

# What is Syndromic Surveillance?

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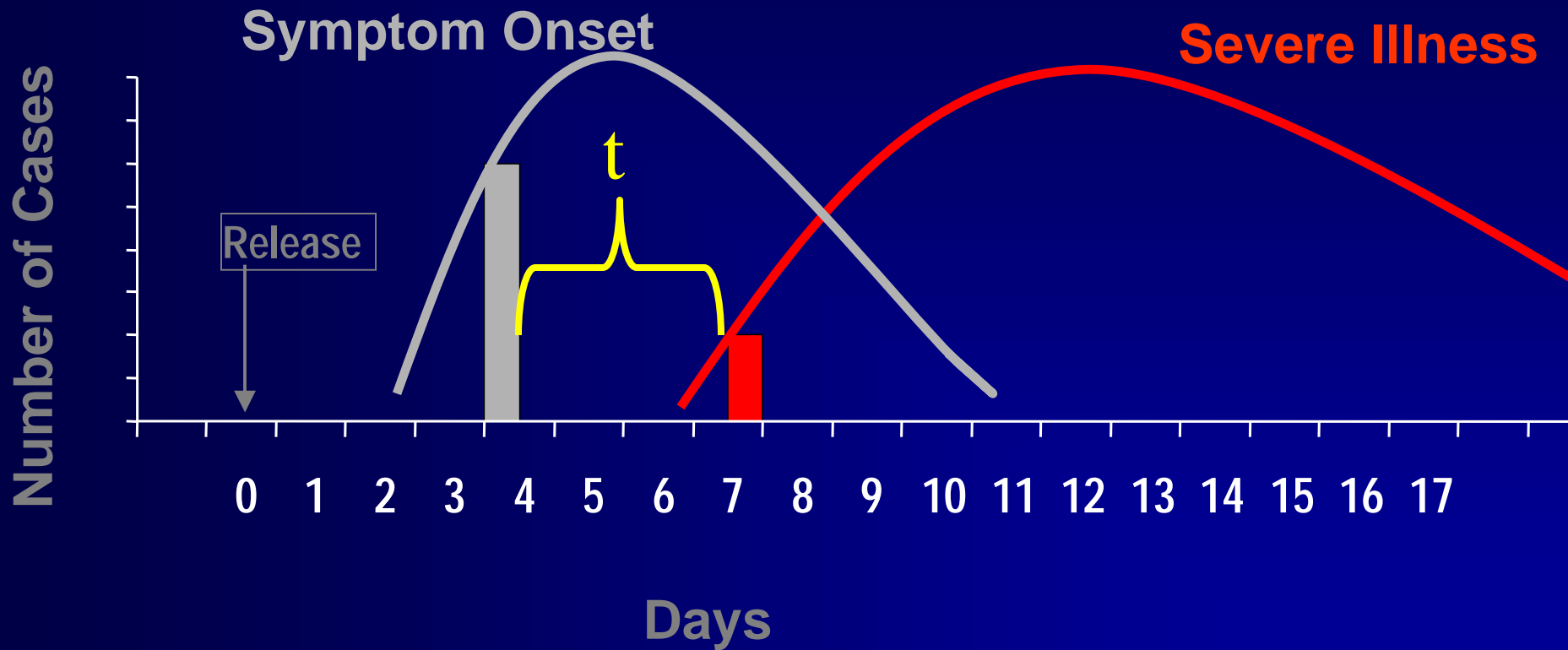
# Overview

- ◆ **Goals**
- ◆ **Definitions/ Assumptions**
- ◆ **“Realistic” Expectations**

# Goals of Syndromic Surveillance

- ◆ Early detection of outbreaks
- ◆ Characterization of size, spread, and tempo of outbreak
- ◆ Monitoring of disease trends
- ◆ Reassurance

# Rationale: Bioterrorism Detection



# Syndromic Surveillance: What's in a Name?

- ◆ Prodromic Surveillance
- ◆ Outbreak Detection System
- ◆ Information System-Based System
- ◆ Early Warning Systems
- ◆ Health Indicator Surveillance
- ◆ Biosurveillance System
- ◆ Syndromic Biosurveillance
- ◆ Prediagnostic
- ◆ Symptom-Based Surveillance
- ◆ Nontraditional Surveillance

# Definitions

Syndromic Surveillance:

?

