom LIMS → difficult and expensive to standardize, validate and maintain
- Analysis / Visualization

NC DETECT Data Volume



Hospital Emergency Departments Reporting to NC DETECT by General Bed Capacity

As of March 2009, 115 hospitals reporting, including VA Medical Centers

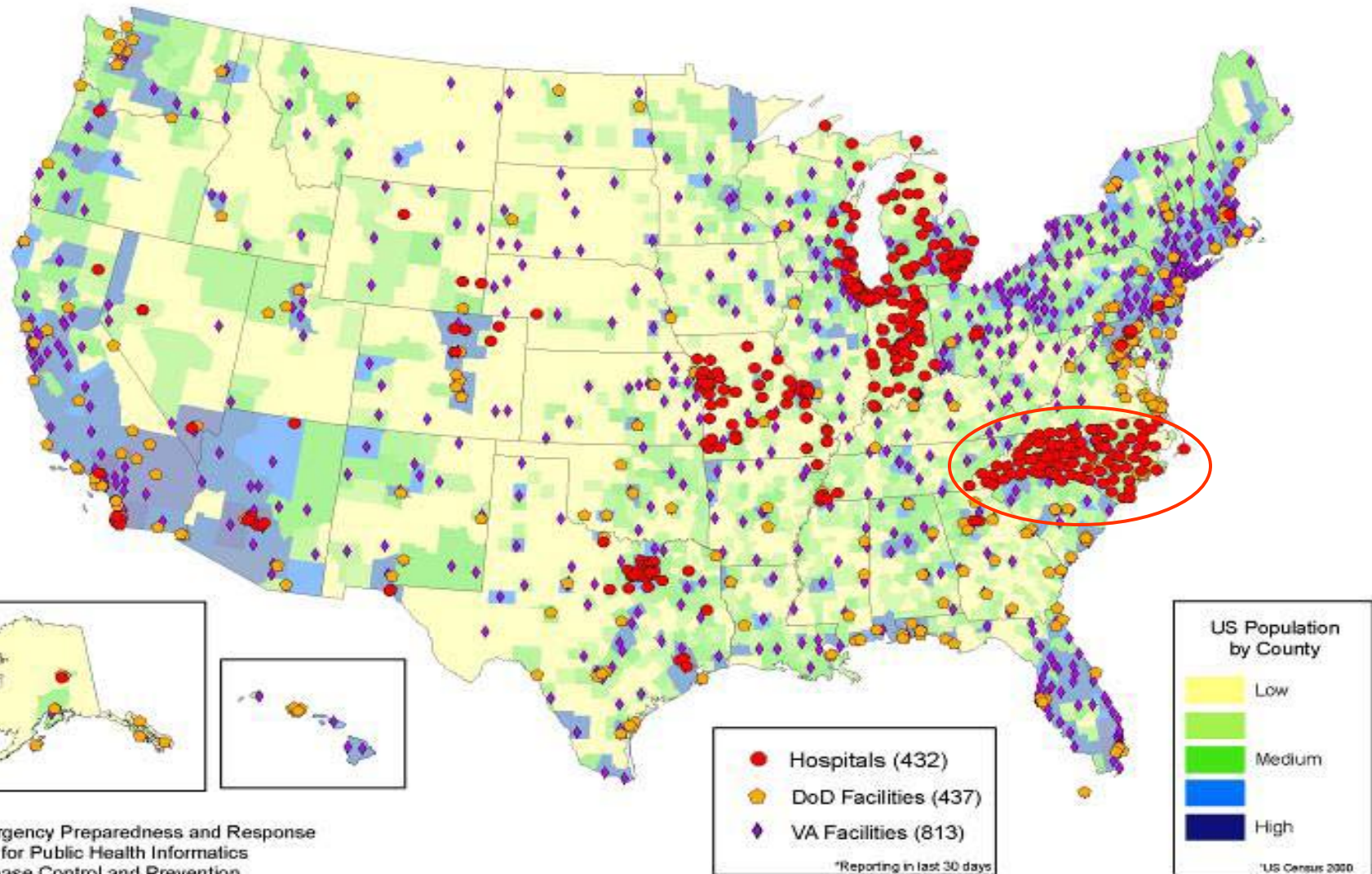


Hospital Emergency Departments

Bed Capacity	Reporting Status
○ 0 - 40	● Reporting
○ 41 - 70	● Not Reporting
○ 71 - 110	○ County
○ 111 - 300	
○ more than 300	

