

Syndromic Surveillance in practice: New York City

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Definitions

“Public health surveillance is the ongoing systematic collection, analysis, and interpretation of health data essential to the planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those who need to know.”

CDC

Traditional Disease Surveillance

- List of notifiable diseases or conditions
- Relies on doctor/ laboratory reporting
- By paper, telephone, fax, electronic

- Significant diagnostic and reporting delays
- Does not include most common causes of widespread illness outbreaks (viral agents)

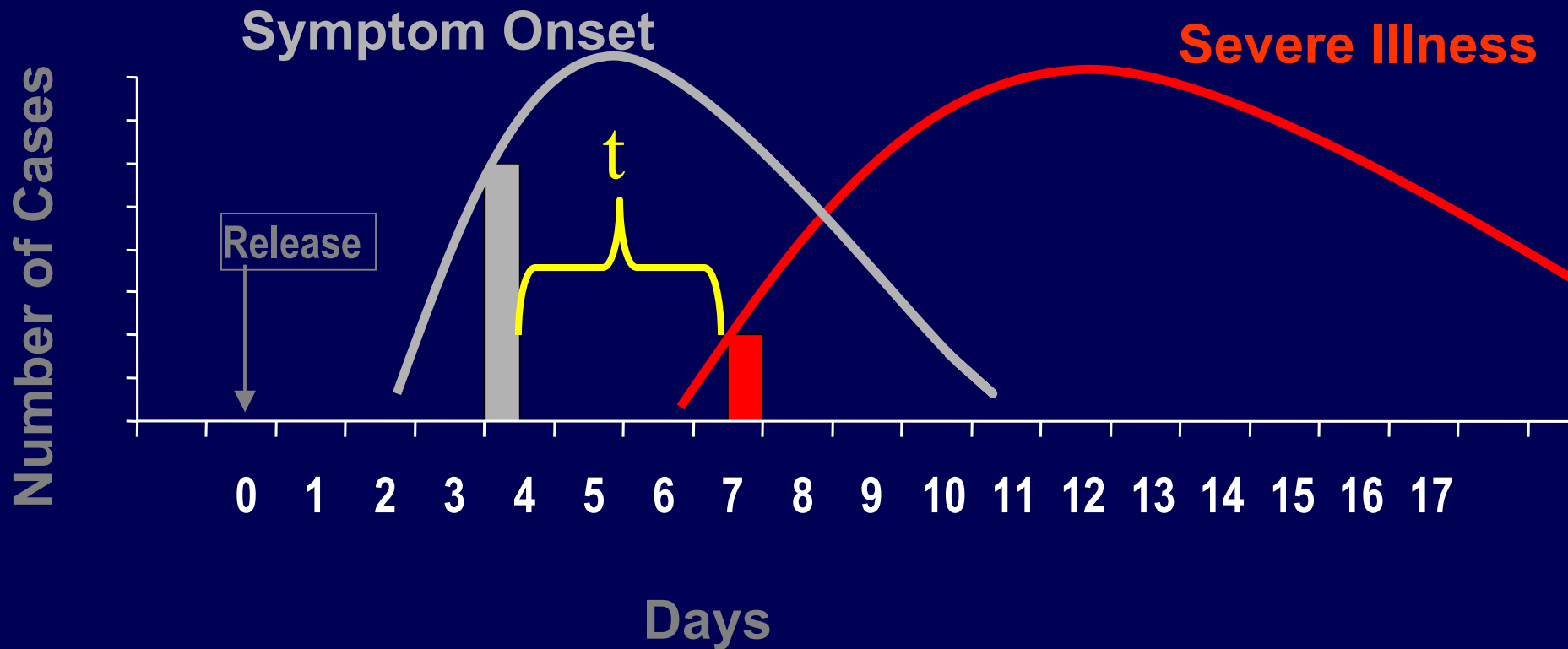
What is Syndromic Surveillance?

- “Real-time” public health surveillance using data that is routinely collected for other purposes
 - Non-specific health indicators
 - Uses existing data
 - “Real time” transmission, analysis, and alerts
 - New analytical techniques needed

Goals

- Early detection of large outbreaks
- Characterization of size, spread, and tempo of outbreaks once detected
- Monitoring of disease trends

Assumptions (Bioterrorism Detection)



Data sources for early detection of acute illness

Day 0 - exposure occurs

Day 1 - feels fine

Day 2 - headaches, fever- **Pharmaceutical Sales**

Day 3 - develops cough **Nurse's Hotline**

Day 4 - sees primary care **Outpatient Visit Data** **Absenteeism**

Day 5 - worsens- call **Ambulance Dispatch (EMS)**

see **ED Logs**

.....
Day 6 - admitted- "pneumonia"

Day 7 - critically ill- ICU, lab tests +

Day 8 - expires- "respiratory failure"

Diagnosed

Reported

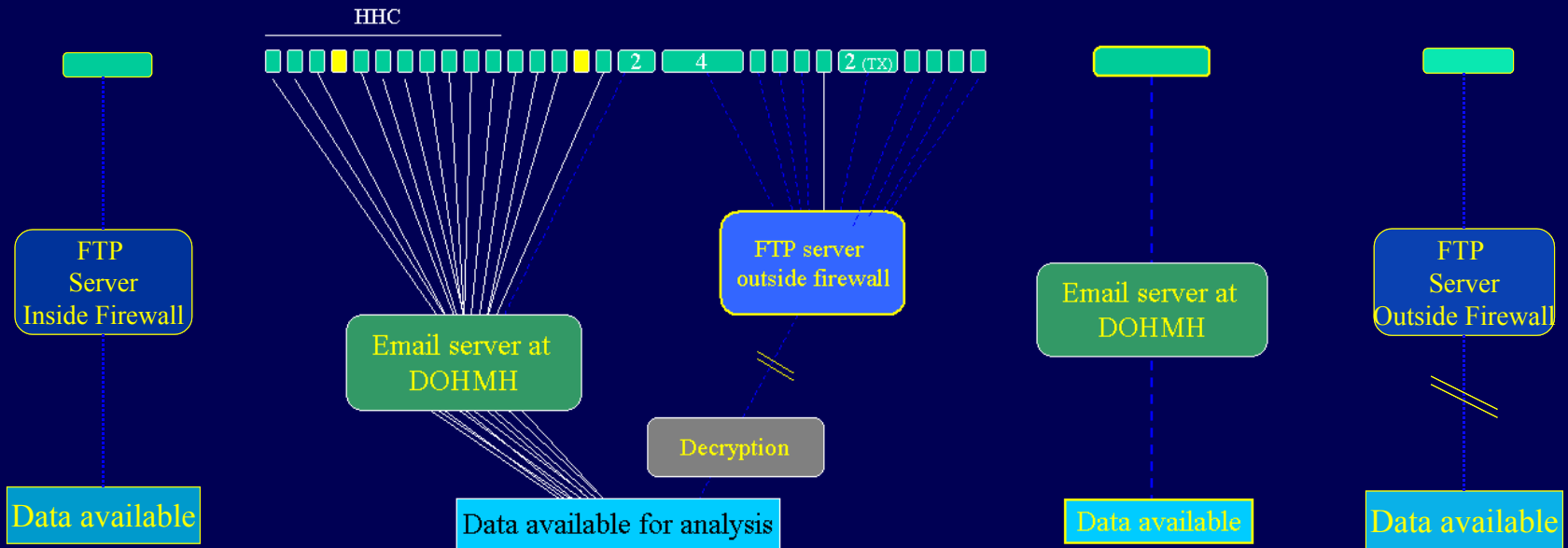
Data Transfer

EMS

Emergency Department

Absenteeism

Pharmacy



Key Hardware and Software

- Secure ftp server
- Desktop personal computers for analysis
- **SAS statistical software (COTS)
- **SatScan cluster detection tool (freeware)
- Other applications
 - PHIN Messaging (freeware)
 - Microsoft SQL Server database

