

APPLICATION OF BIOTERRORISM SURVEILLANCE METHODS IN SAN DIEGO COUNTY

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OVERVIEW

- * **San Diego County is a natural target for a bioterrorism event.**

- * **San Diego County characteristics:**
 - **2.9 million population**
 - **Largest military complex and retired military population in U.S.**
 - **Numerous tourist attractions (Zoo, SeaWorld, Mexico Border)**

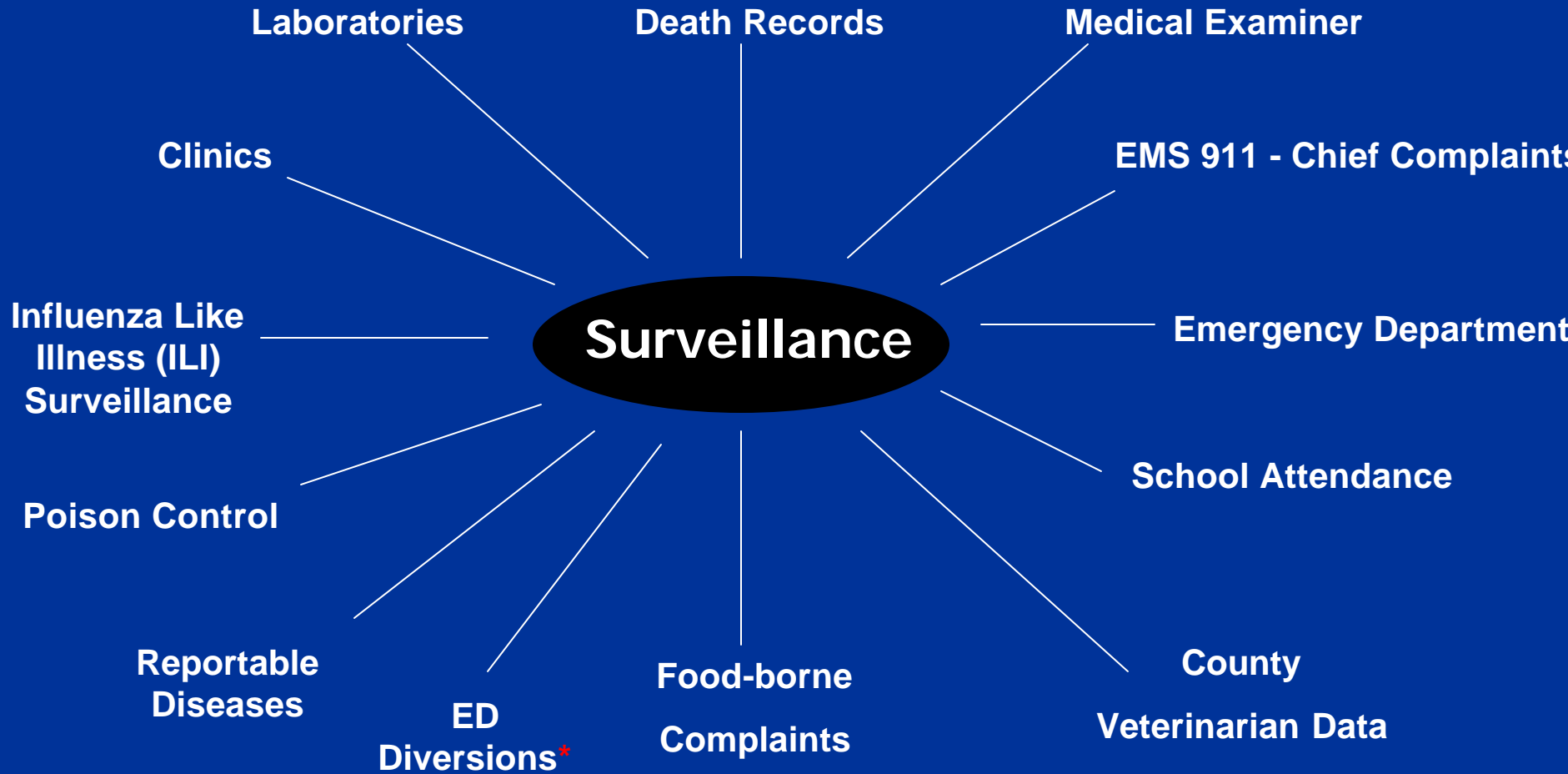
- * **Our Aim**
 - **To improve early detection and response capabilities for bioterrorism events or naturally occurring disease outbreaks.**