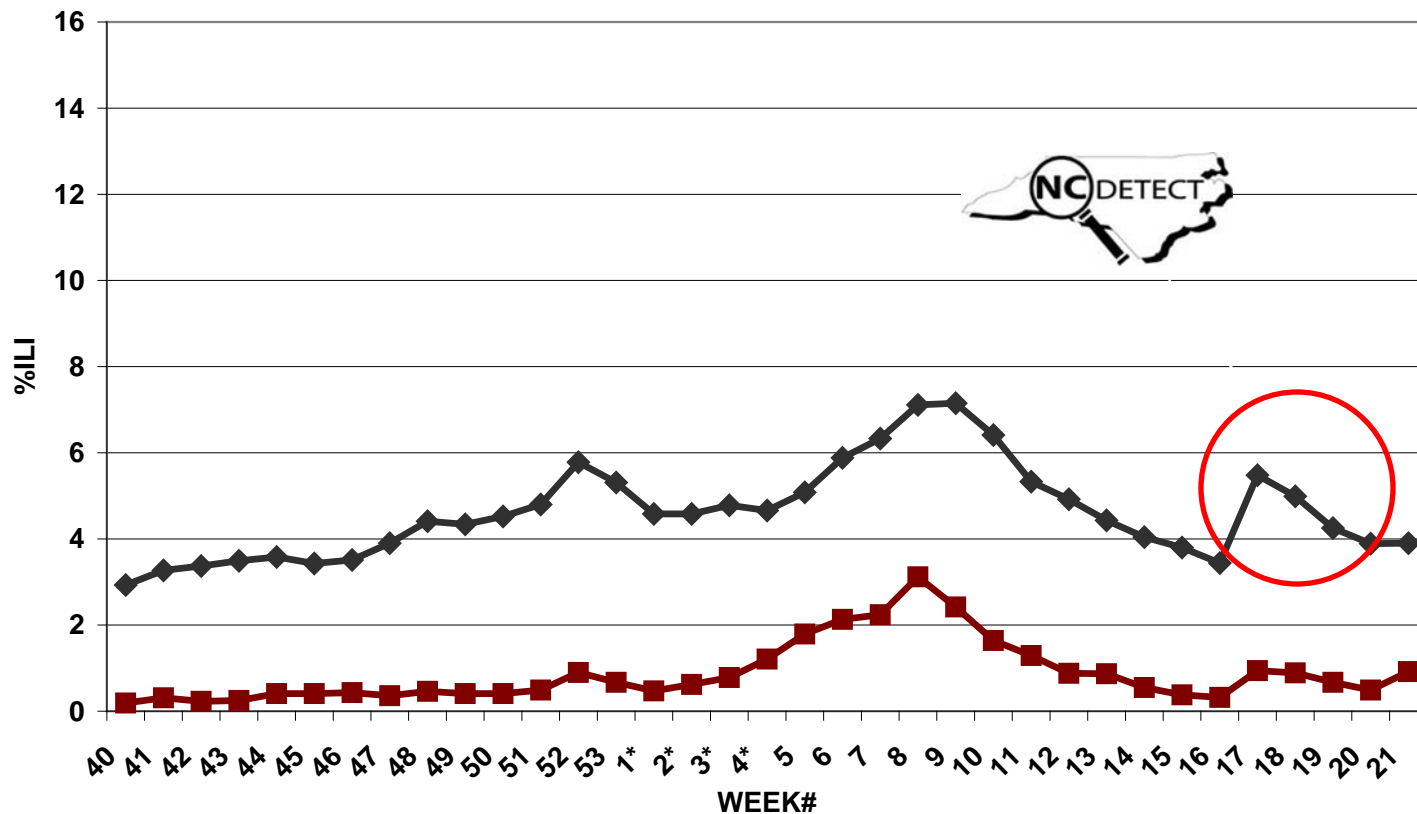
**3 + years to reach
statewide compliance
with mandate**

Hospital ED data shared with BioSense



Novel Influenza H1N1

Influenza-Like illness Surveillance in North Carolina, 2008-2009
Influenza Season Comparative trend between two surveillance systems:
Sentinel provider Network (SPN) and Hospital Emergency Department (ED)



*ED ILI data unavailable for several Carolinas Health Facilities for weeks 1-4

◆ ED

■ SPN

NC DETECT Value

- Seasonal surveillance → Influenza, etc.
- Case-finding, population-level surveillance, situational awareness, and public health response
- Facilitates active surveillance by hospital-based Public Health Epidemiologist network
- Monitoring during large-scale natural or manmade disasters
- Reassurance during public health threats
- Retrospective knowledge discovery
- Monitoring and reassurance of population health status during large scale events