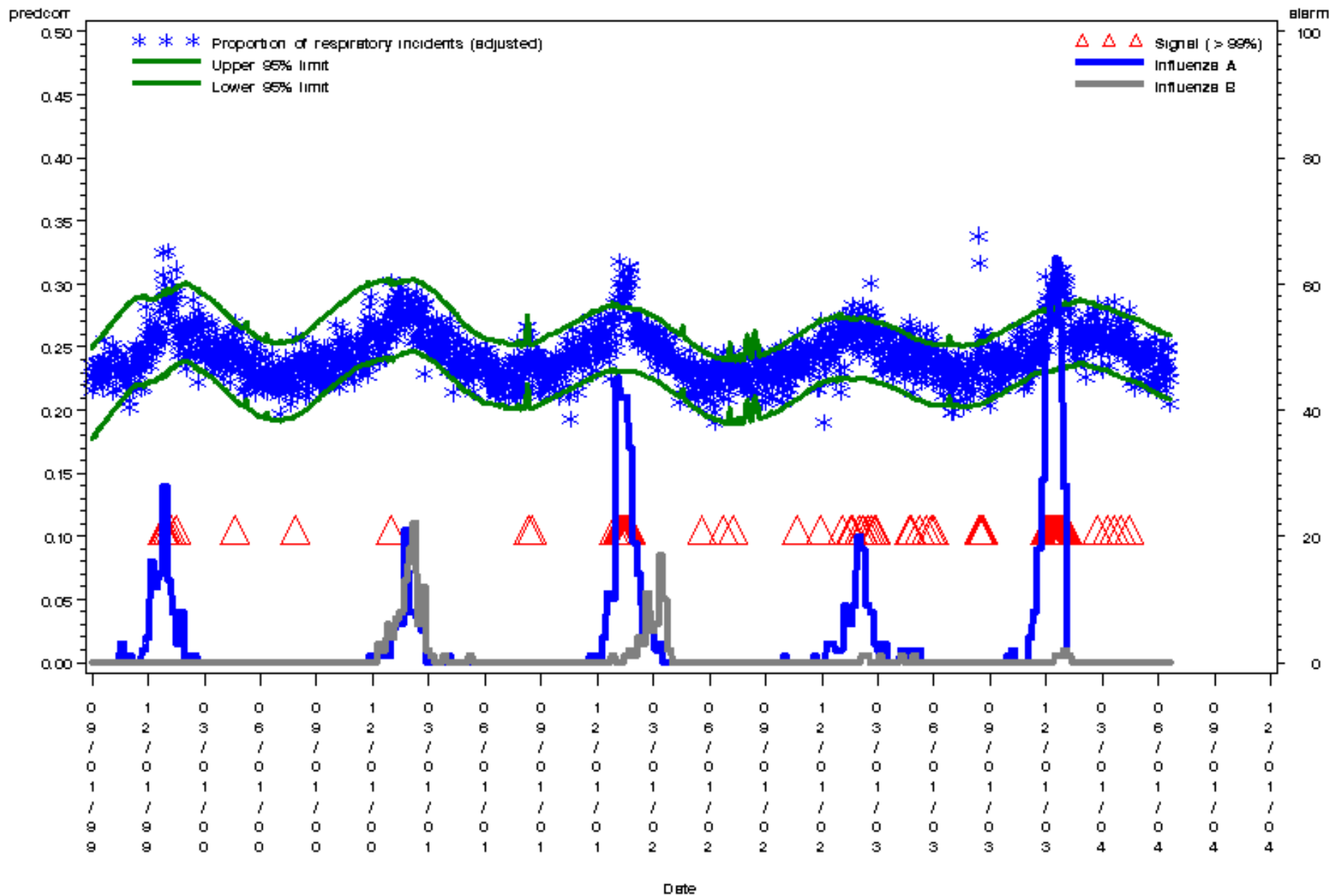
EMS-911 surveillance

Date	Time	Call-type	Zip
09/06/99	13:09:19	SICK	10013
09/06/99	11:09:57	UNC	11220
09/05/99	09:09:12	SEIZR	10458
09/05/99	08:09:22	RESPIR	10025
09/04/99	11:09:52	ABDPN	11434

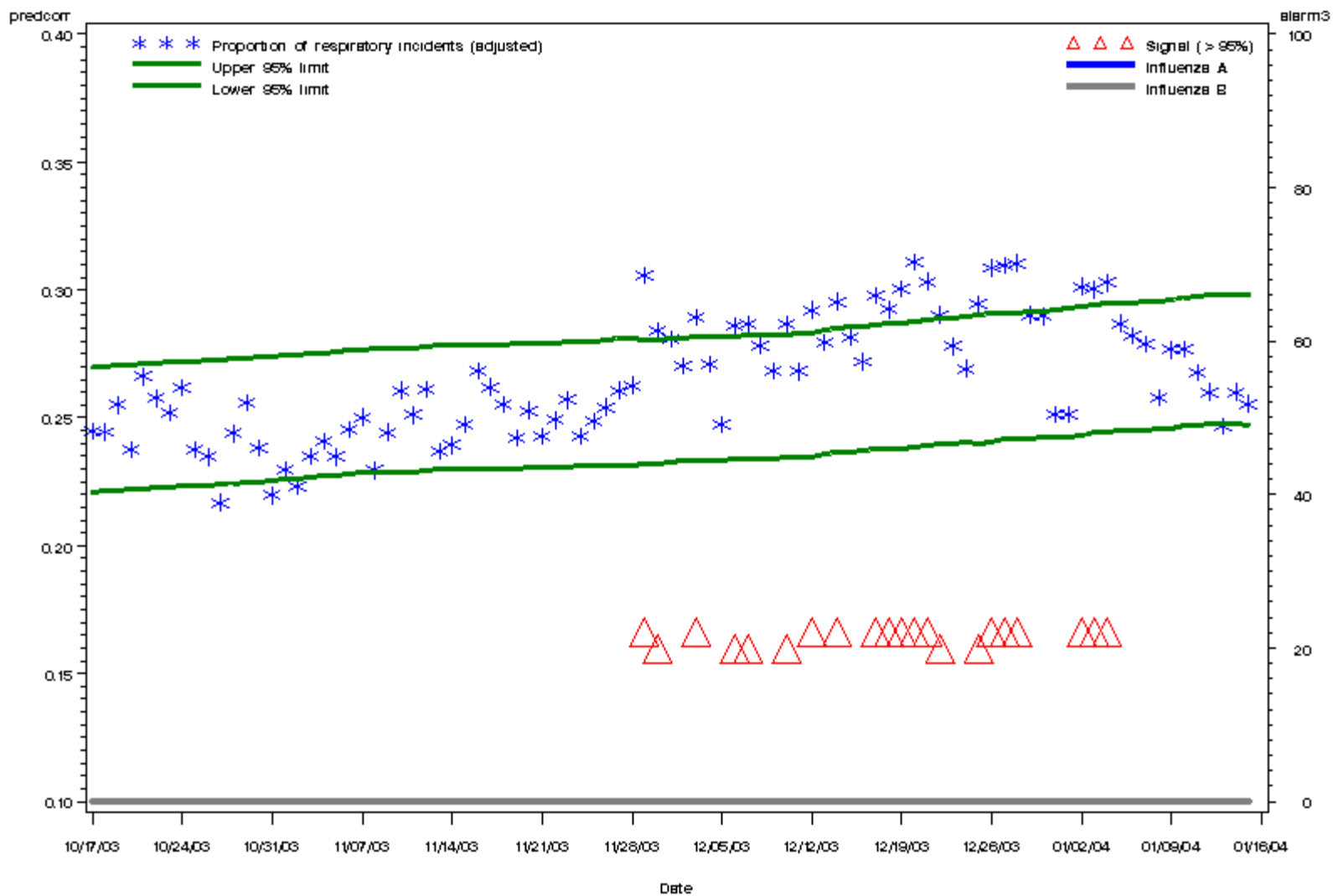
Influenza-like illness

RESPIR, DIFFBR, SICK, SICPED

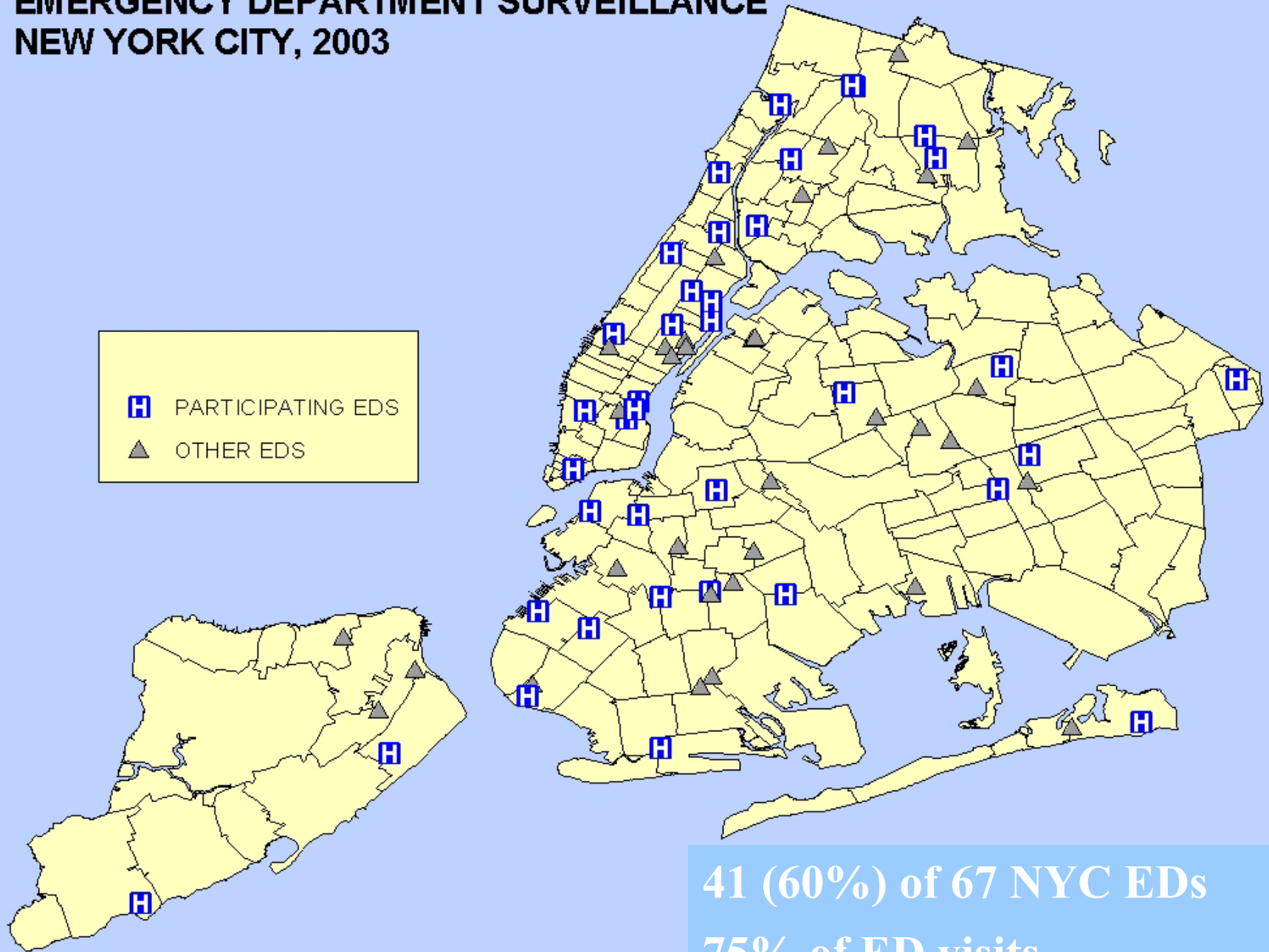
Influenza Activity and EMS Calls, NYC 01SEP99 – 21JUN04