# Definitions

**Syndromic Surveillance: “The monitoring of the frequency of illnesses with a specified set of clinical features in a given population, without regard to the specific diagnoses, if any, that are assigned to them by clinicians”**

Reingold, A. Biosecurity and Bioterrorism: 2003;1 :77-81

# Definitions

**Syndromic Surveillance**: “ The collection and analysis of pre-diagnosis information that lead to an estimation of the health status of the community”

DOD-GEIS. <http://ndms.umbc.edu/coference>  
2003/Proceedings/conf12\_Biosurveillance\_Lobardo.pdf



# Definitions

Syndromic Surveillance: “An investigational approach where health department staff, assisted by automated data acquisition and generation of statistical alarms, monitor disease indicators in **real-time** or **near real-time** to detect outbreaks of diseases **earlier** than would otherwise be possible with traditional public health methods.”

CDC. Draft Framework for Evaluating Surveillance Systems for Early Detection of Outbreaks. August 26, 2003.

# Definitions

- ◆ **“Real-time” public health surveillance using data that is routinely collected for other purposes**
  - **Non-specific/pre-diagnostic health indicators**
  - **Use of existing electronic data**
  - **“Real time” transmission, analysis, and alerts**

# System Attributes

<u>Duration</u>	<u>Data Types</u>
Event-Based	Manual
Sustained	Electronic/Pre existing

# Syndrome Definitions (clinical)

ESSENCE	Nat'l Capital Area	NYC DOHMH	Milwaukee HD
Respiratory	Death	Respiratory	Respiratory + Fever
GI	Sepsis	Diarrhea	Rash + Fever
Derm, Infectious	Rash	Vomiting	Bloody Diarrhea
Derm, Hemorrhagic	Respiratory	Asthma	CNS Infection
Neurologic	GI	Fever	Bot-like sxs
Fever/sepsis	Neurologic		Sepsis/shock
Coma/Sudden Death	Unspecified		
	Other		

# Definitions: Data Sources

## Clinical

ED Volume

Hospital Admissions

ED Chief Complaint

ED DC Diagnosis

Ambulatory DC  
Diagnosis

Provider Call Lines

911 Calls

Insurance Claims

## Alternative

School Absenteeism

Work Absenteeism

OTC Medication Sales

Animal Illnesses/Deaths

# 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 **Managed Care Org** **Absenteeism**

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

see **ED Logs**

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

Day 7 - critically ill- ICU, lab tests +

Day 8 - expires- "respiratory failure"