NC DETECT Challenges

- Ongoing data maintenance
- Sustainability
- Evolving user needs
- End user public health workforce

Electronic Public Health Reporting Common Themes

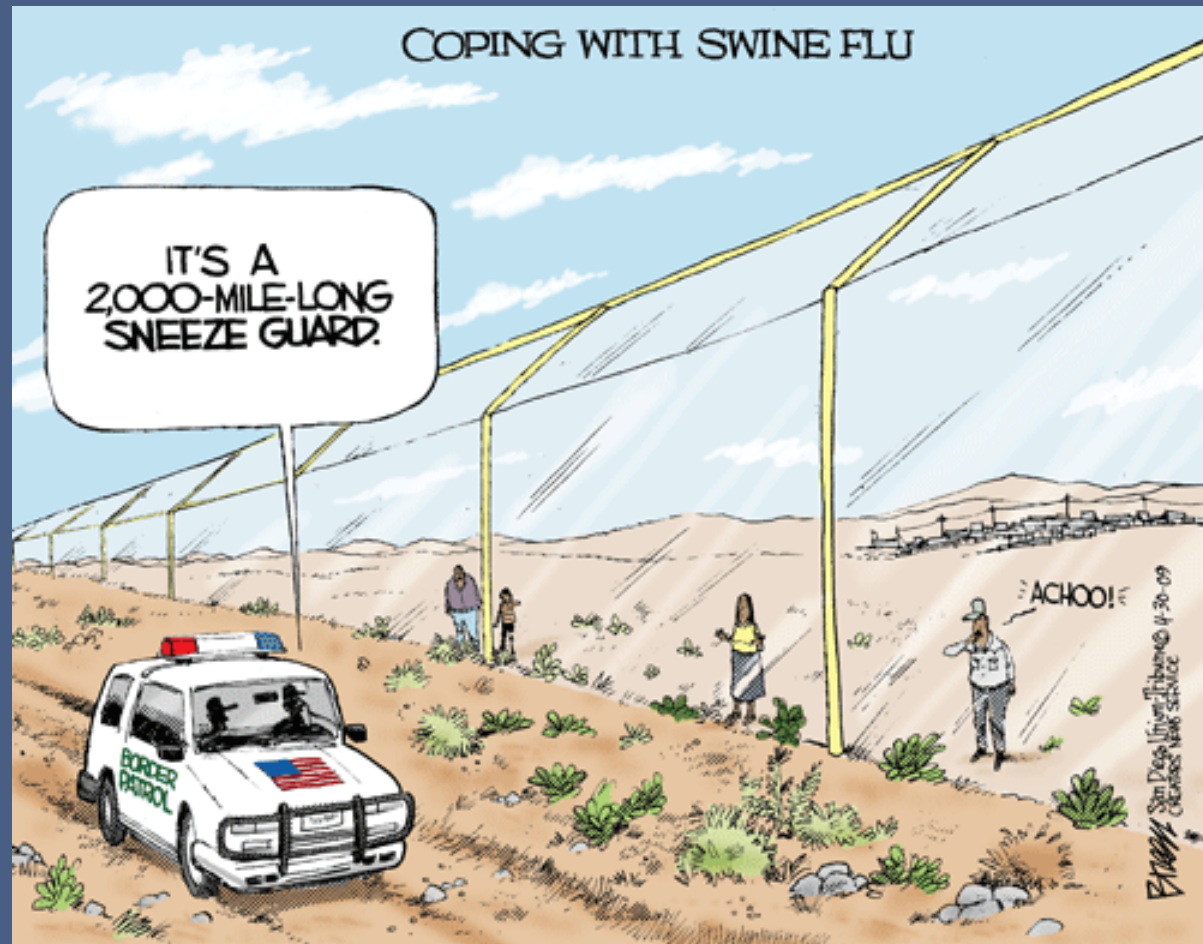
- Re-use of electronic data
 - Hospitals
 - Labs
 - Ambulatory Care
 - Etc.
- All health information systems have a potential public health reporting component.