Influenza Activity and EMS Calls, NYC 17OCT03 – 15JAN04



EMERGENCY DEPARTMENT SURVEILLANCE NEW YORK CITY, 2003



 PARTICIPATING EDS
 OTHER EDS

41 (60%) of 67 NYC EDs
75% of ED visits

Electronic ED logs

Admission List For 01/28/2002

AGE	SEX	TIME	CHIEF COMPLAINT	ZIP
15	M	01:04	ASSAULTED YESTERDAY, RT EYE REDDENED.	11691
1	M	01:17	FEVER 104 AS PER MOTHER.	11455
42	F	03:20		11220
4	F	01:45	FEVER, COUGH, LABORED BREATHING.	11507
62	F	22:51	ASTHMA ATTACK.	10013
48	M	13:04	SOB AT HOME.	10027
26	M	06:02	C/O DIFFICULTY BREATHING.	
66	M	17:01	PT. MOTTLED AND CYANOTIC.	10031

- 4% of records have missing or uninformative chief complaint (Eg. 'See Triage', 'Walkout', 'N/A' etc.)

Coding chief complaints into syndromes

Respiratory illness

key words: cough, shortness of breath, URI, pneumonia
excludes: cold symptoms

Non-specific febrile illness

key words: fever, chills, body aches, flu/influenza, viral syndrome

Gastrointestinal illness

key words: diarrhea, vomiting
excludes: abdominal pain alone, nausea alone

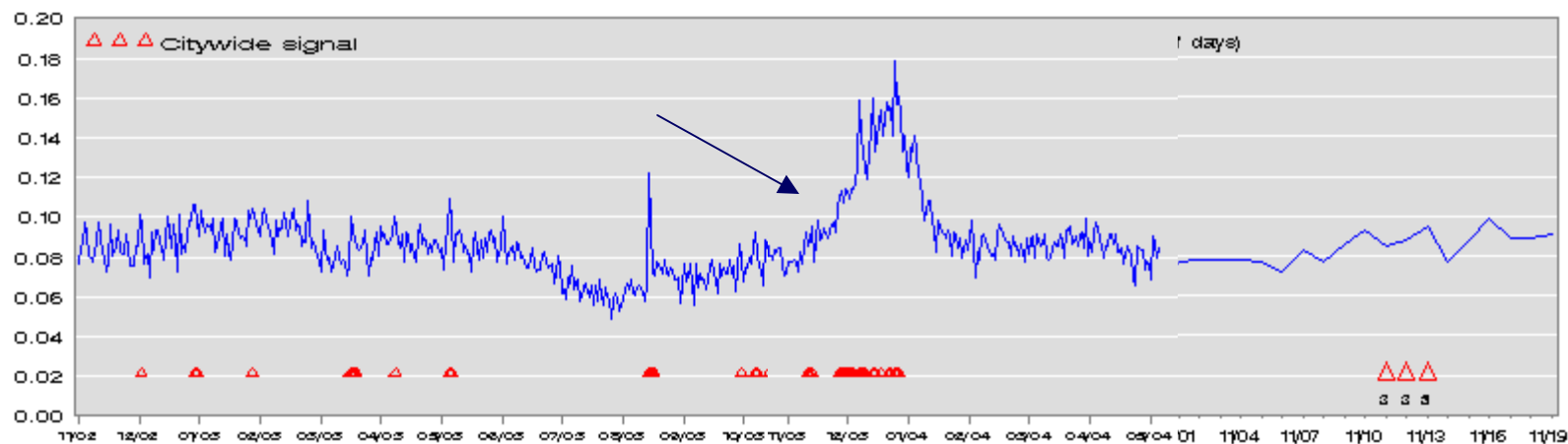
Daily Reports: Resp/ Fever (November 19, 2003)

NYC Emergency Department Surveillance

Citywide trends in the ratio of syndrome visits to other visits through Nov 19, 2003

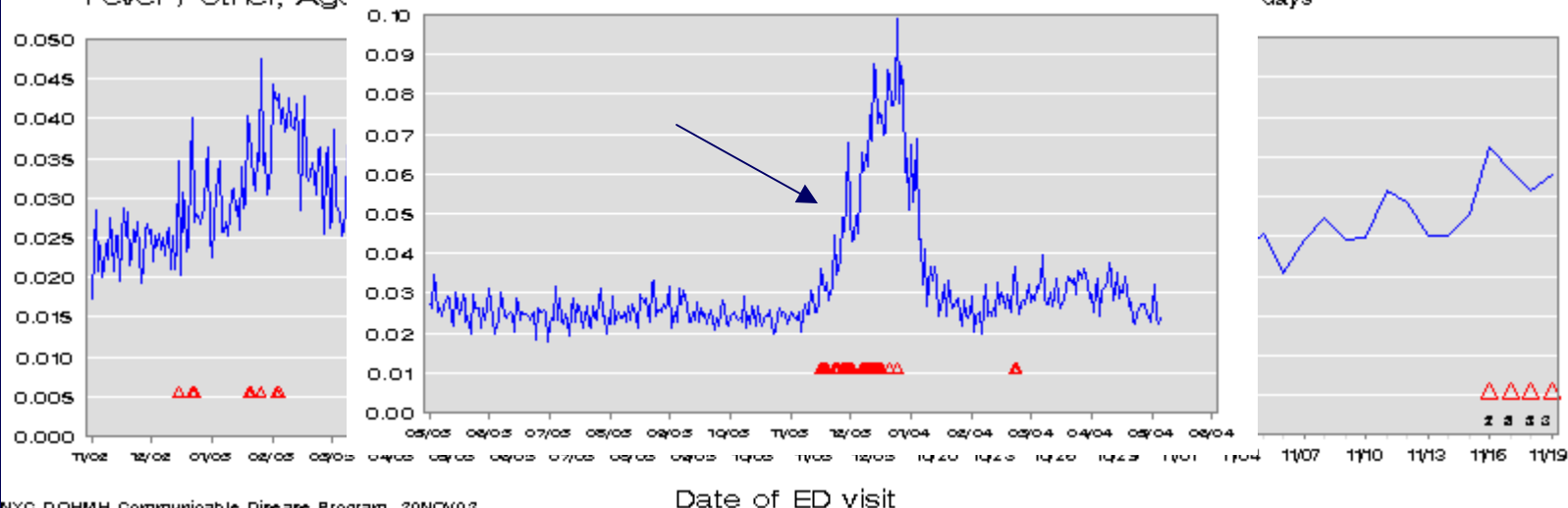
Respiratory / other, Age 13+, last 12 months

Last 30 days



Fever / other, Age

days



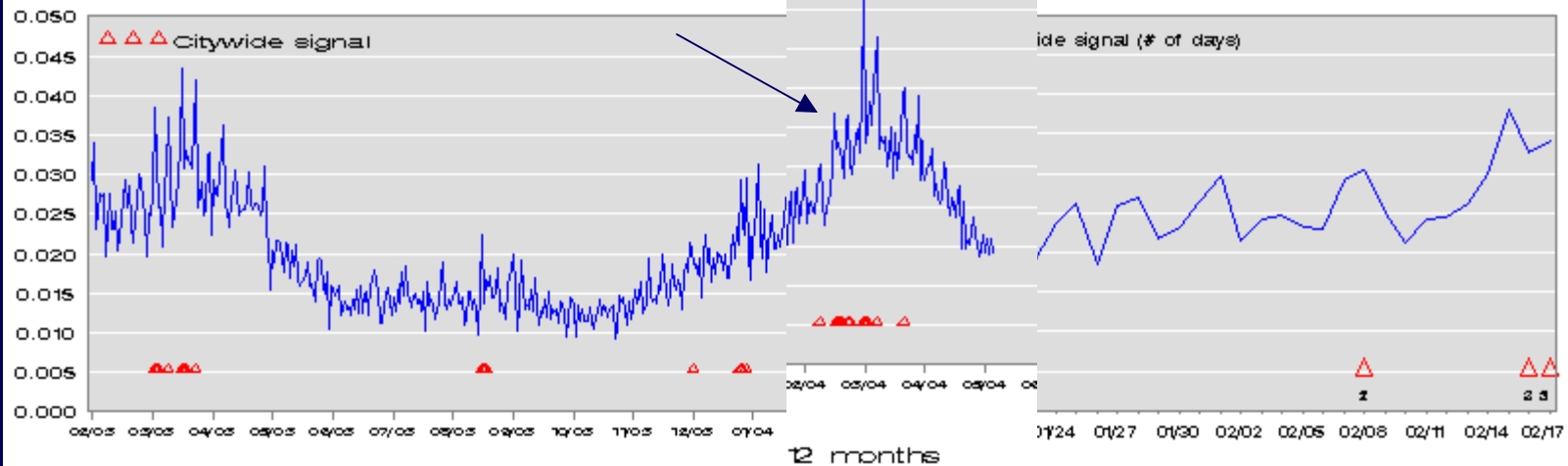
Diarrhea/Vomiting (Feb 18, 2004)

