Emerging Best Practices for Early Detection of Infectious Disease Outbreaks:
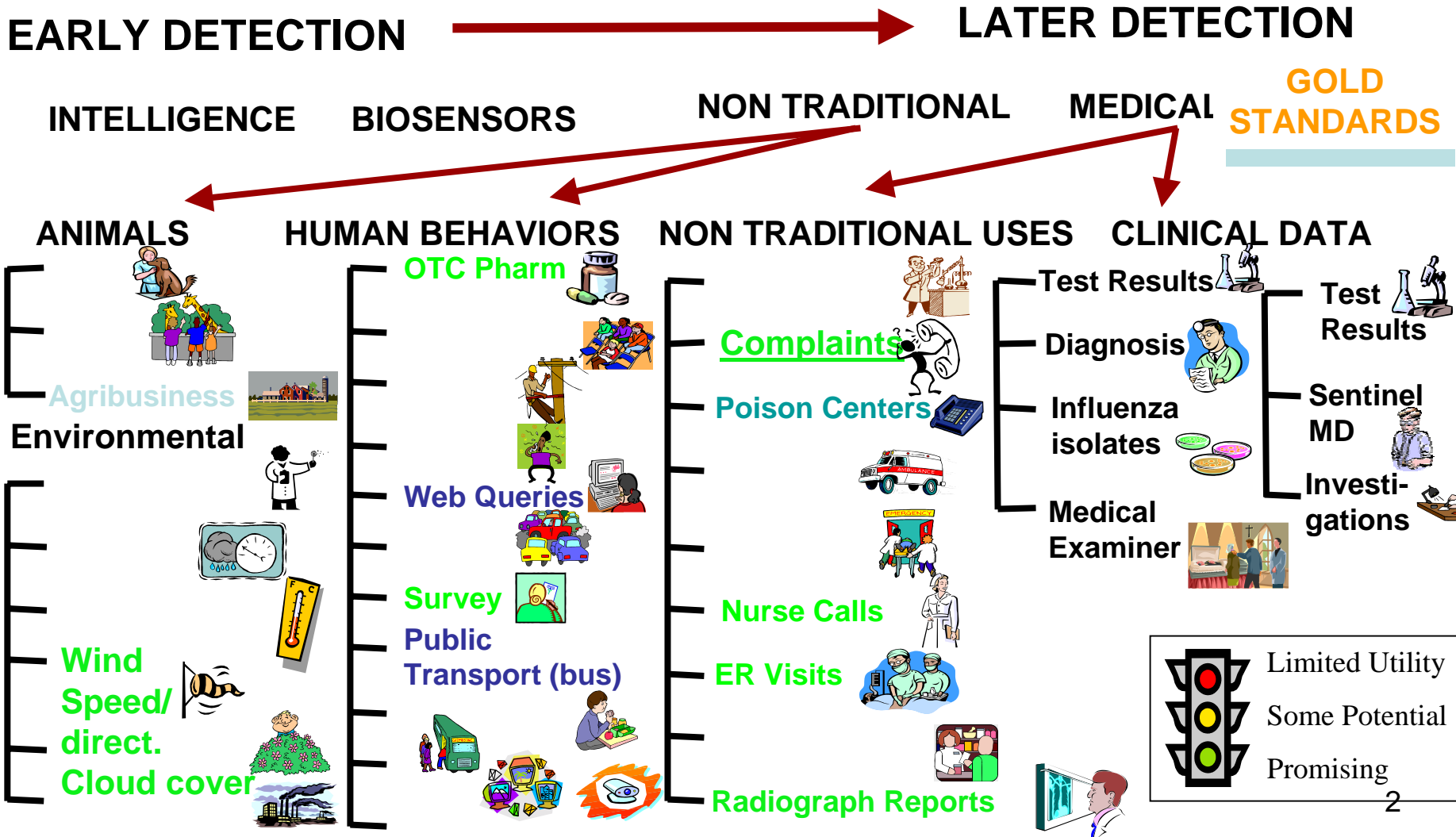
It's time for Action in Canada