Challenges to Electronic Public Health Reporting

- Inclusion of public health stakeholders in RHIOs / HIEs at the outset
- Storing EHR clinical data in discrete data elements for easier extraction*
- Public health informatics workforce

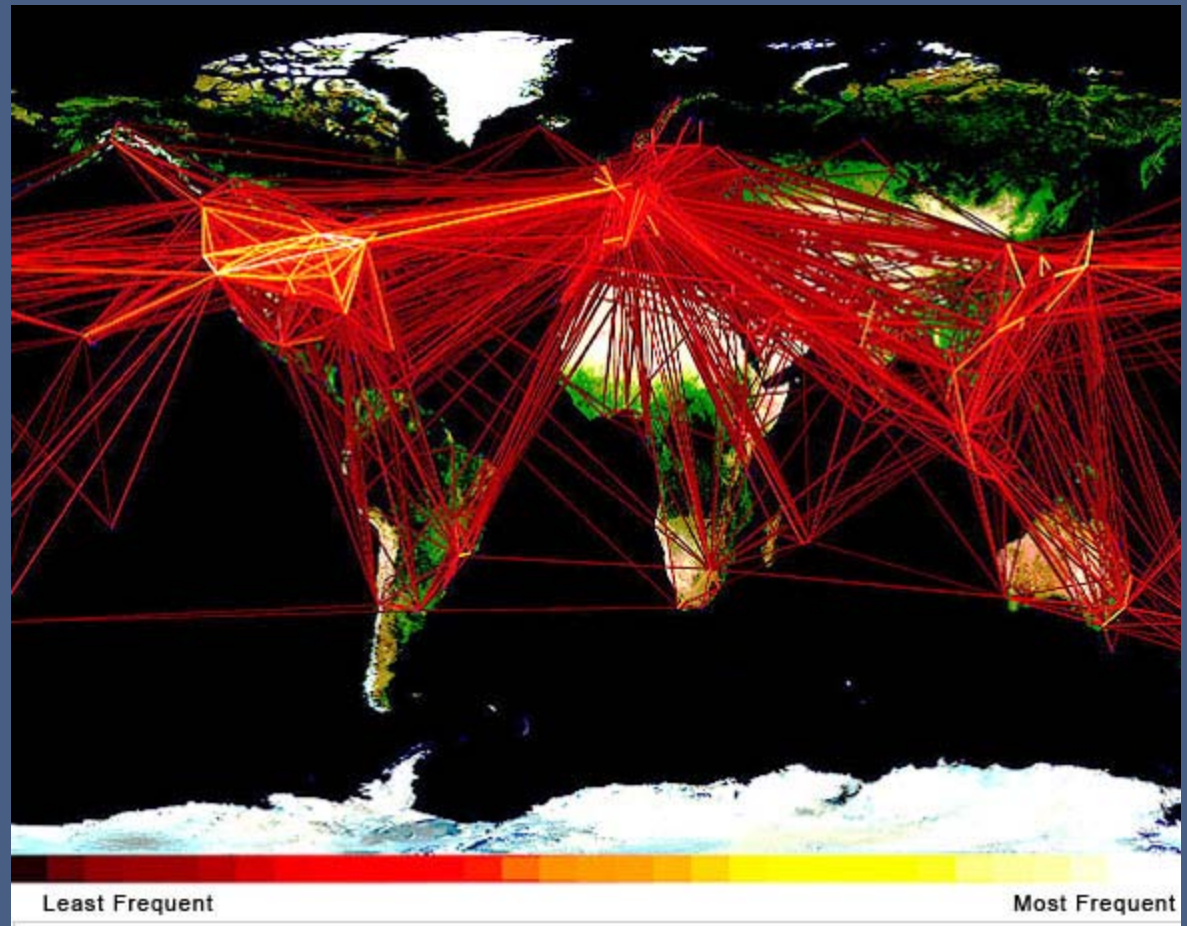
*N.B.: Reporting software upgrades may include contract language about vendor use of your data

Global Perspective: Infectious disease surveillance and response is a *global* public good