NYC Emergency Department Surveillance

Citywide trends in the ratio of syndrome visits to other visits through Feb 17, 2004

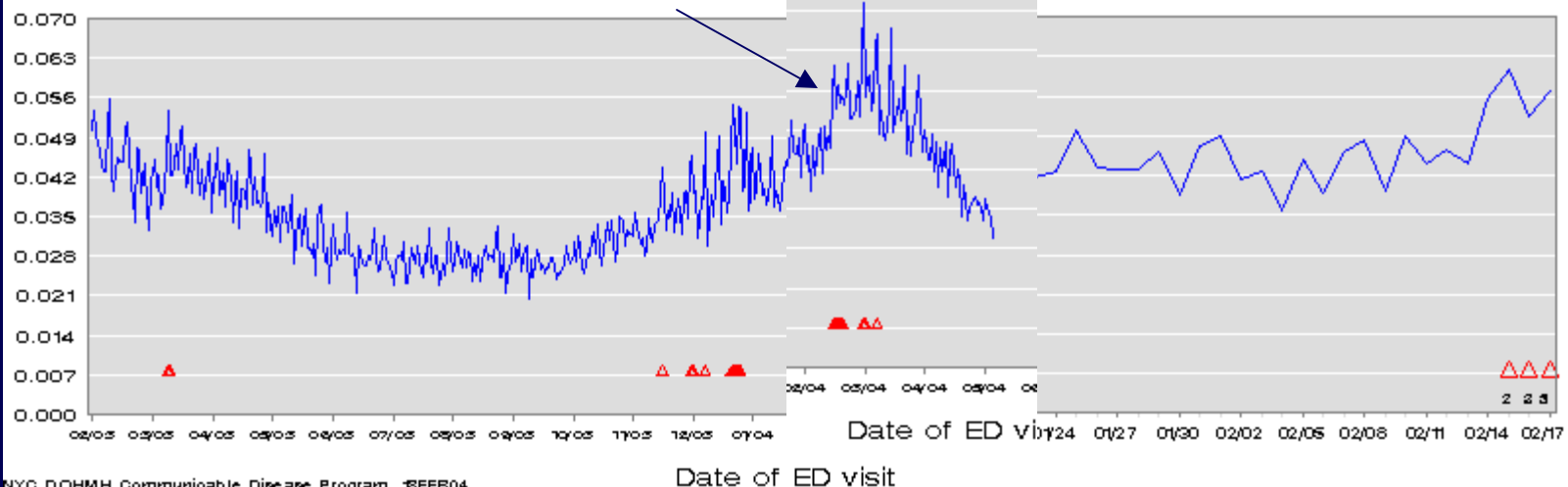
Diarrhea Syndrome, All ages, last 12 months