**Diagnosed**

**Reported**

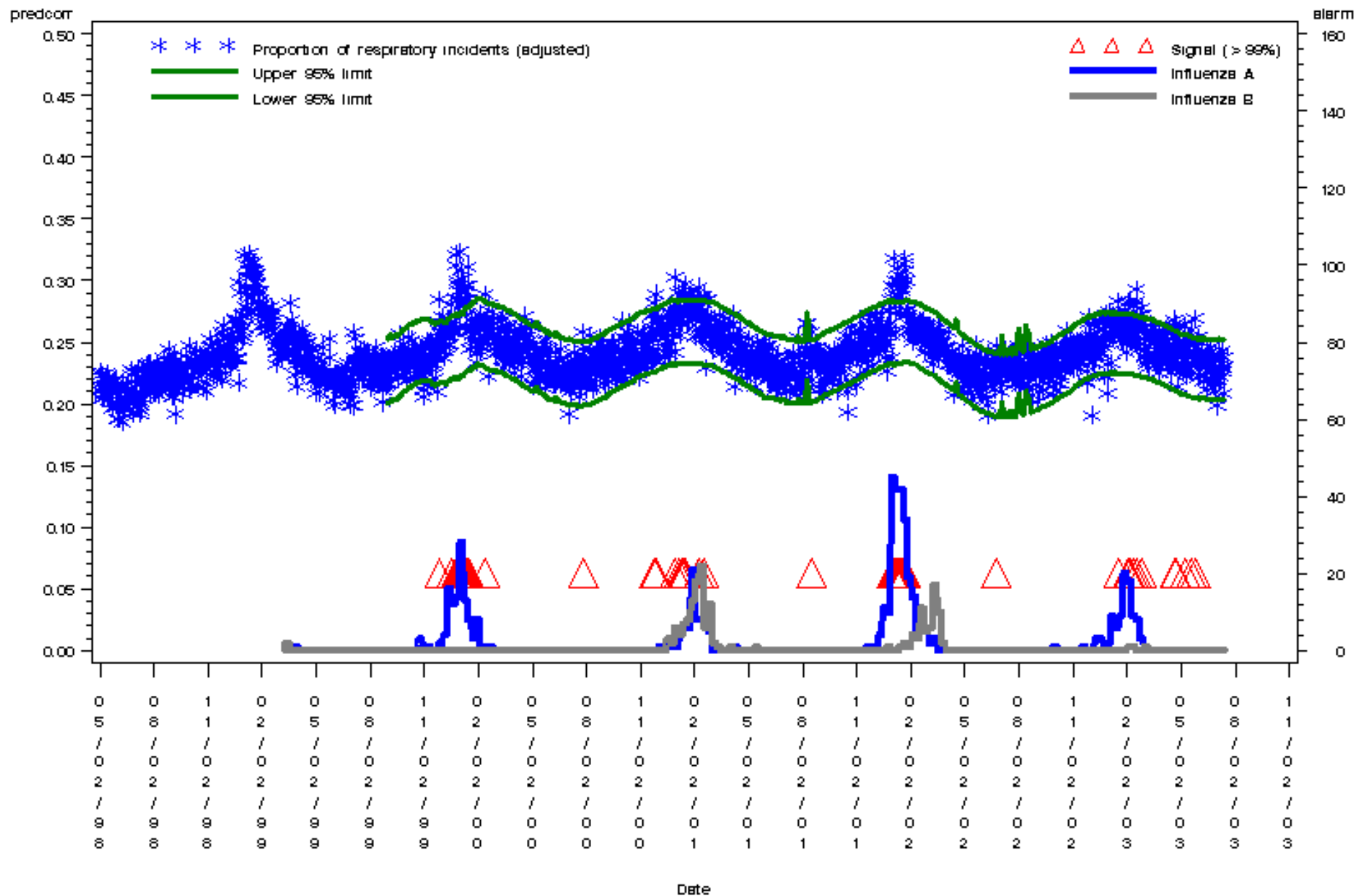
# EMS-911 surveillance

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 02MAY98 – 15JUL03

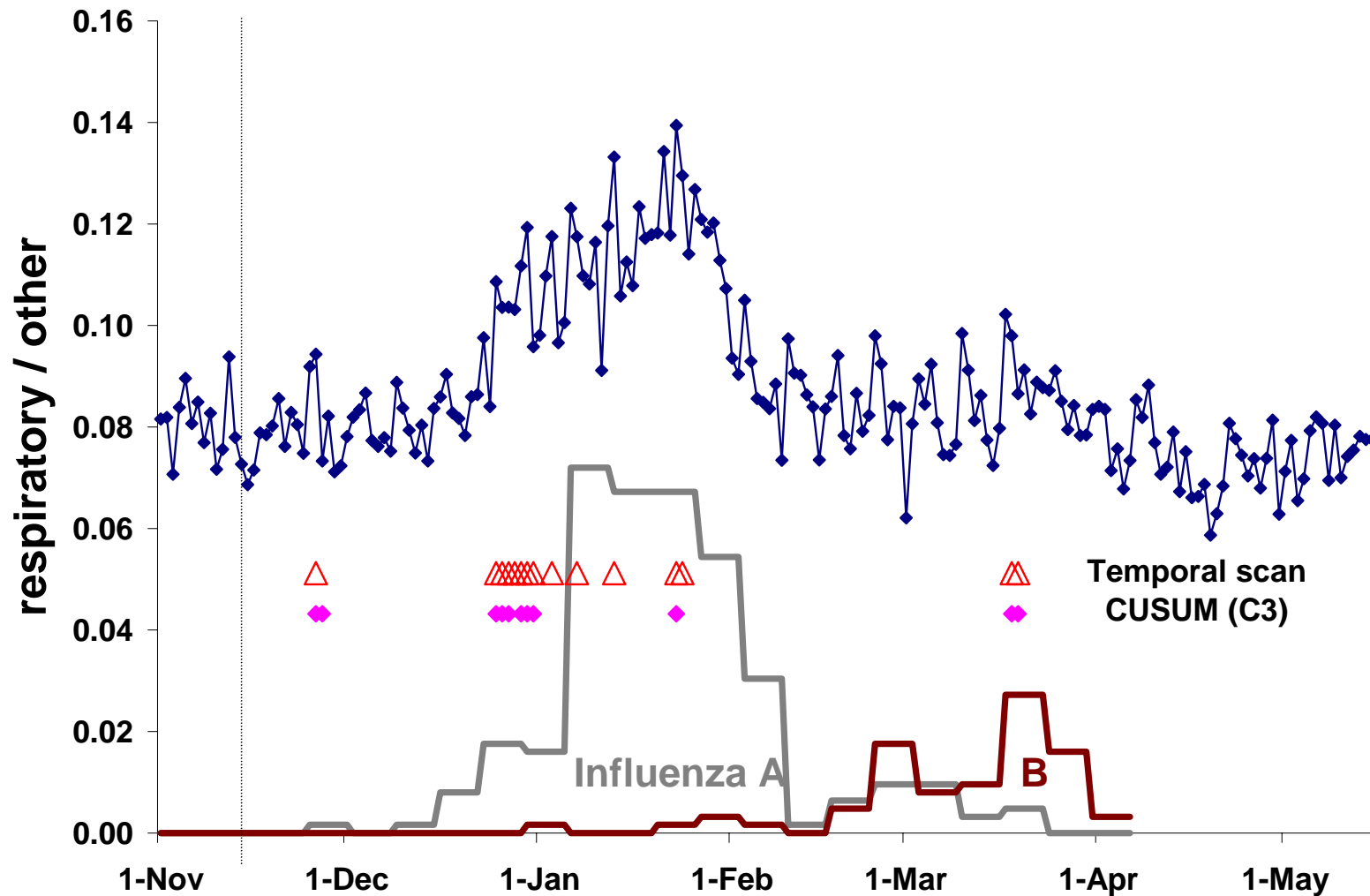


# Electronic ED logs

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