- * **Surveillance characteristics**
 - **Traditional and non-traditional data sources**
 - **Network of people related to the data and reporting sources**
 - **Influenza Surveillance, Syndrome Surveillance, Enhanced Health Surveillance systems in place**
 - **Application of aberration detection methods**
 - **Effective communication of results**

SAN DIEGO COUNTY BIOTERRORISM PLAN

- * **Early Detection** – enhanced surveillance for clinical syndromes, real-time data from heterogeneous data sources, early warning alerts, rapid epidemiological assessment and laboratory identification
- * **Mass Patient Care** - rapid expansion of health care system, triage, staffing, isolation/quarantine & treatment protocols, integration w/ regional, State & National Disaster Medical Assistance Teams (DMAT)
- * **Mass Immunization/Prophylaxis** - access to local, State and National Pharmaceutical Stockpile Program (NPSPP), set-up, staffing, security
- * **Mass Fatality Management** - rapid expansion of morgue facilities, Disaster Mortuary Teams (DMORT), victim identification, family notification, autopsy processing, decontamination
- * **Environmental Surety** - assessment, sampling, scene management & mitigation, environmental quarantine, bio-hazardous waste management...
- * **Command and Control** - known scene vs covert release, County Emergency Operations Center (EOC), public information, quarantine...

SURVEILLANCE DATA SOURCES



** Real Time Data Sources*

*** Data collection**

Data are extracted and compiled from different sources by various means

*** Syndromic Surveillance**

Data sources: EMS 911 Chief Complaints, Emergency Departments, Poison Control

Syndromes: Abdominal Pain, Altered Neurological Functioning, Botulism Syndromes, Chest Pain, Flu/Fever/Rash, Respiratory Distress, COPD, Seizure, Psychiatric

Data are analyzed and summarized daily

*** Data Analysis**

Data are analyzed using various methodologies, including:

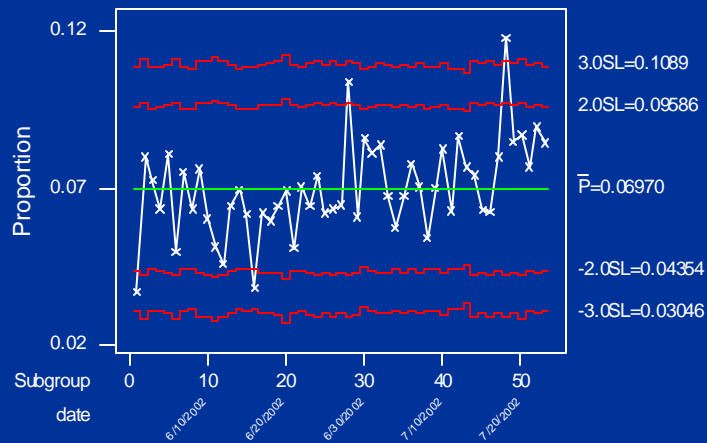
- Statistical Process Control Charts (e.g., P-Chart, CUSUM)**
- Time Series Models (i.e., ARIMA)**
- Spatio/Temporal Analysis (SaTScan 2.1.3)**
- Historical Limits Method (CDC's MMWR Figure 1)**

SYNDROMIC SURVEILLANCE

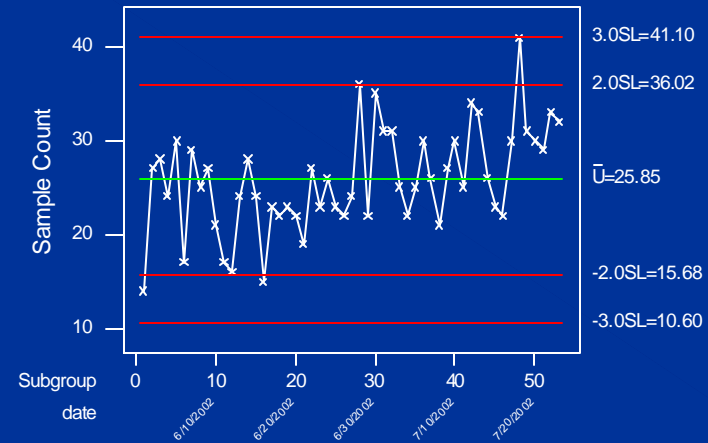
Statistical Process Control Charts used for aberration detection