Last 30 days

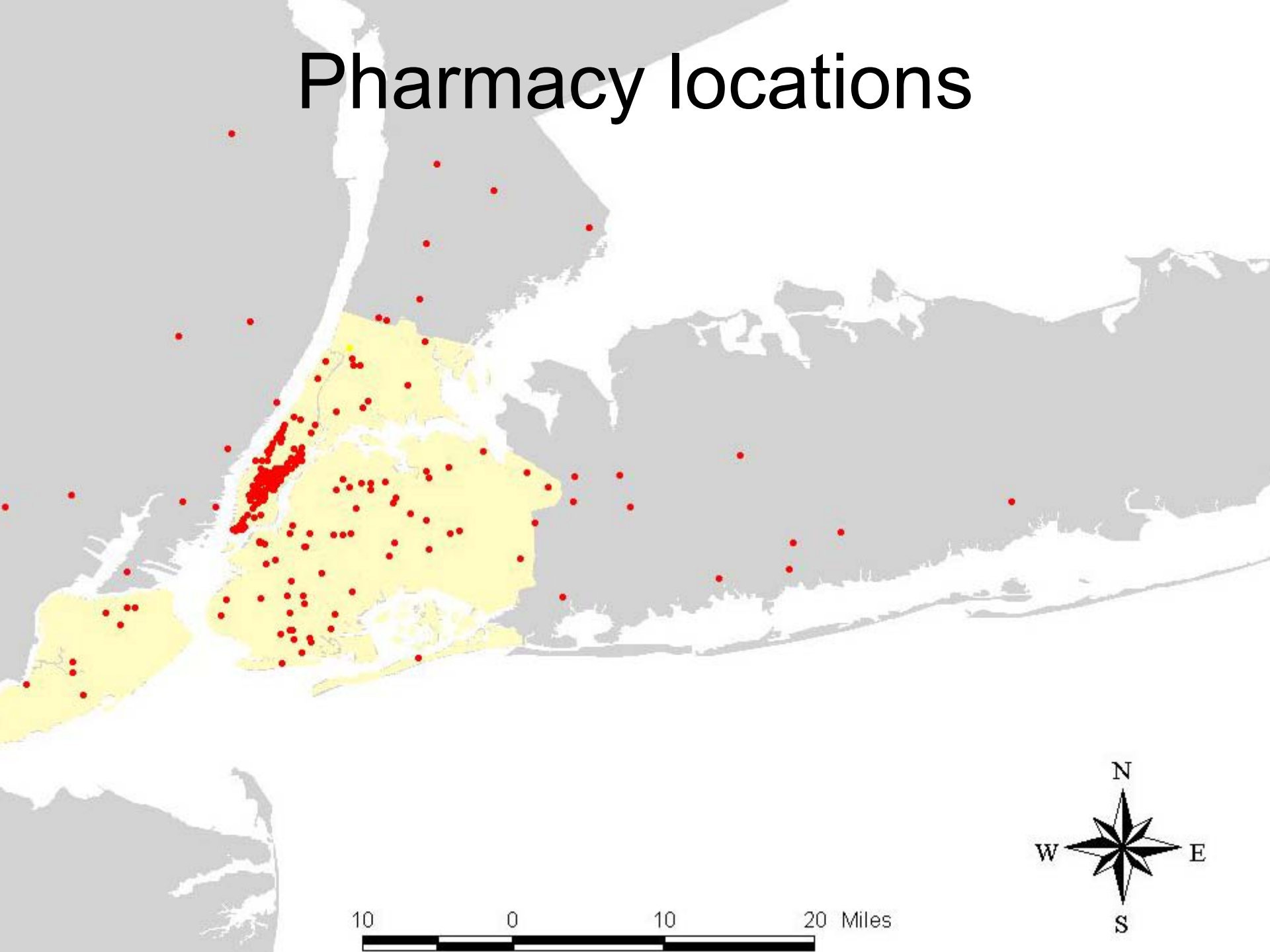


Vomiting Syndrome, All ages, last 12 months

Last 30 days

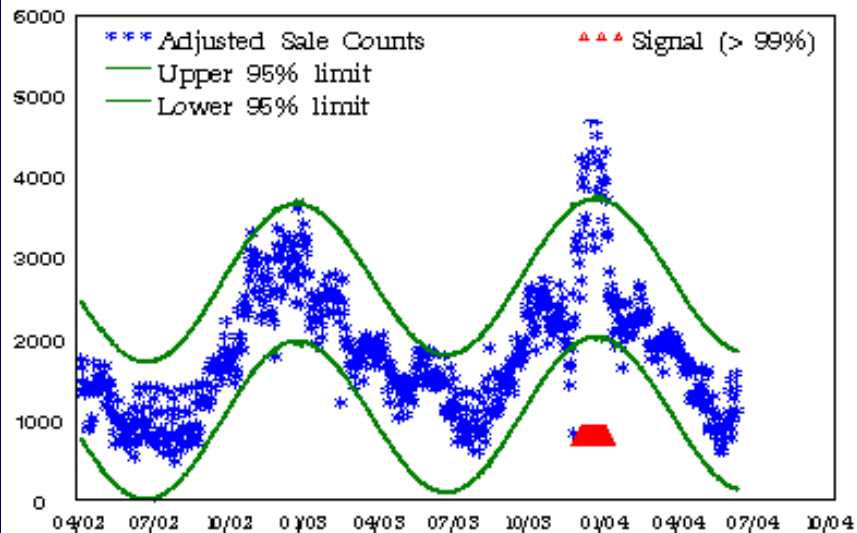


Pharmacy locations

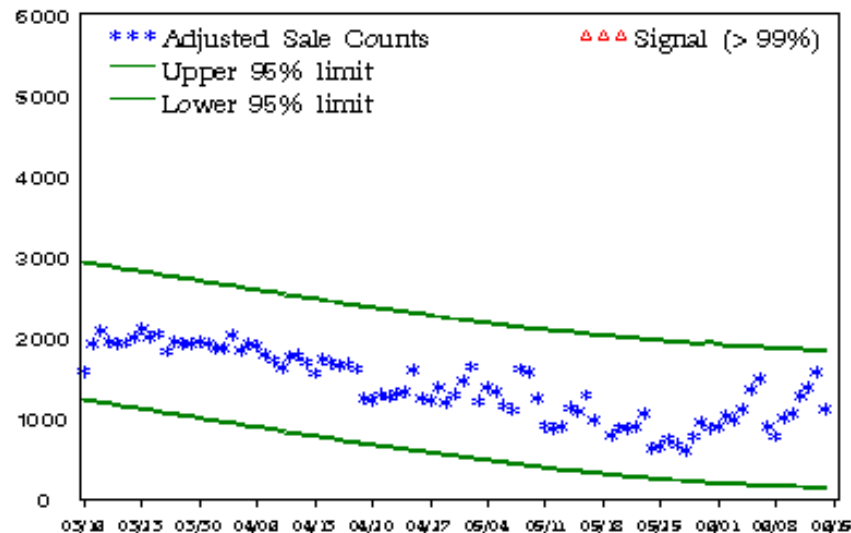


NYC Surveillance for Pharmacy Over The Counter Sales
 Citywide Flu-like Med Sales through 14JUN04

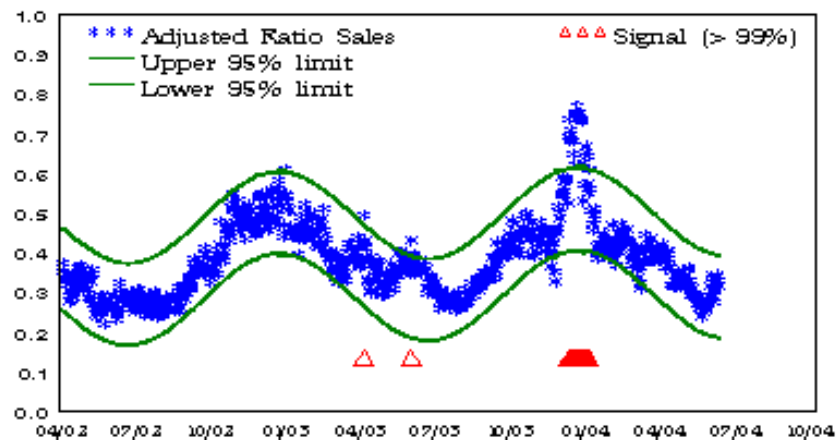
Flu-like Meds



Flu-like Meds, past 3 months



Ratio Flu/Analgesics



Ratio Flu/Analgesics, past 3 months



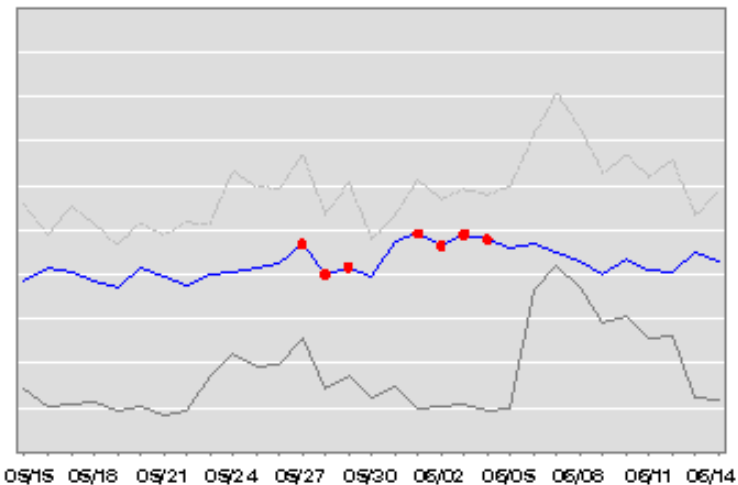
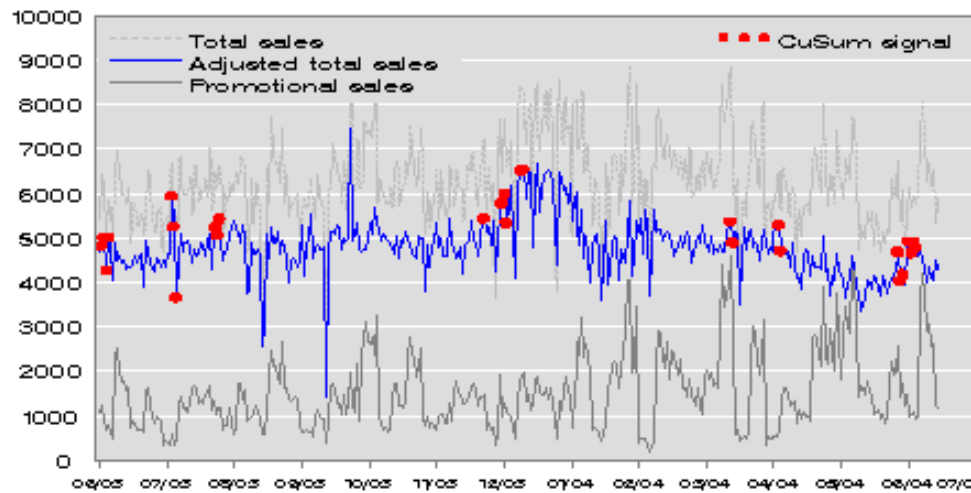
Date of Sale

RODS/NRDM OTC Pharmacy Sales

Citywide trends in adjusted total units sold through Jun 14, 2004

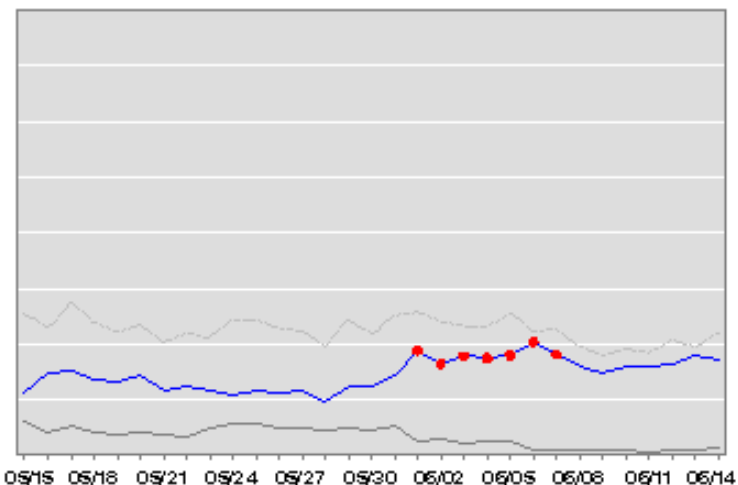
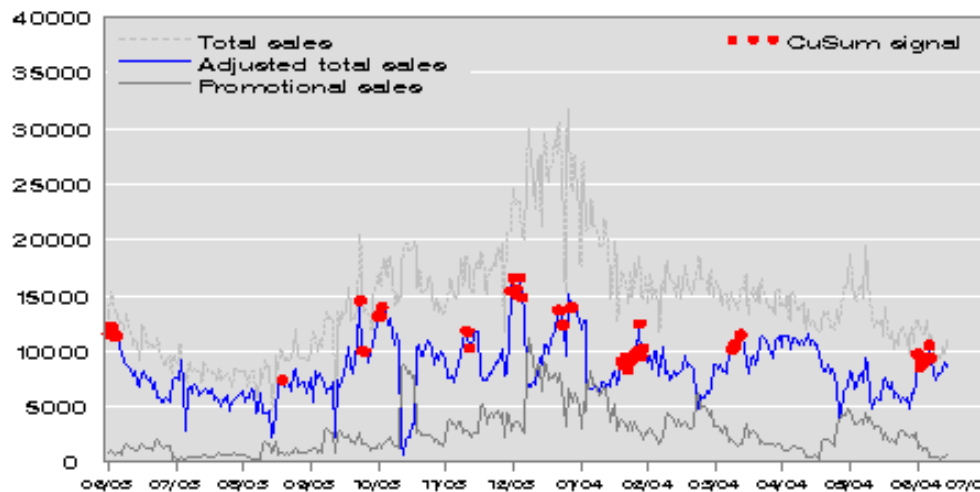
Analgesics sold since May 1, 2003