# ED Respiratory Visits, Nov-May

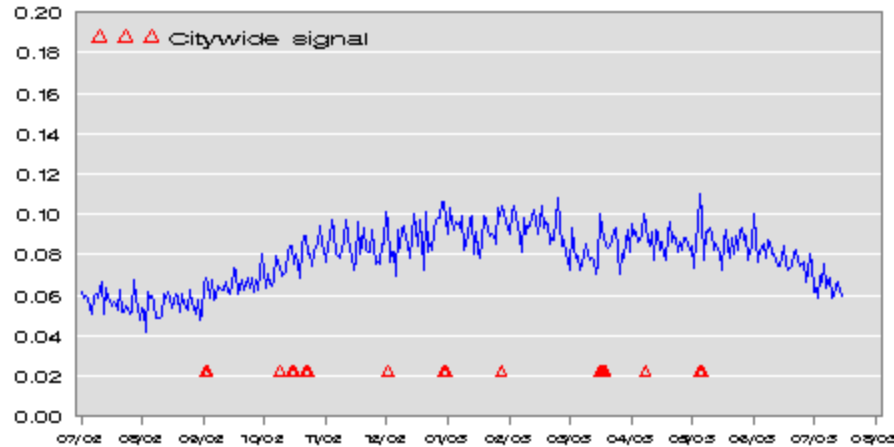


# Daily Reports

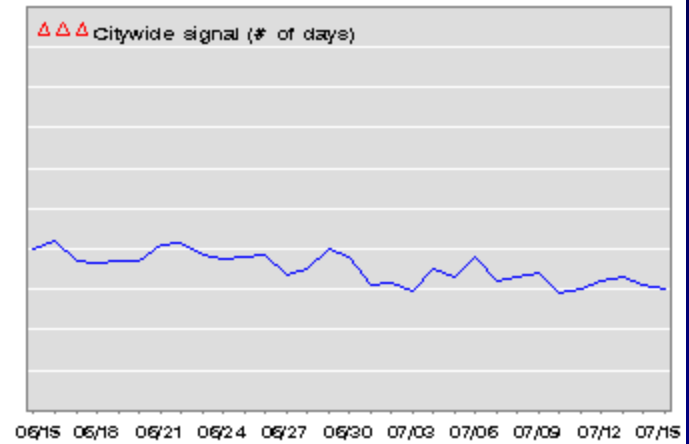
## NYC Emergency Department Surveillance

Citywide trends in the ratio of syndrome visits to other visits through Jul 15, 2003

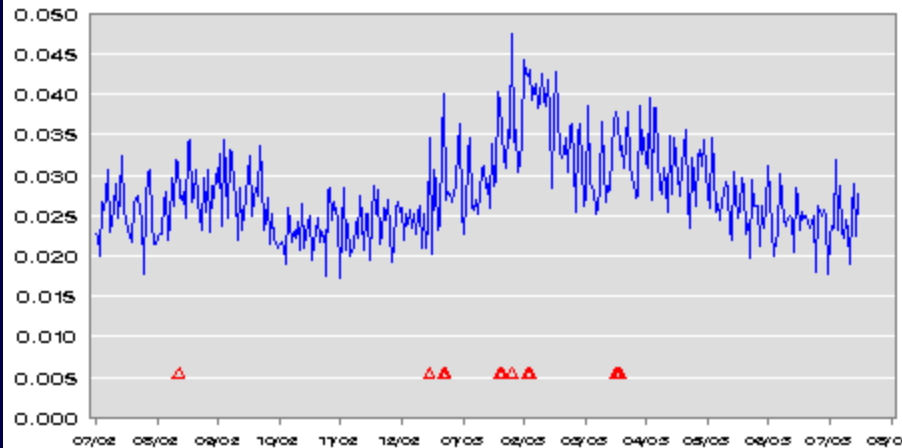
Respiratory / other, Age 13+, last 12 months