Biosurveillance Data

EARLY DETECTION → **LATER DETECTION**

INTELLIGENCE   **BIOSENSORS**   **NON TRADITIONAL**   **MEDICAL**   **GOLD STANDARDS**

ANIMALS   **HUMAN BEHAVIORS**   **NON TRADITIONAL USES**   **CLINICAL DATA**

ANIMALS
- Agribusiness
- Environmental
- Wind Speed/ direct.
- Cloud cover

HUMAN BEHAVIORS
- OTC Pharm
- Web Queries
- Survey
- Public Transport (bus)

NON TRADITIONAL USES
- Complaints
- Poison Centers
- Nurse Calls
- ER Visits
- Radiograph Reports

CLINICAL DATA
- Test Results
- Diagnosis
- Influenza isolates
- Medical Examiner

- Test Results
- Sentinel MD
- Investi-gations

Limited Utility

Some Potential

Promising

2

What Others Are Doing (1)

2nd Conference on Syndromic Surveillance

Sponsors: - Centres for Disease Control,
- New York City Department of Health, and
- New York Academy of Medicine

New York City, NY October 20-24, 2003

What Others Are Doing (2)

"Syndromic Surveillance:
   Performance and Utility"

Annual Fall Symposium,
American Medical Informatics Association

Washington, D.C., November 8-12, 2003

New York City

Algorithmic analysis nightly of electronic data:

- chief complaints of 8,000 patient visits to 40 hospital emergency departments
- 3,000 health-related calls to 911
- sales of 8,000 prescription drugs
- sales of 30,000 OTC products
- absenteeism of civic workers

Greater Washington, DC

- **ESSENCE: Electronic Surveillance System for the Early Notification of Community-based Epidemics**

- **US Department of Defense Global Emerging Infections System (DoD-GEIS) developed a prototype system for early detection of infectious disease outbreaks at military treatment facilities.**

- **Surveillance of syndromes recorded at the time of patient visit instead of specific diagnoses reported after laboratory or other diagnostic procedures can greatly lessen the time it takes to determine that an outbreak is occurring.**

- **ESSENCE II includes analysis of military and civilian outpatient visits, over-the-counter pharmacy sales, school absenteeism and animal health data system and is available to public health personnel in the DC area via a secure website.**

Pennsylvania & Utah

- **Artificial Intelligence Early Warning System at the 2002 Winter Olympics in Utah**

- U.S. has never seen security measures like those in Salt Lake City for the Olympics. One little known measure gave early warning of a possible bioterrorist attack.

- The Artificial Intelligence (AI) system, known as RODS, analyzes patient data from emergency rooms and instant care facilities. If it detects a significant pattern, it pages the on-call state public health physician.

- Continued after Olympics and expanded state-wide.

Web Interfaces

- In 1999, researchers at the University of Pittsburgh began developing the Real-time Outbreak and Disease Surveillance (RODS) system.

- Based on earlier work by the same researchers in building a clinical event monitor (CLEM) and a clinical communication system.

- In October 2001, RODS began to demonstrate the feasibility of real-time data collection in a 13-county region in Western Pennsylvania for 3 million people.

- Demonstrated the use of Trusted Data Broker for public health surveillance

- Established a minimal de-identified data set that is widely available

- Created a model memoranda of understanding and an application service provider (ASP) model

- Expanding state-wide in Pennsylvania

Real-time Outbreak and Disease Surveillance Laboratory
Center for Biomedical Informatics
University of Pittsburgh

- Emergency room IT systems capture chief complaints at registration -- as part of normal workflow -- electronically

- Registration computer transmits chief complaints to other computers in the health system (trusted broker) via a secure line or VPN

- The message router can de-identify these messages and transmit them via the Internet to a public health dept.

- …in real time !