Last 30 days



Cough/cold units sold since May 1, 2003

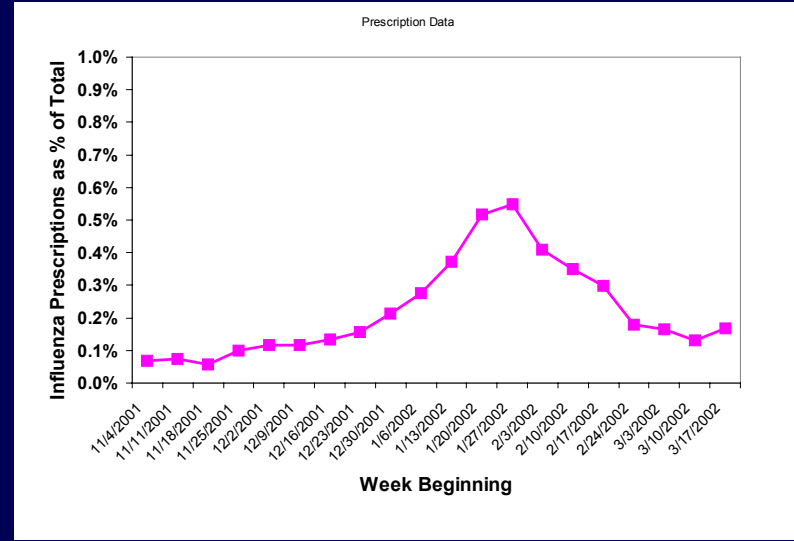
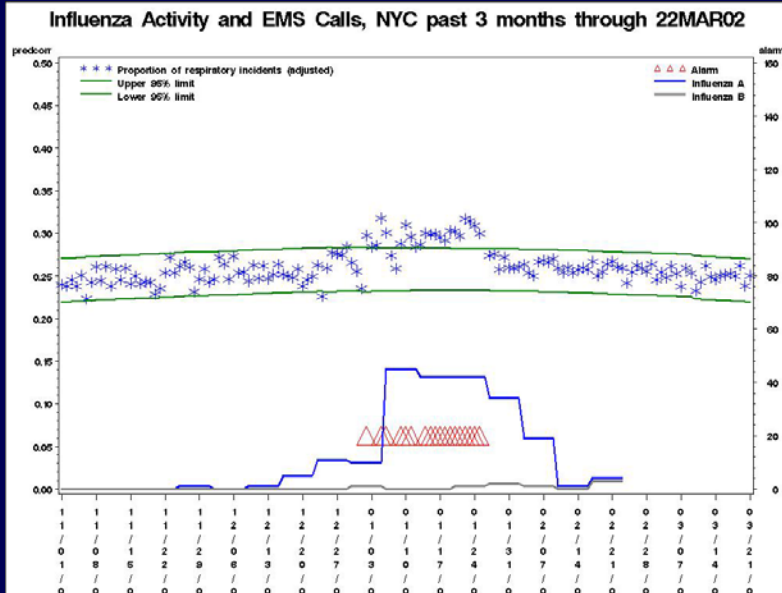
Last 30 days



Date of sale

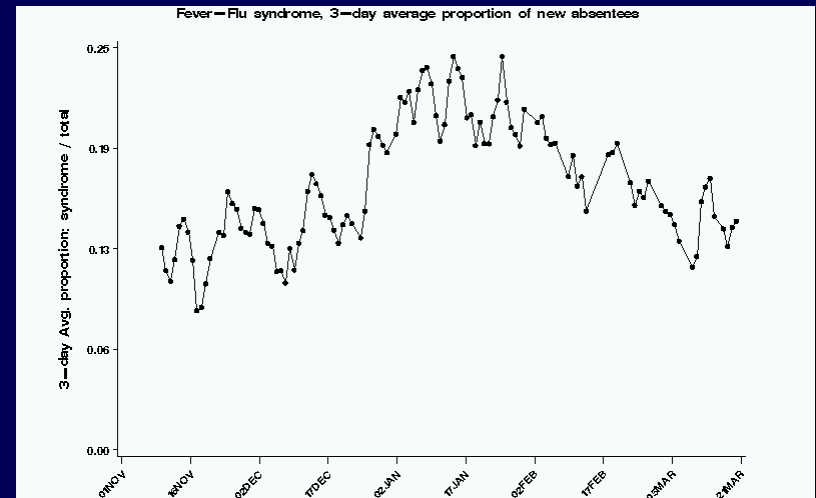
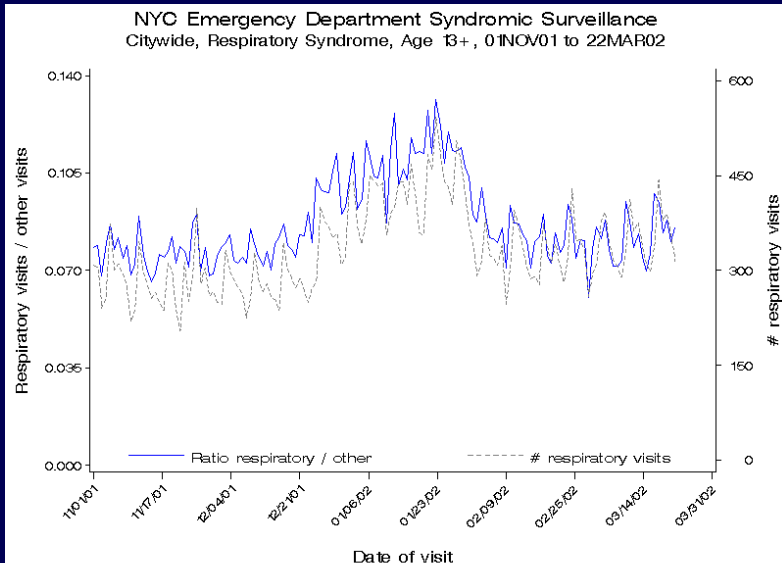
EMS calls

Pharmacy Antiviral Rx



ED respiratory visits

Employee Absenteeism- "flu"



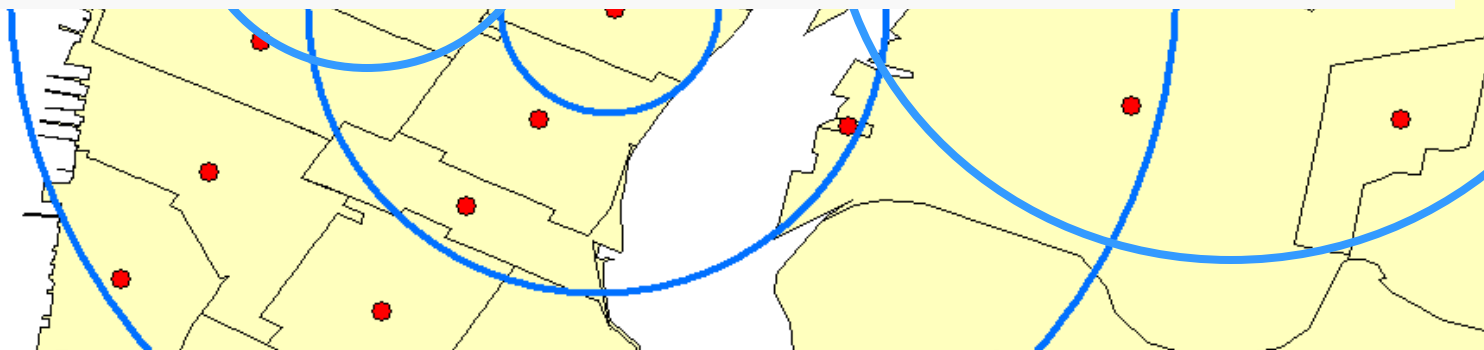
Summary of citywide temporal signals

- Some clear seasonal patterns evident
- Sharp spikes associated with known events
- Difficult to investigate
- Used to reinforce public health messages (influenza, viral GI, heat wave, blackout)

Spatial cluster detection using SatScan

Abdom All ages Zip code 1-day 12 obs / 2.6 exp RR= 4.6 p=0.004

Details:	Zip	Obs / Exp	RR	UHF Neighborhood
	10455	3 / 0.7	4.6	Hunts Point - Mott Haven
	10459	5 / 0.5	10.9	Hunts Point - Mott Haven
	10473	4 / 1.2	3.3	Pelham - Throgs Neck
	10474	0 / 0.3	0.0	Hunts Point - Mott Haven



Legal Mandate

Local health officers shall exercise due diligence in ascertaining the existence of outbreaks of illness or the unusual prevalence of diseases, and shall immediately investigate the causes of same

New York State Sanitary Code,
10 NYCRR Chapter 1, Section 2.16(a)

Guidelines for evaluating alarms

More concerning

- Sustained increase
- Multiple hospitals involved
- Multiple syndromes
- High number of cases
- Other systems alarming
- Strong geographic clustering
- Coincident clinician call
 - Coincident with high profile public event