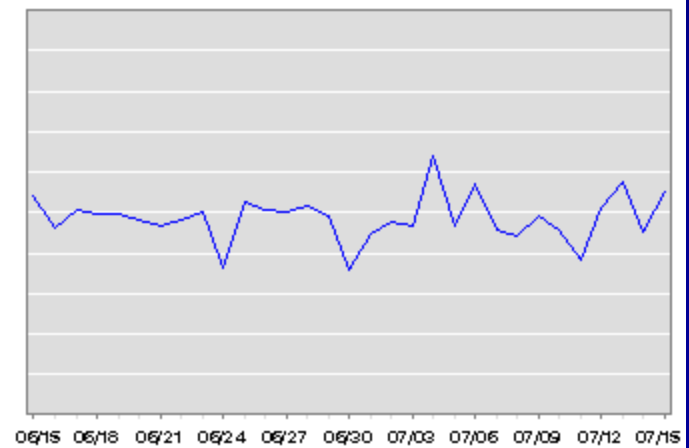
Last 30 days



Fever / other, Age 13+, last 12 months



Last 30 days



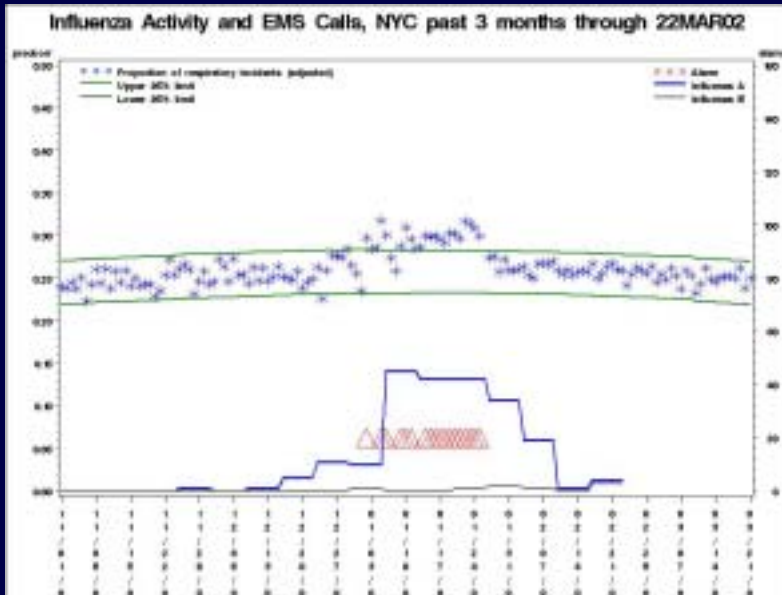
# Statistical Analysis for Signal Detection

- ◆ Not standardized
- ◆ Effectively identifies an outbreak signal from background noise
- ◆ Temporal
  - Modified Cyclical Regression Model
  - CUSUM
- ◆ Spatial-Temporal
  - Spatial Scan Statistic