“Altered Neurological” Chief Complaint – 6/1/02-7/23/02

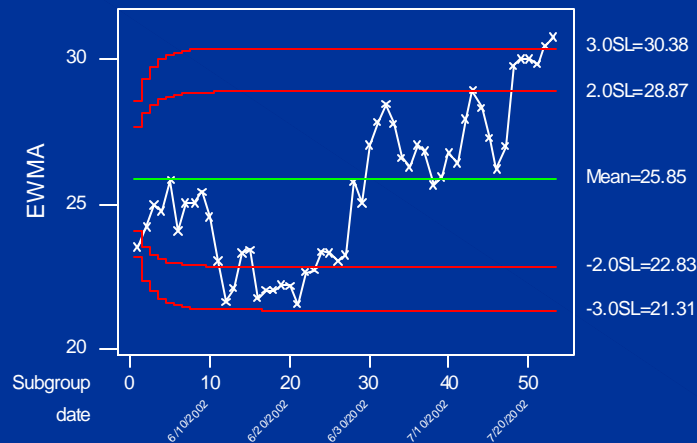
P-Chart (Alt Neur: 6/1/02 - 7/23/02)



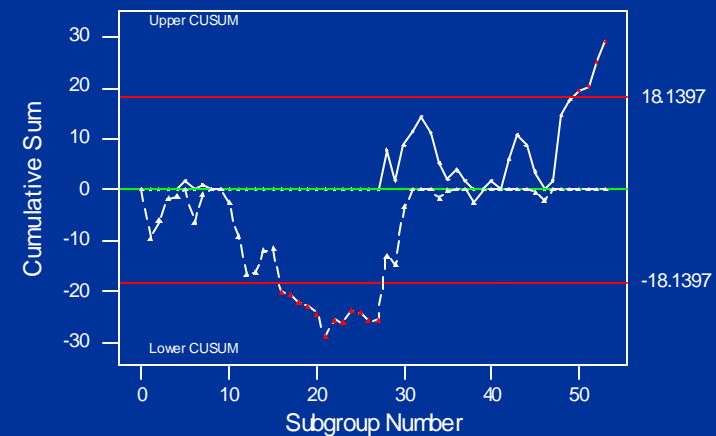
U-Chart (Alt Neur: 6/1/02 - 7/23/02)



EWMA (Alt Neur: 6/1/02 - 7/23/02)