Less concerning

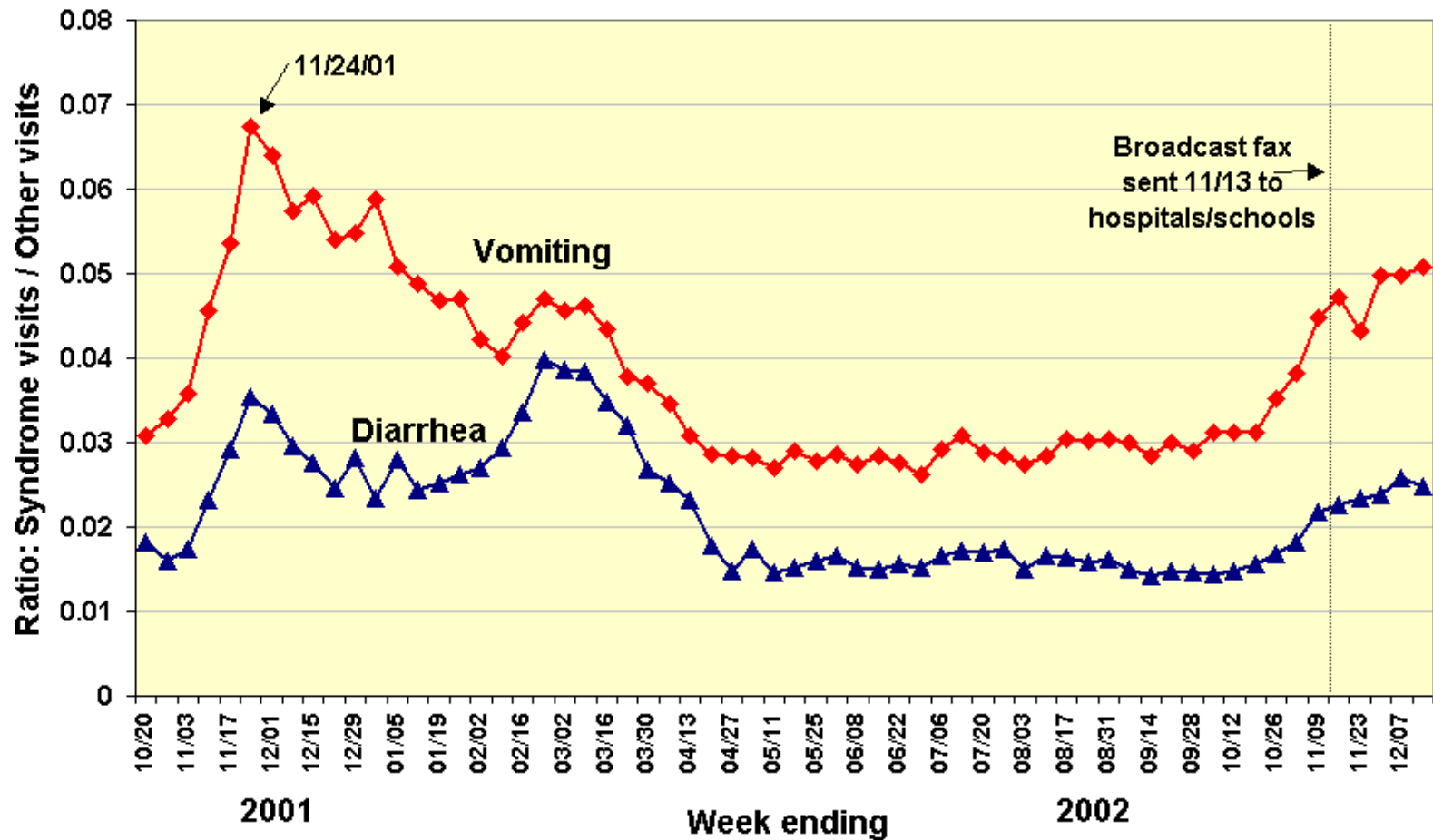
- One-day increase
- Single hospitals involved
- Low number of cases
- No other evidence
- Diffuse increase across city

Is It Worth the Effort?

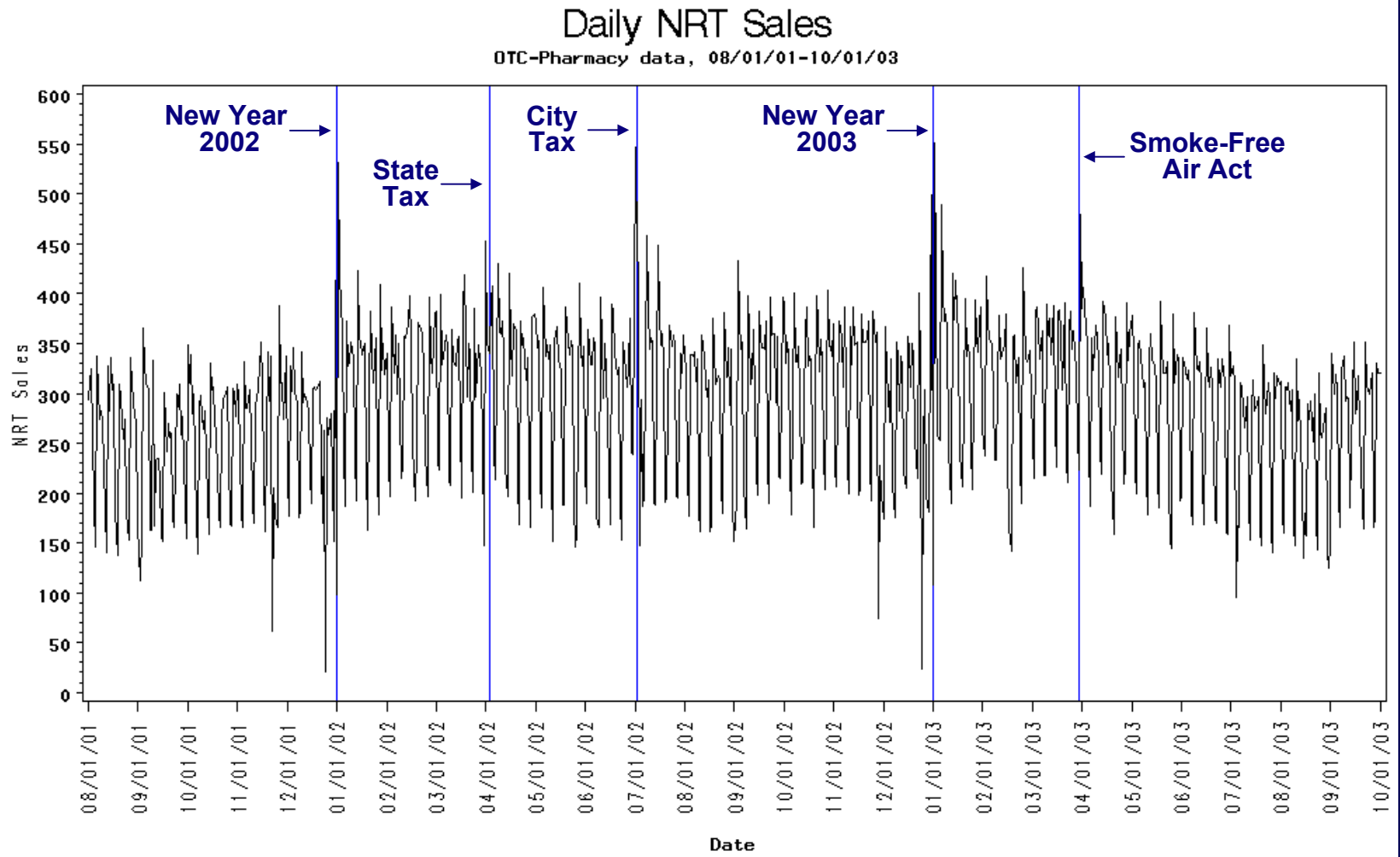
- Costs
 - Implementation costs are modest
 - Operational costs=time of public health staff, investigations
- Benefits
 - Possibility of huge benefit if early detection
 - Characterization
 - Strengthening traditional surveillance
 - Dual Use

Early warning of viral GI activity

Weekly Emergency Department Visits for Vomiting and Diarrhea Syndrome, New York City, All ages, Oct 2001 - Dec 14, 2002

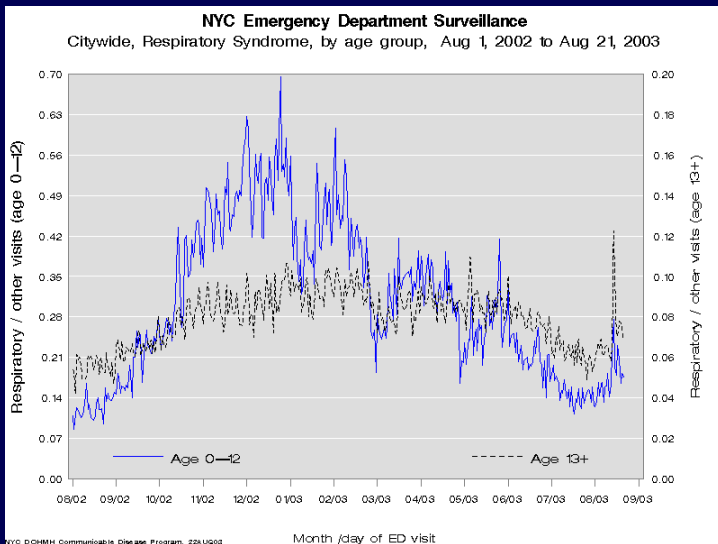
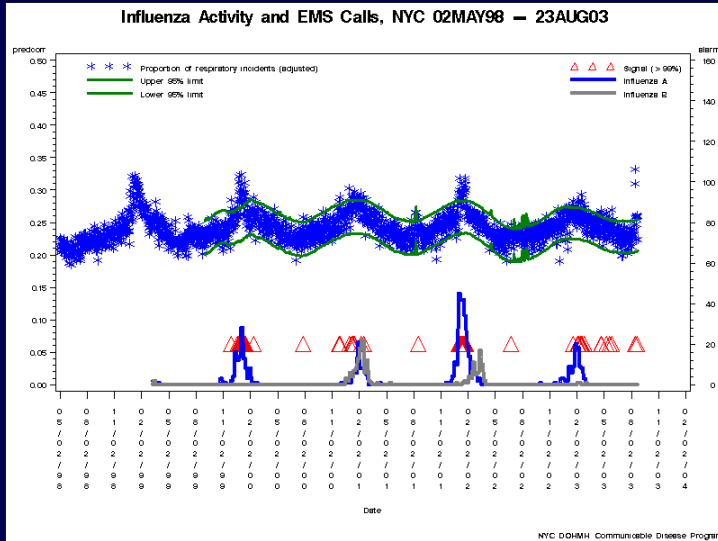


Increase in NRT sales concurrent with taxes/regulations?