EDs

Message Router

RODS

DEPARTMENT OF HEALTH
… in pursuit of good health

Web Interfaces



Copyright University of Pittsburgh 2002
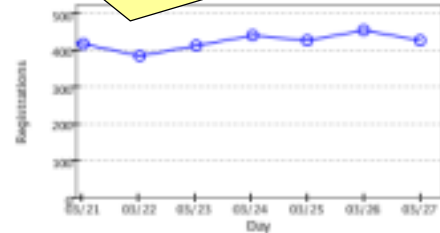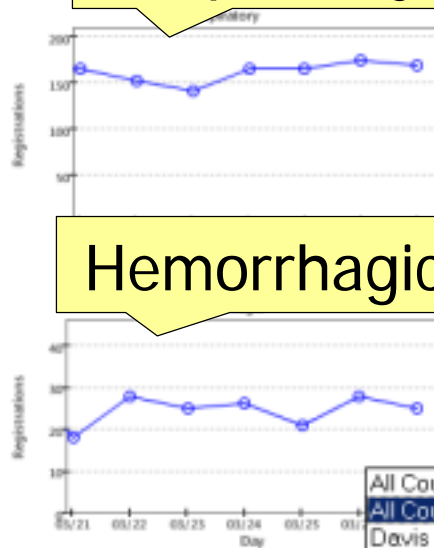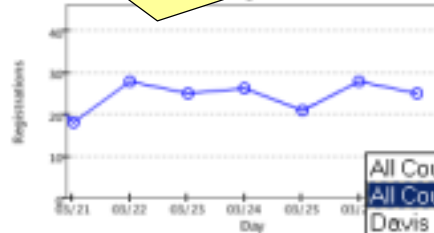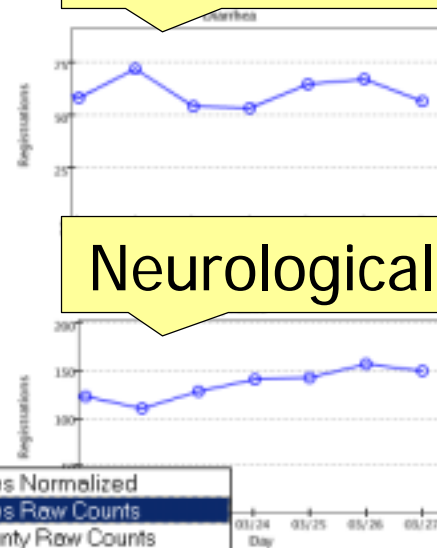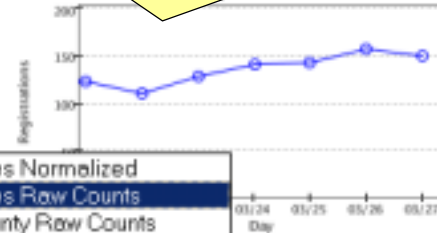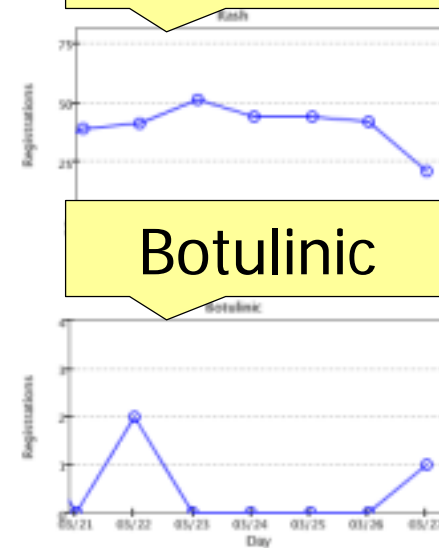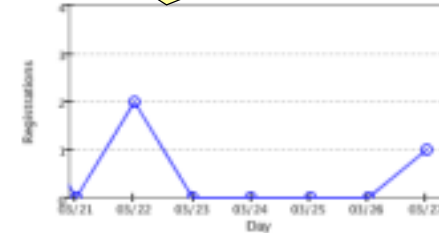
The RODS Technology Dissemination Story

02/02   demonstrated at Olympics how to obtain hospital
         data in real time. Generalizable solution.