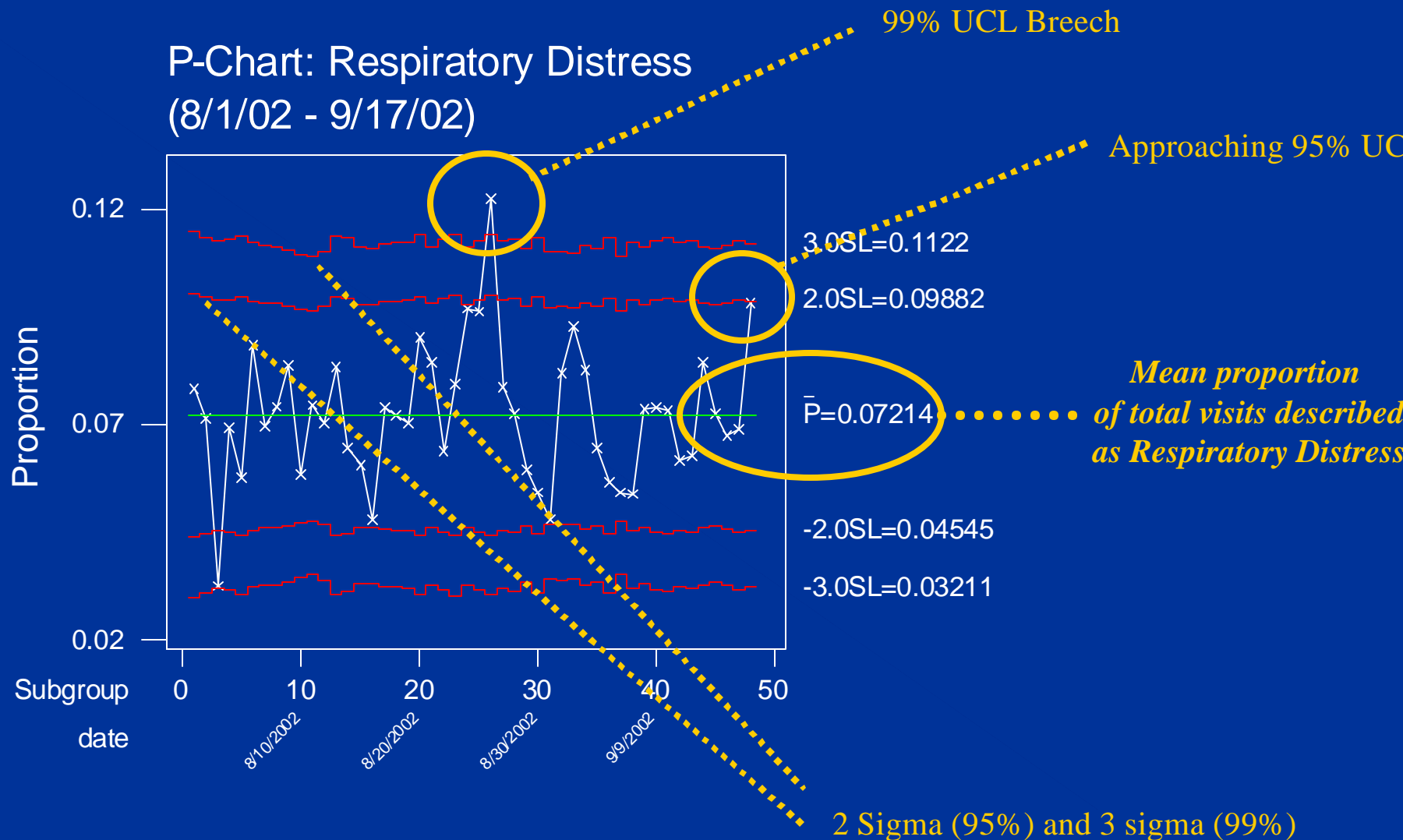
CUSUM (Alt Neur: 6/1/02 - 7/23/02)



SYNDROMIC SURVEILLANCE

SPC charts for the detection of large spikes in data:

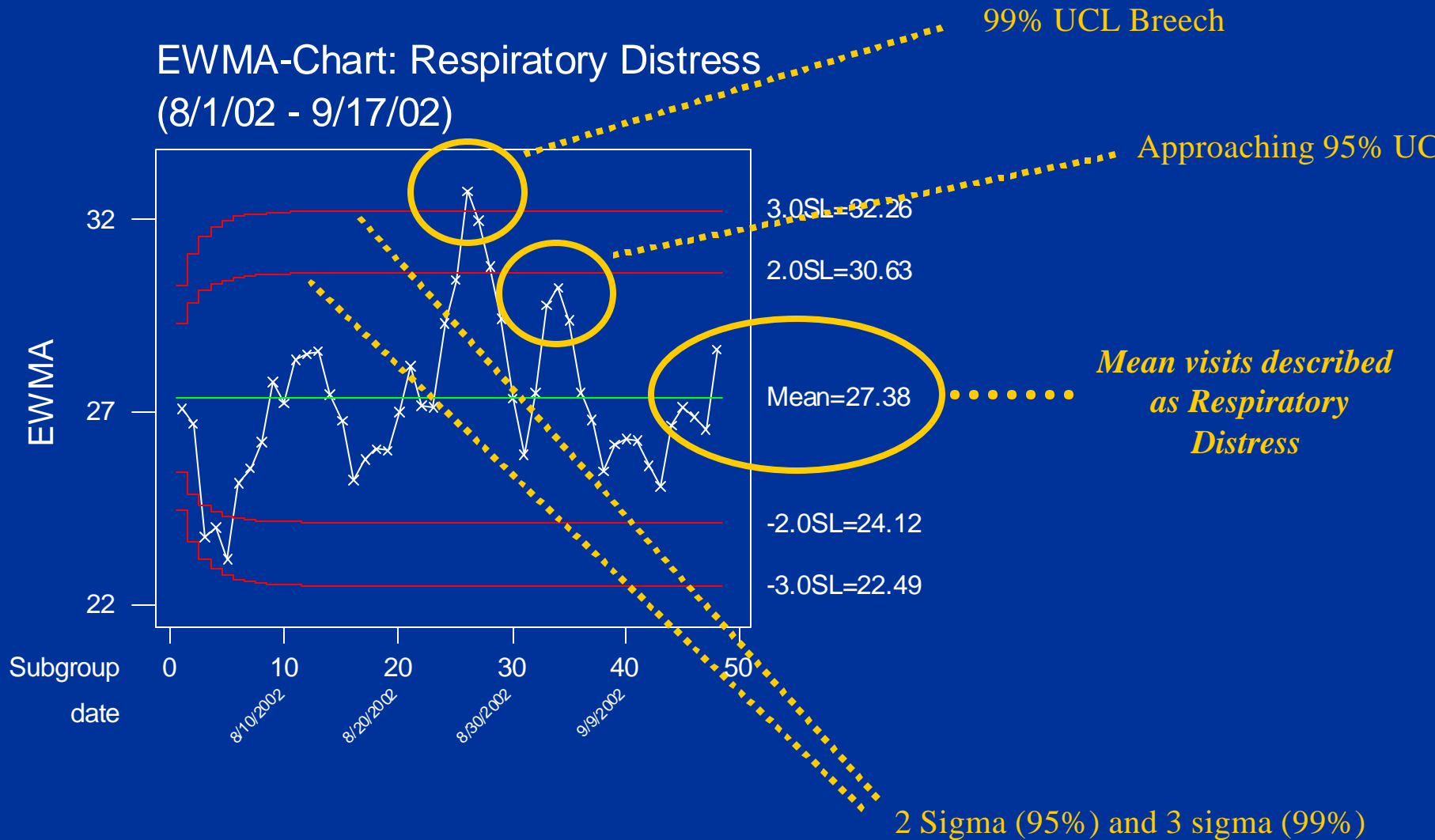
- P-Chart, U-Chart



SYNDROMIC SURVEILLANCE

* SPC Charts for the Detection of small process shifts in data:

- CUSUM, EWMA



SPATIO/TEMPORAL ANALYSIS

SaTScan 2.1.3 has been used with selected data sources to detect clusters in space and time.

Program has been tested using historical local death data.

Suicide data from 1997 were analyzed using SaTScan, in an attempt to identify the mass suicide that took place in Rancho Santa Fe (Zip Code 92067) in March of that year.

-In San Diego on March 26, 1997, the bodies were found of 39 similarly dressed men and women who took their own lives in a mass suicide. Led by Marshall Applewhite, the Heaven's Gate cult believed that a flying saucer was traveling behind the Hale-Bopp comet. They chose to leave their physical bodies behind to find redemption in an extraterrestrial "Kingdom of Heaven."

(Robinson, December 3, 1997)

SPACE TIME ANALYSIS RESULTS

SaTScan V.2.1.3

Program run on: Mon Jul 29 14:18:04 2002

Space Time analysis scanning for clusters with high rates using the Poisson model.

SUMMARY OF DATA

Study period: 1997/1/1 - 1997/12/31

Number of census areas: 105

Total population: 2813833

Total cases: 333

Annual cases / 100000.: 11.8

MOST LIKELY CLUSTER

1.Census areas included.: **92067**

Coordinates / radius...: (6.27307e+06,1.95304e+06) / 0.00

Time frame.....: 1997/3/1 - 1997/3/31

Population.....: 9126

Number of cases.....: **35** (0.10 expected)

Annual cases / 100000.: 4076.1

Overall relative risk.: **344.204**

Log likelihood ratio..: 171.441571

Monte Carlo rank.....: 1/1000

P-value.....: **0.001**

The log likelihood ratio value required for an observed cluster to be significant at level