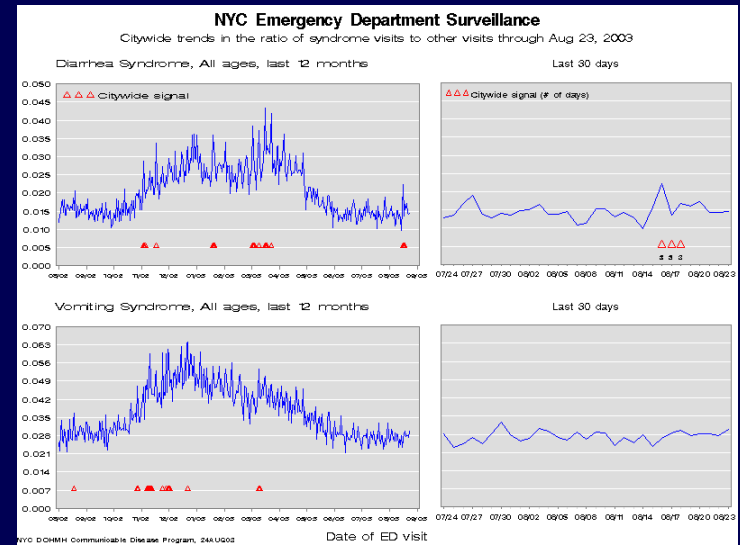
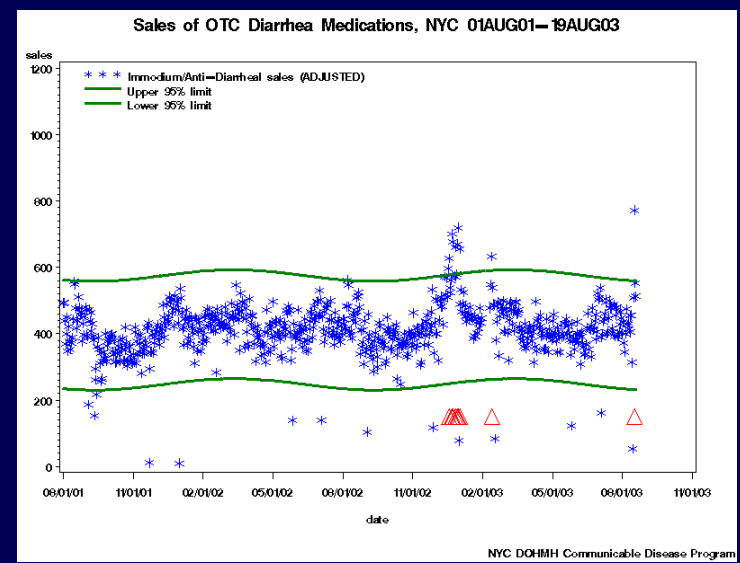


Blackout

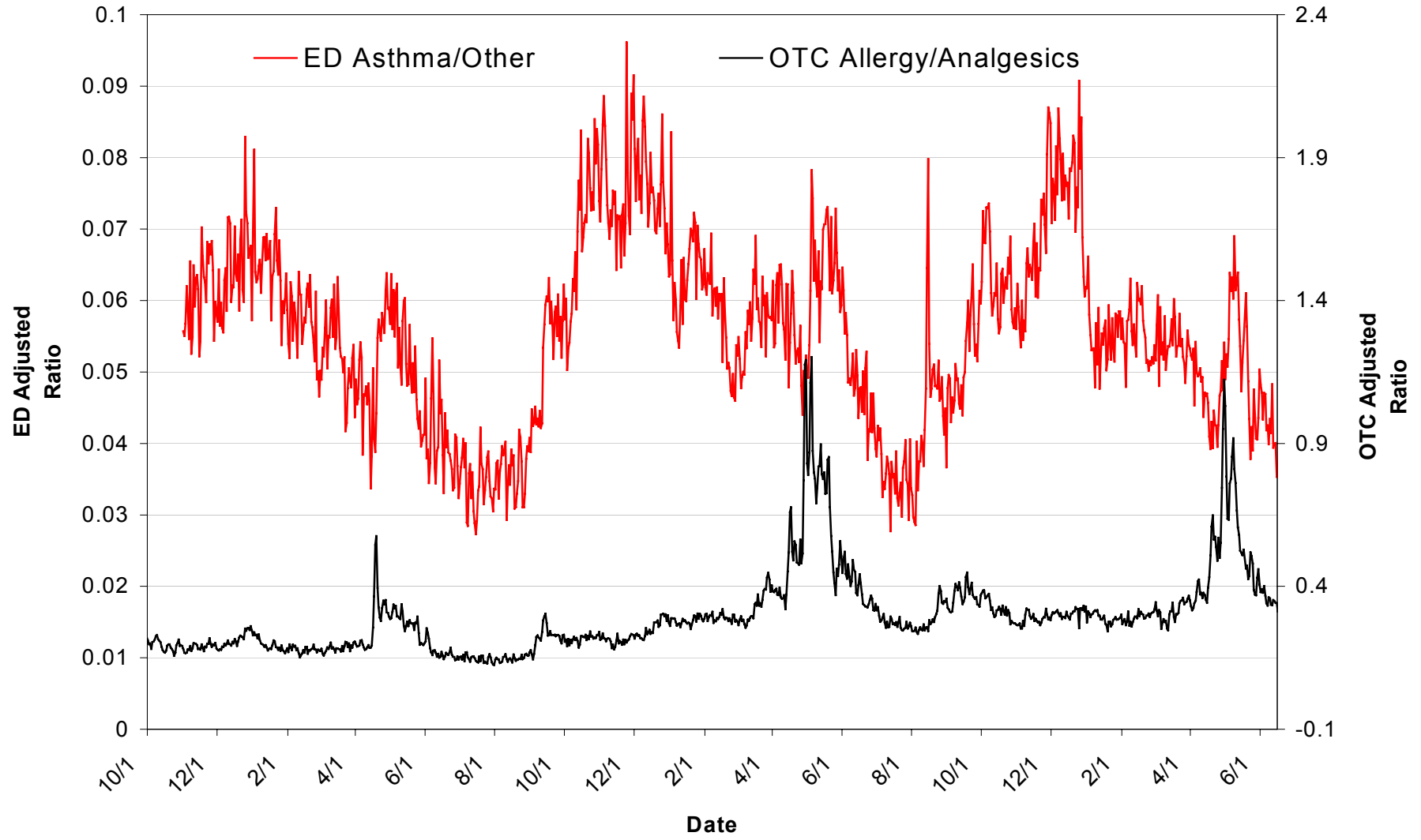
Respiratory



Gastrointestinal



Allergy Meds & Asthma Visits



Other Uses

- Case finding for measles outbreak
- Heat-related illness
- Cipro sales after anthrax
- Fireworks
- Dog bites/rat bites
- West Nile virus spraying
- Suicide attempts
- Overdoses
- Carbon monoxide poisoning

Privacy and Confidentiality

- Health departments have strong tradition of maintaining security of confidentiality information
 - Public health provisions in HIPAA
- Data collected under auspices of bioterrorism surveillance de-linked from any identifiers for non-BT surveillance

So What?

- Strengthened surveillance systems in place
- Potential to better monitor all public health situations
- Even if there are no more bioterror attacks, preparation can strengthen our public health infrastructure and ability to respond

Which Data Source is Best?

- Readily Available
- Representative
- Timely
- Flexible
- Specific
- Investigable
- Good Signal-Noise

In NYC

- ED visit logs
- Ambulance Dispatch
- Local Pharmacy Chain
- National Pharm Data
- Absenteeism

National Program?

- Potential Issues:
 - Legal mandate
 - Regional outbreaks
 - Data sources available
 - Support investigation and response
 - Support multi-use/ flexibility
 - Single point of failure?

Build the Highway

- Standards that enable data flow
- Facilitate National → Local data flow
- Support evaluation
- Develop and deploy rapid diagnostics

- Strengthen local capacity
 - Reliable, sustained funding

Future Steps

- Data Sources
 - Outpatient visit & EMR data
 - Lab orders
 - School sick visits
- Data Transport
 - Transition to PHIN-MS
- Data Analysis
 - Text normalization and coding
 - Multiple data sources
 - Integration with environmental surveillance
 - Outbreak “signatures”

Future Steps, cont.

- Investigation
 - Rapid specimen collection & diagnostic testing
- Evaluation & Validation
 - Simulated (synthetic) outbreaks
 - Systematic documentation of prospective surveillance
 - Sharing of experiences

2004 National Syndromic Surveillance Conference

Boston, Nov 3-4

www.syndromic.org

Acknowledgements

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