04/02   tried to disseminate through a technology partner

12/02   tried to disseminate by giving it away for free

2003   Found that ASP model removed a lot of barriers

         Ongoing validation studies

         Realized data access was a huge barrier -> *NRDM*

09/03   RODS Open Source project

How NDRM Works (1)

NRDM
National Retail Data Monitor
a public health surveillance tool

- OTC products have UPC bar codes

- Stores use optical scanners

- Chains agreed to send daily sales data from their data warehouses

- "Antidiarrheals" and 17 other surveillance categories
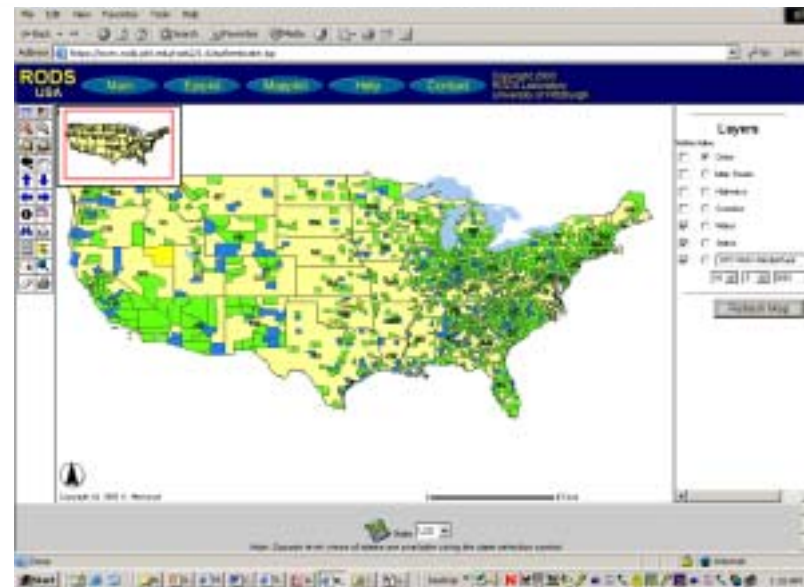
Health Departments Use

260+ accounts/39 States)
Raw data feeds: New York State, New York City, National Capital Area (MD, VA, DC), CDC, New Jersey, Georgia, Indiana…

Wagner et al, *Design of a National Retail Data Monitor*, JAMIA, Sept. 2003;10(5) 409-20

How NRDM Works (2)

NRDM
National Retail Data Monitor
a public health surveillance tool

- **Packages for OTCs are UPC bar coded**

- **10 chains own +30,000 stores**
  - **(60% of all unit sales)**

- **Every purchase is scanned optically**

- **"Asked" for the data**

- **Receive data from ~14,000 stores**
  - By 3 pm the next day

- **Developed model agreement for data use and confidentiality of commercially sensitive details**

Surveillance Categories

- **~7500 products (individual UPC codes) used for self-treatment of infectious diseases**

- **Group into 18 analytic classes at present ("categories")**

Cold Relief Adult Liquid (709 products)
Cold Relief Adult Tablet (2467)
Cold Relief Pediatric Liquid (323)
Cold Relief Pediatric Tablet (74)
Cough Syrup Adult Liquid (592)
Cough Syrup Adult Tablet (32)
Cough Syrup Pediatric Liquid (24)
Nasal Product Internal (371)
Throat Lozenges (364)

Antifever Pediatric (274)
Antifever Adult (1340)
Bronchial Remedies (43)
Chest Rubs (78)
Diarrhea Remedies (165)
Electrolytes Pediatric (75)
Hydrocortisones (185)
Thermometer Pediatric (125)
Thermometer Adult (313)