Air Travel & Infectious Disease Spread

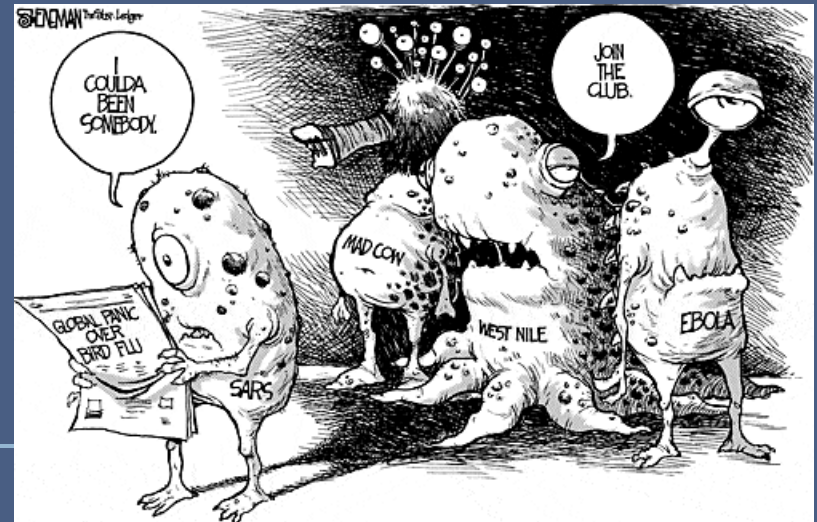
Global civilian aviation network



Hufnagel, L., Brockman, D., and Geisel, T., “Forecast and Control of Epidemics in a Globalized World,” *Proc. Natl. Acad. Sci. U.S.A.* 101(42), 15124–15129 (2004).

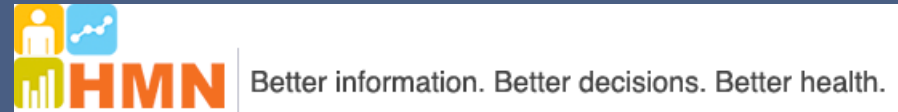
WHO: International Health Regulations (2005)

- All public health risks (no preset list of diseases)
- Containment at source whenever possible
- *“To prevent, protect against, control and provide a public health response to the international spread of disease in ways that are commensurate with and restricted to public health risks, and which avoid unnecessary interference with international traffic.”*



Health Metrics Network (HMN)

Objectives



- “Increase the availability & use of timely & accurate health information in country & globally by catalyzing the joint funding & development of core country health information systems.”
 - Establish a Common HIS Framework
 - Strengthen Country HIS
 - Access & Use of Health Information
- <http://www.who.int/healthmetrics/en/>

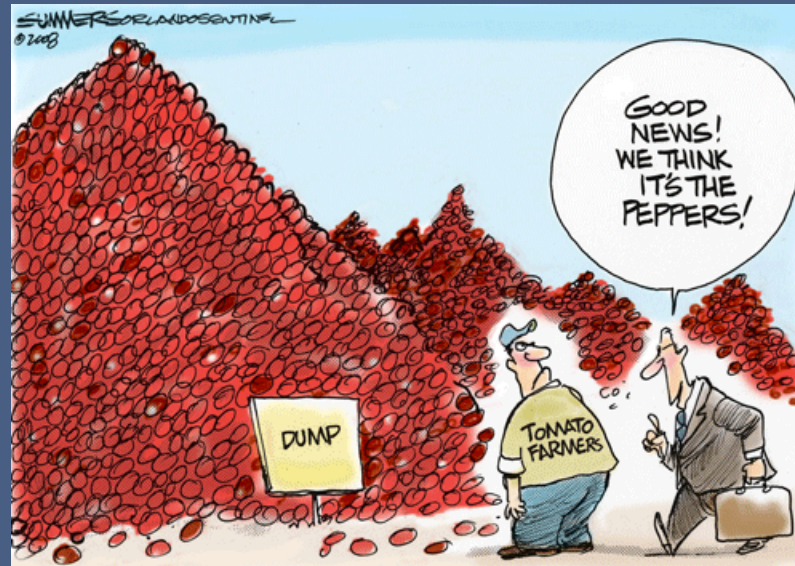
HMN: Examples of HIS Value

- **Bolivia:** Efficiencies with HIS tripled appropriate utilization of services
- **South Africa:** HIS increased access to essential drugs (39% reduction in stockouts)
- **Mali:** Targeting cut costs per fully immunized child by 47%
- **Tanzania:** Better resource allocation saved children's lives (\$68.50 per DALY gained)

Summary

- Public health IT Systems
 - Require data sharing and re-use to be successful
 - Facilitate local surveillance and response but have global implications
 - Require additional informatics workforce for growth and sustainability

Timely surveillance of all health-related data sources needs to be accurate to protect health and industry



<http://cartoonbox.slate.com/hottopic/?image=107&topicid=20>

Thank You!

- http://www.himss.org/davies/pastRecipients_ph.asp
- <http://www.ncdetect.org> → more info about influenza-like illness tracking, custom data requests, training opportunities
- Amy_ising@med.unc.edu