... 0.01: 11.493640

... 0.05: 10.088269

RELATIVE RISK FOR EACH INDIVIDUAL CENSUS AREA

Census Area	Observed Cases	Expected Cases	Relative Risk
91905	0	0.19	0.000

92067	37	1.20	30.904

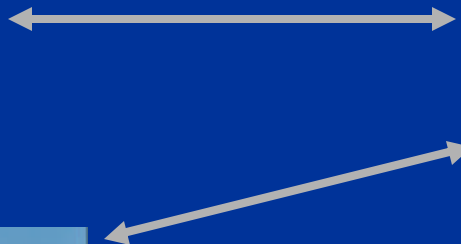
92536	0	0.05	0.000

92067 = Rancho Santa Fe, CA

Emergency Medical Alert Network (EMAN)

Over 500 participants / Web-based / Confidential / Bi-Directional

EMAN is a network dedicated to facilitating bi-directional confidential communication between San Diego County's medical community and public health and safety agencies in order to ensure rapid identification of and response to unusual disease events or public health emergencies.




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EMAN
EMERGENCY MEDICAL ALERT NETWORK
COUNTY OF SAN DIEGO · HEALTH AND HUMAN SERVICES AGENCY

EMAN is a network dedicated to facilitating bi-directional confidential communication between San Diego County's medical community and public health and safety agencies in order to ensure rapid identification of and response to unusual disease events or public health emergencies.

Welcome And General Information	Current EMAN Alert
Report Communicable Diseases	Archived EMAN Alerts
Bioterrorism Websites	West Nile Virus
Bioterrorism Training Resources	Influenza Surveillance Update
Emergency Preparedness	Subscribe to EMAN
Communicable Disease Links	Physicians' Bulletin

[Feedback / Comments](#)

Emergency Medical Alert Network (EMAN)
County of San Diego, Health and Human Services Agency
Community Epidemiology Division
MS: P511C-A P.O.Box 85222 San Diego, CA. 92186-5222
Phone: (619) 515-6620
Urgent phone: (619) 565-5255

Start | Inbox - Microsoft... | Microsoft Power... | C:\Surveillance | www.emansan... | 2:21 PM

Bio2001 Convention (San Diego - June 23-27, 2001)

* **Background:**

Largest international biotechnology convention - 15,000+ people

Concern – Annual protests about bio-engineered food and products, and cloning

Real threats including bombs, nerve agents, release of bio-agents, etc..

* **Surveillance Period:**

June 17 – June 30, 2001

* **Data Sources:**

ED Encounters, Urgent Care clinics, EMS 911 Medical chief complaints,
Poison Control, Foodborne complaints, HAZMAT, ED Diversions

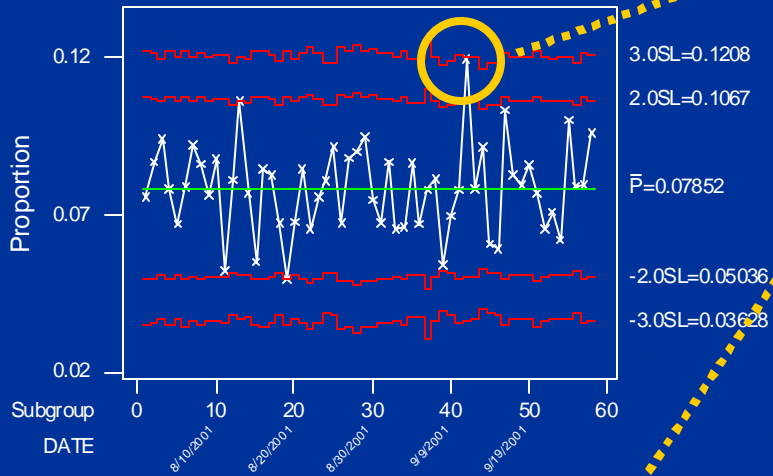
* **Results:**

- EMAN alert sent out to area physicians, laboratory personnel
- Real-Time & Daily data collection from data sources
- Good cooperation with emergency departments
- Widespread local news coverage of Convention and event planning and safety
- No adverse public health outcome
- Excellent interagency coordination and cooperation