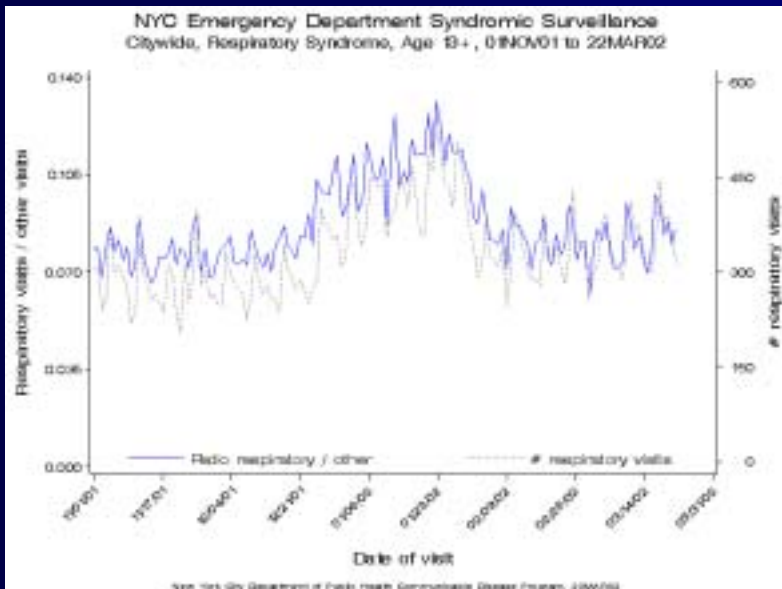
# Response Protocols

- ◆ Documented Procedures
- ◆ Adequate Staff
- ◆ 24/7 Coverage
- ◆ Effective means of alerting those who need to know
- ◆ How to proceed if “cases” are unidentifiable?
- ◆ Role of independent data sources