Numbers in parenthesis are the number of UPC codes in the category
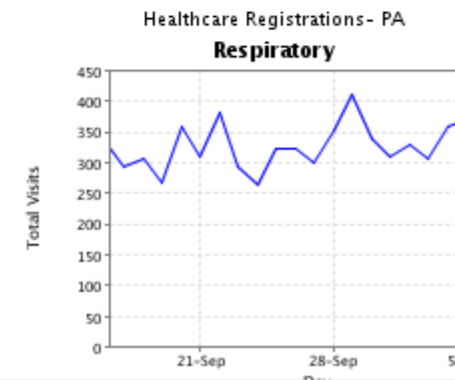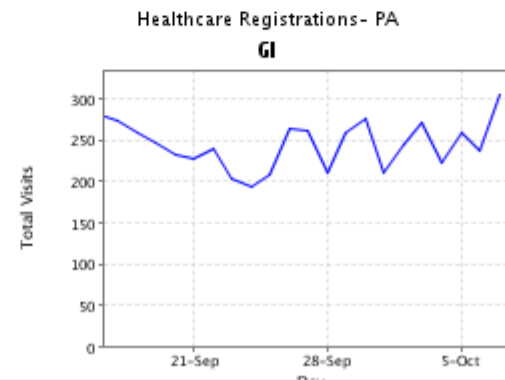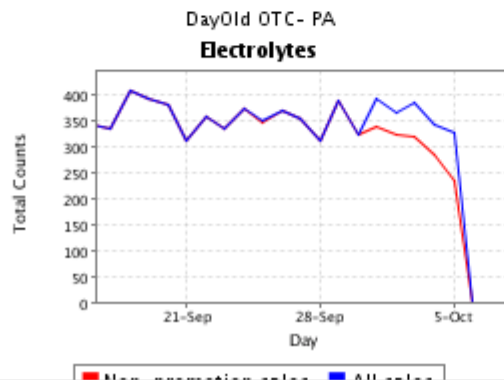
OTC Sales, Pennsylvania 3 Weeks