9-11-01 SURVEILLANCE IN SAN DIEGO

Increase in pre-hospital chest pain chief complaints on Sept 11 & 13

P-Chart (Chest Pain: 8/1/01 - 9/27/01)

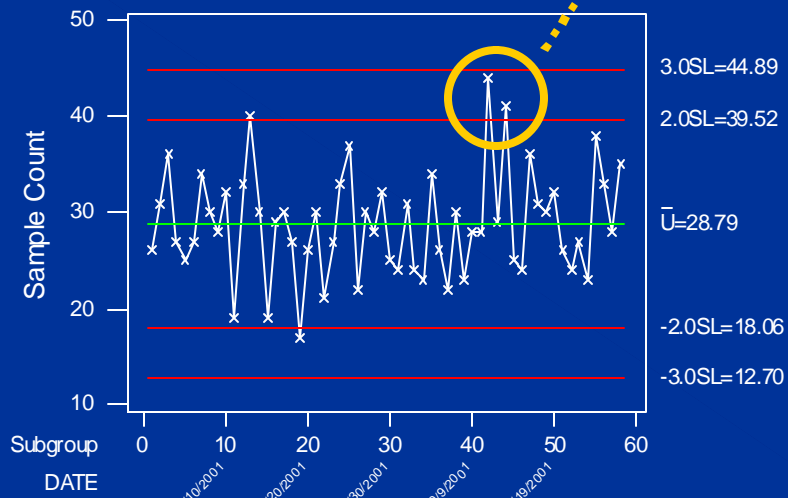


Complaints of Chest Pain (proportion of total visits) approached 99% UCL on 9/11

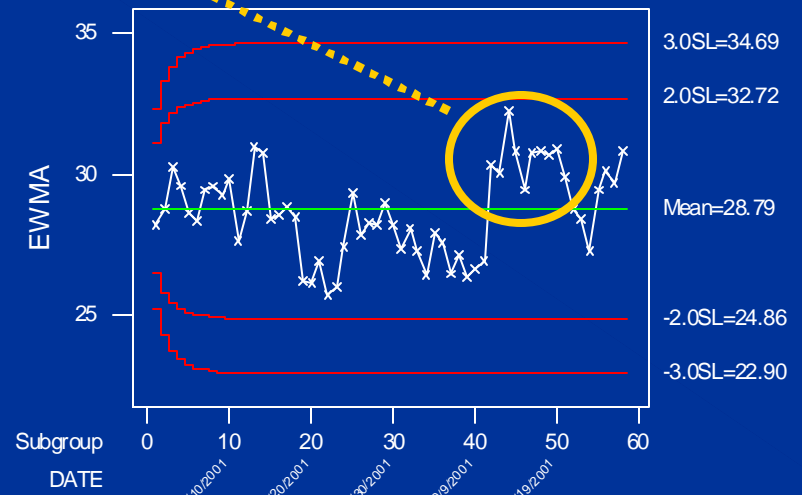
Total number of Chest Pain complaints breached 95% UCL on 9/11 and again on 9/13

Upward shift in number of Chest Pain complaints following 9/11(10 day duration)

U Chart (Chest Pain: 8/1/01 - 9/27/01)



EWMA Chart (Chest Pain: 8/1/01 - 9/27/01)



INFLUENZA SURVEILLANCE

- * **Because many BT agents exhibit flu like symptoms, effective syndrome surveillance is built upon a background of influenza surveillance.**