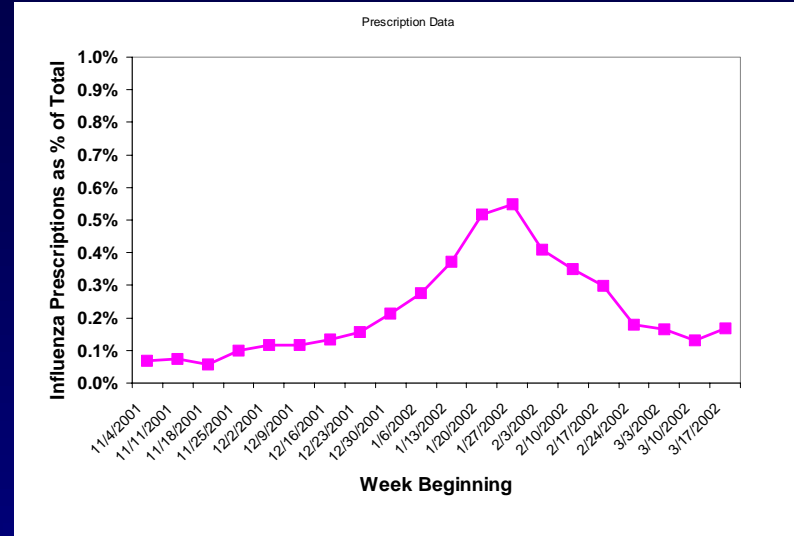
# EMS calls



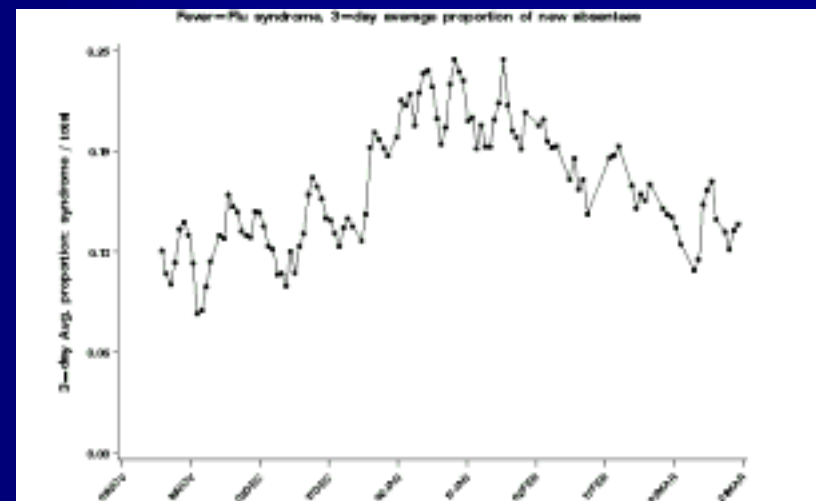
# ED respiratory visits



# Pharmacy Antiviral Rx



# Employee Absenteeism- "flu"

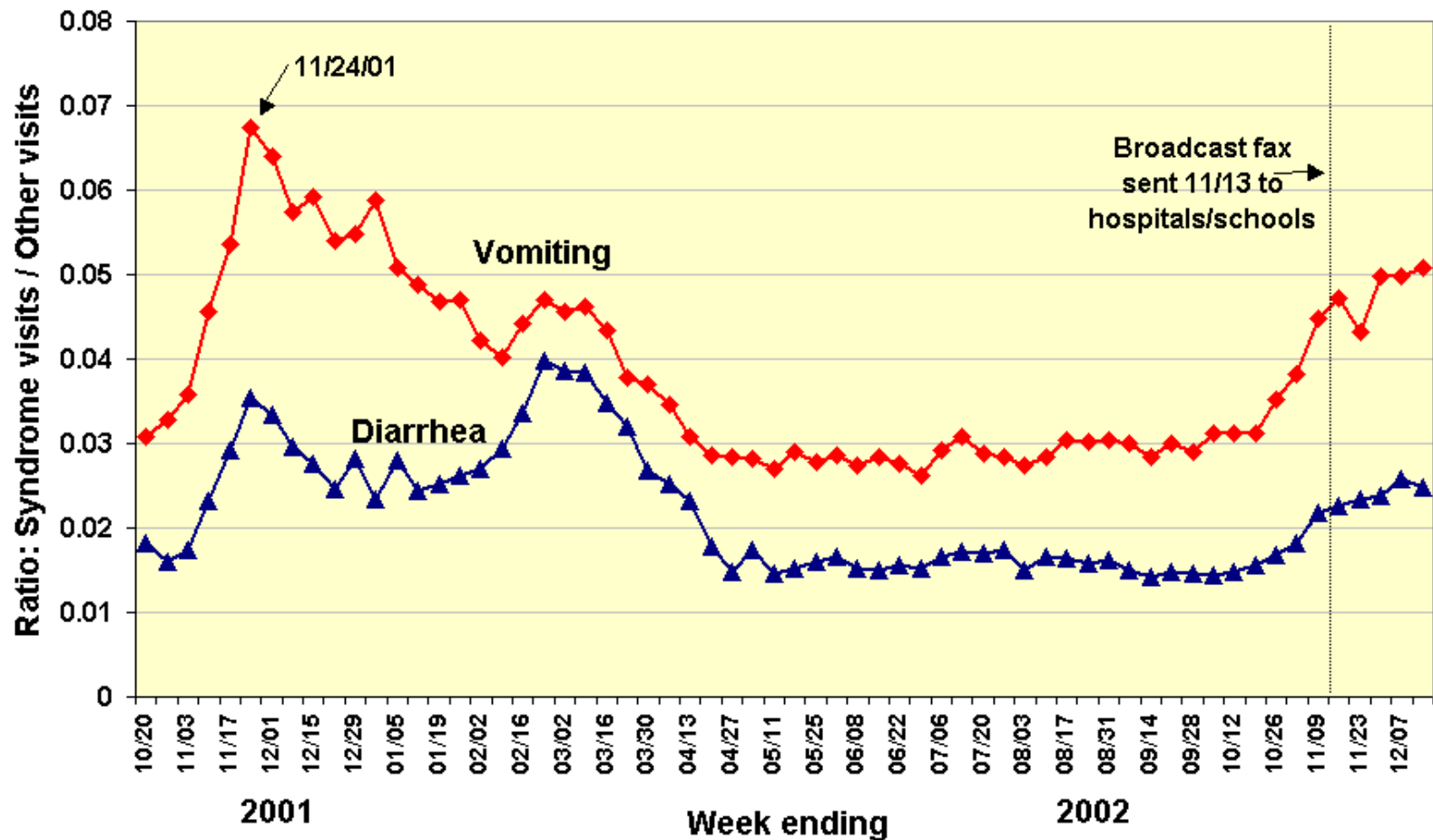


# Multi-use systems

- ◆ Natural outbreaks
- ◆ Heat-related illness
- ◆ Asthma trends
- ◆ Nicotine replacement sales
- ◆ Cipro sales after anthrax
- ◆ Fireworks
- ◆ West Nile virus spraying
- ◆ Suicide attempts