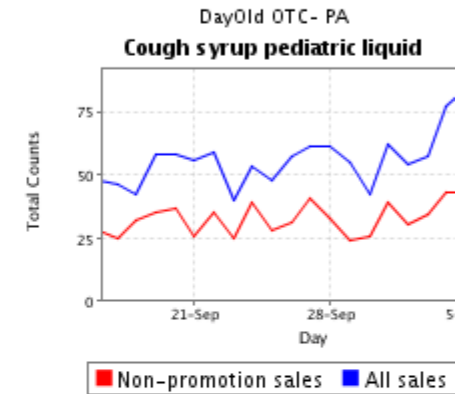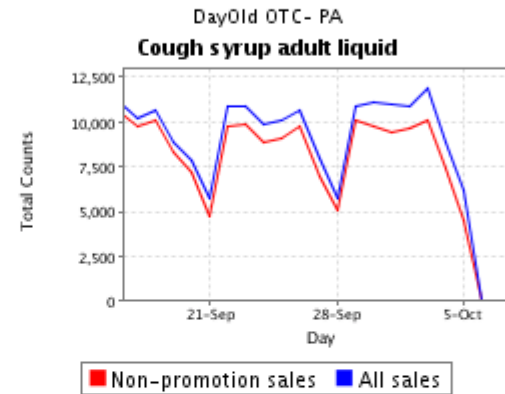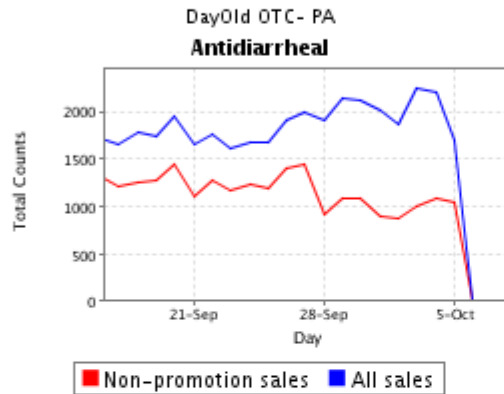
Electrolyte Sales, 4/13/03, Philadelphia
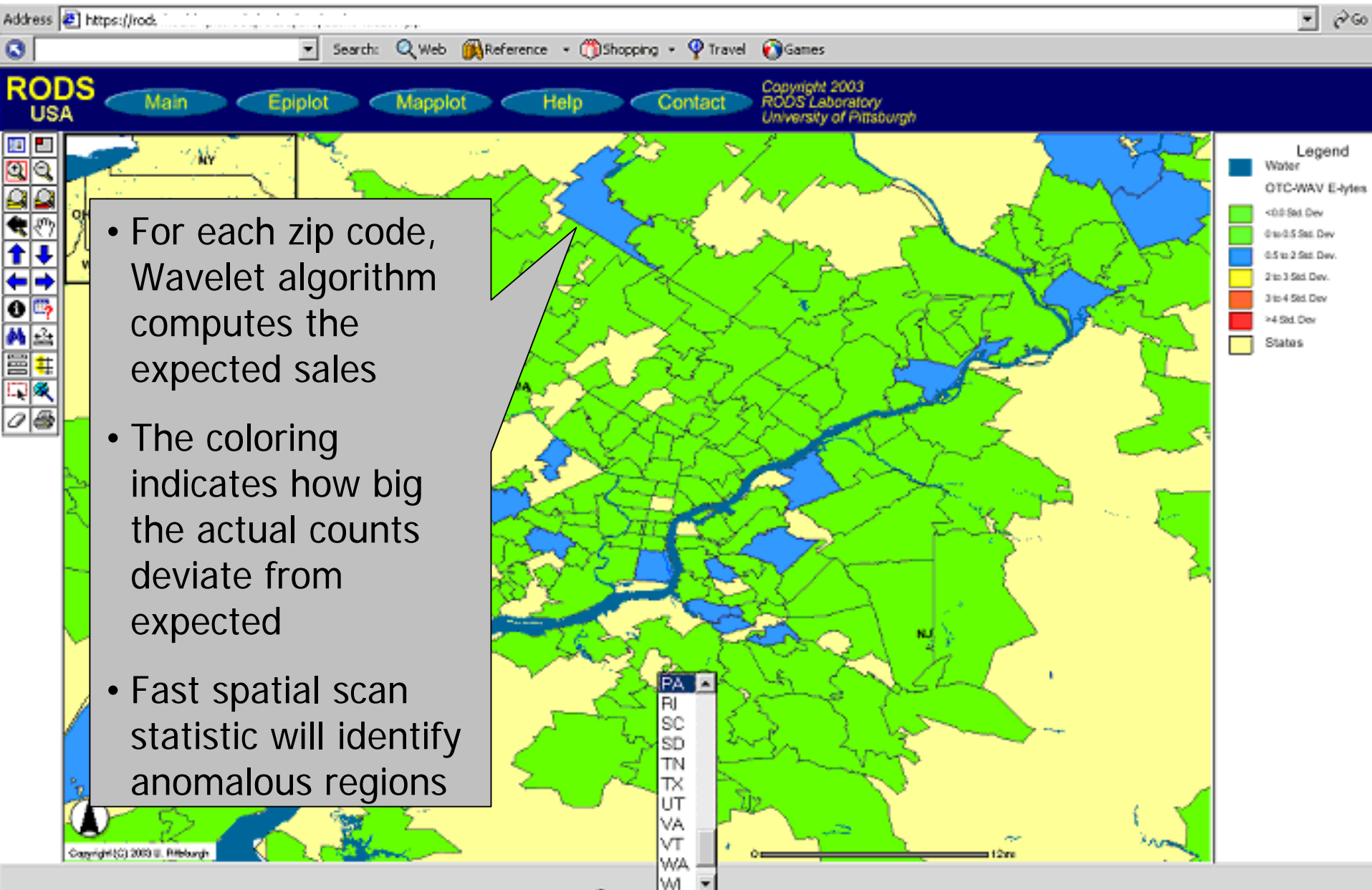
Big city coverage