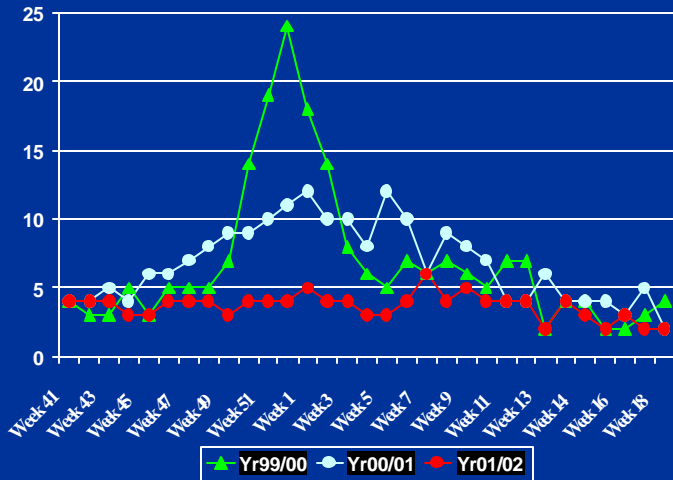
- * **In San Diego County, year-round surveillance of influenza and influenza-like-illness (ILI) is performed through the continual monitoring of:**
 - **Emergency Department ILI Visits (% of total) from sentinel hospitals**
 - **ILI visits at Community Clinics**
 - **University Health Centers sentinel clinics**
 - **Deaths attributed to Pneumonia and Influenza**
 - **Isolates detected and reported to the Public Health Laboratory**
 - **School Absenteeism**
 - **EMS 911 respiratory related chief complaints**
 - **ED Diversions**

- * **Weekly influenza surveillance reports are distributed via email and posted on the EMAN web site (www.emansandiego.com).**

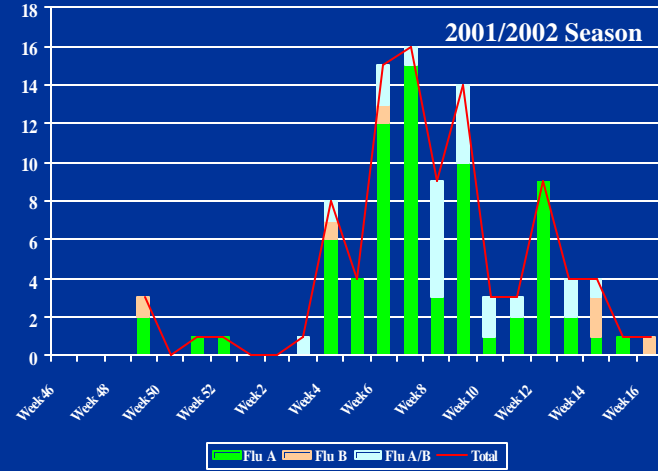
INFLUENZA SURVEILLANCE

Influenza Surveillance in San Diego County

ILI ED Visits

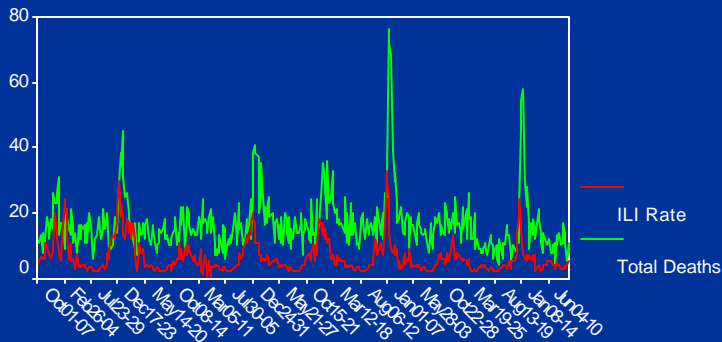


Laboratory



Deaths

Tot. Weekly Pneumonia and Influenza Deaths
vs. E.D. Influenza-Like-Illness Rate
County of San Diego (10/1/92 - 9/30/00)



Report

CONCLUSIONS

- * **Real-time EMS 911 medical chief complaints are useful for syndrome surveillance**
- * **SaTScan is an effective tool for detecting space and time clusters, but usage depends upon data source**
- * **Analysis methods are dependent upon the the type of data source and the type of detection desired**
- * **Additional real time data sources are needed**
- * **The network of people is the greatest strength for detecting single cases or large scale outbreaks**
- * **Early detection systems are useful for identifying naturally occurring disease clusters and outbreaks**
- * **Early detection surveillance is best coordinated by local public health departments in cooperation with local medical systems**

FUTURE DIRECTIONS

- * **Automation of data collection, analysis, and dissemination of results**
- * **Development of an Integrated Data Repository (IDR)**
- * **Piloting additional early detection surveillance applications**
- * **Refining our Aberration Detection Response Protocol**
- * **Evaluating potential data sources for surveillance usage**
- * **Enhanced collaboration of surveillance efforts with local hospitals**
- * **Special surveillance for SuperBowl January 2003**