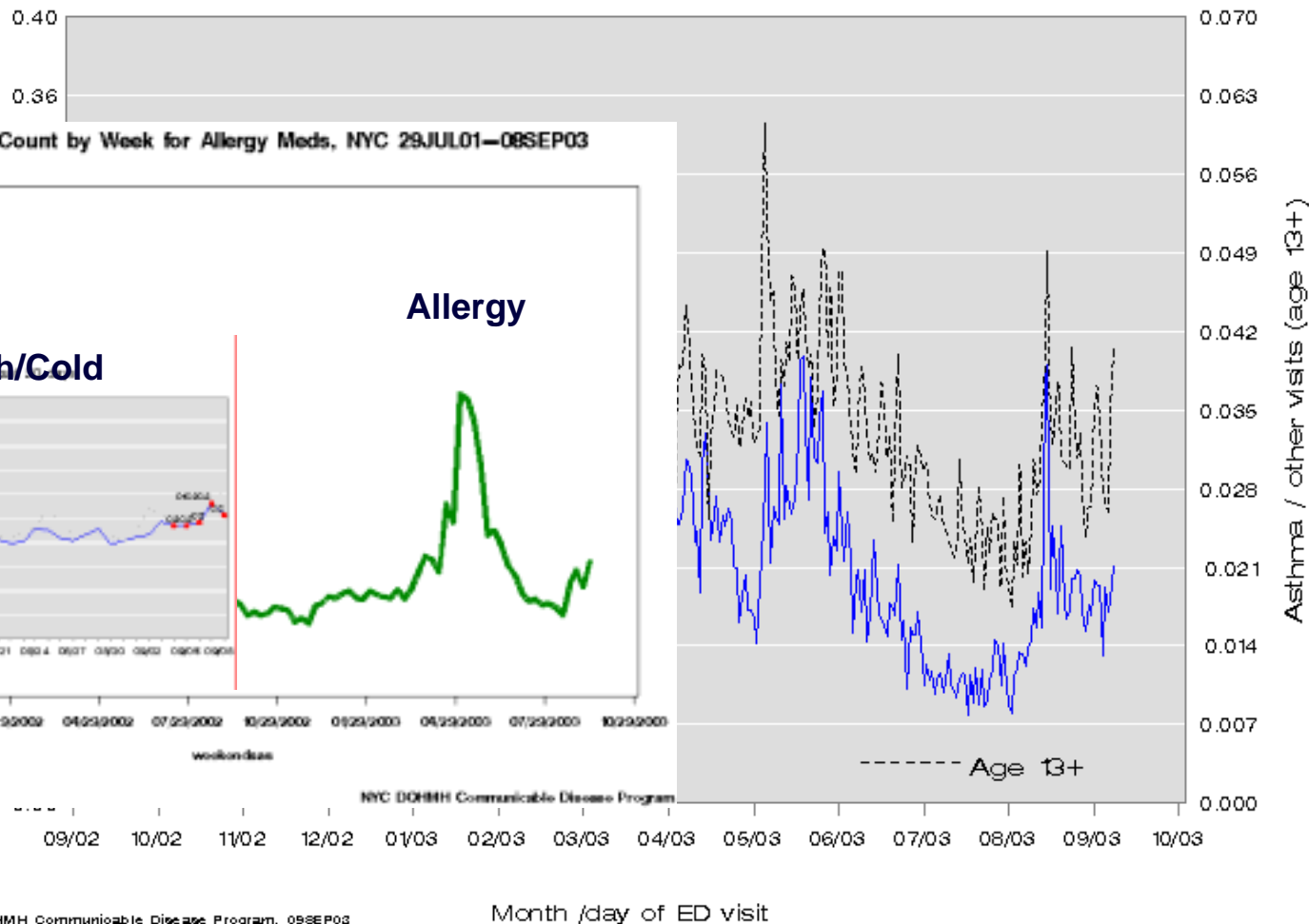
# Early warning of viral GI activity

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



# Allergy and Asthma

**NYC Emergency Department Surveillance**  
 Citywide, Asthma Syndrome, by age group, Sep 1, 2002 to Sep 8, 2003



NYC DOHMH Communicable Disease Program, 08SEP03

Month /day of ED visit

# **“Realistic Expectations”**

## **What can we agree on?**

- ◆ **Syndromic surveillance does not replace traditional public health surveillance**
- ◆ **Direct reporting by physicians to health departments is crucial for early detection**
- ◆ **Syndromic surveillance will not detect a single case of bioterrorism-related illness**
- ◆ **Syndromic surveillance should enhance, not replace, traditional approaches to outbreak detection**

# **“Realistic Expectations”**

## **What can we agree on?**

- ◆ **Numerous countries, states, and localities have developed syndromic surveillance systems**
- ◆ **Healthcare-related information is not likely to become less electronic**
- ◆ **Defining the scope of an outbreak, reassurance, and dual-use are taking on added importance**

# **“Realistic Expectations”**

## **What do we NOT agree on?**

- ◆ **Optimal data sources**
- ◆ **Clinical and ICD-9 syndrome definitions**
- ◆ **Optimal signal detection methods**
- ◆ **Minimally acceptable response protocols**
- ◆ **Resource commitment vs traditional methods**

# Additional Considerations

- ◆ The role of academic partners in bridging the gaps
- ◆ Utility of a national repository of syndromic data
- ◆ Advancing the use of simulation datasets and analytic methods
- ◆ Outbreak response protocols and the use of broad DNA based diagnostics

# Acknowledgements

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