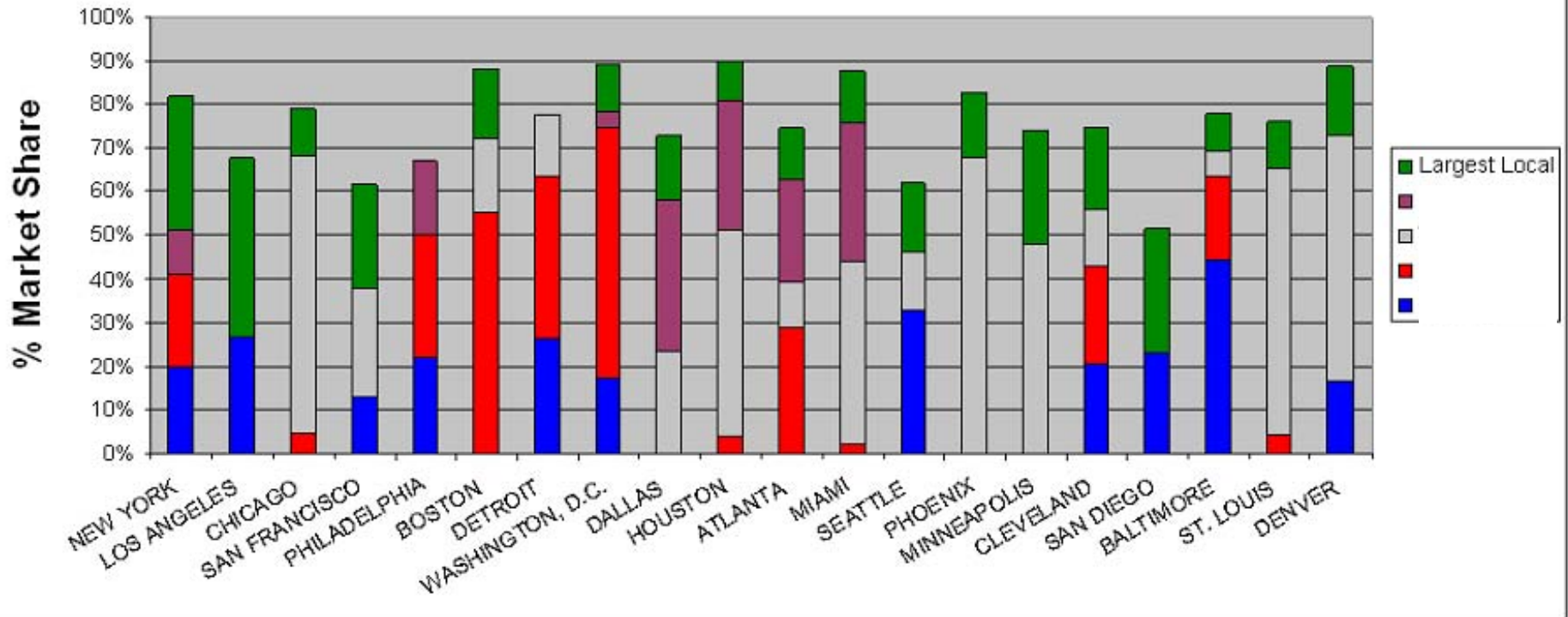Large City OTC Share: 20 Cities

Source: Estimated from industry statistics using ACNielsen Scantrack, IRI Infoscan and Racher Press Chain Drug Research.
N.B. For New York, the largest local retailer already provides data to the health department

Public Health Law Changes

Wisconsin	Utah
Act 109 a pharmacist or pharmacy shall report:	Act 26-23b-105. A pharmacist shall report:
• An unusual increase in the number of prescriptions dispensed or nonprescription drug products sold for the treatment of medical conditions specified by DHFS by rule.	• an unusual increase in the number of prescriptions filled for antimicrobials;
• An unusual increase in the number of prescriptions dispensed that are antibiotic drugs.	• any prescription that treats a disease that has bioterrorism potential if that prescription is unusual or in excess of the expected frequency; and
• The dispensing of a prescription for the treatment of a disease that is relatively uncommon or may be associated with bioterrorism	• an unusual increase in the number of requests for information about or sales of over-the-counter pharmaceuticals …

Michigan too!

Results about Chief Complaints and OTC

November, 2003

Michael Wagner, MD PhD
Real-time Outbreak and Disease Surveillance (RODS) Laboratory
University of Pittsburgh

Important Distinctions

SARS showed need for electronic information solutions for:

1. early detection

2. case management, and

3. contact management.

Health Canada's iPHIS software is focused on public health case management (not early detection) with a new plan to add contact management.

There is a gap concerning an early detection solution.

Findings & Recommendations

1) Ontario (and Canada) lack but need an early detection electronic system for public health

2) Need for a clear mandate and champion i.e. leadership

3) Funding needed for early detection for data collection, sharing and analysis

4) Laws needed to promote and require data sharing for early detection of potential epidemics.

Emerging Best Practices
for Early Detection of
Infectious Disease Outbreaks:

It's Time for Action in Canada!

Elivery Solutions Inc.
258 Adelaide Street East, Suite 402
Toronto, ON M5A 1N1
(416) 350-8383
jadams@eliverysolutions.com