

# Program Goal

- To increase the likelihood that Physicians will recognize a chemical-release-related illness so public health authorities can implement the appropriate emergency response and public health actions.

# Program Objectives

- Epidemiologic clues that might suggest the covert release of a chemical agent
- Importance of reporting and surveillance in enhancing recognition of chemical-related outbreaks

# Recognition of Illness Associated with **Chemical Exposure**

## Voice

United States

(800) 793 - 8598

International

(404) 639 - 0180

# Recognition of Illness Associated with **Chemical Exposure**

## **Fax**

United States

(800) 553 – 6323

International

(404) 639 – 0181

# Recognition of Illness Associated with **Chemical Exposure**

**TTY**

United States

(800) 815 – 8152

International

(404) 639 – 0182

Recognition of Illness Associated  
with **Chemical Exposure**

[EHHEingq@cdc.gov](mailto:EHHEingq@cdc.gov)

# Recognition of Illness Associated with **Chemical Exposure**

[www.phppo.cdc.  
gov/phtn/webcast/chemical-exp](http://www.phppo.cdc.gov/phtn/webcast/chemical-exp)

# Recognition of Illness Associated with **Chemical Exposure**

## Web Assistance

United States

(800) 728 – 8232

International

(404) 639 -1289

# Recognition of Illness Associated with **Chemical Exposure**

## Registration and Evaluation

August 5, 2004 – September 4, 2004

[www.phppo.cdc.gov/phtnonline](http://www.phppo.cdc.gov/phtnonline)

# Recognition of Illness Associated with **Chemical Exposure**

**September 5, 2004**

Webcast – WC0061

Web-on-Demand - WD0049

# Recognition of Illness Associated with **Chemical Exposure**

## Questions

1-800-41-TRAIN  
(1-800-418-7246)  
[ce@cdc.gov](mailto:ce@cdc.gov)

# INTRODUCTION

## Overt event

- Large explosion
- Dissemination of chemical or biological agent(s) as aerosols or volatile liquids





**Covert event**

# INTRODUCTION

- Recent cases involving intentional or inadvertent contamination of food or product tampering with chemicals have occurred.



# Contaminated Ground Beef

## Michigan 2003†

- Dec 31-Jan 1: 18 persons ill after eating ground beef
  - Nausea, vomiting, burning mouth, dizziness
- Jan 3: Supermarket recalls 1,700 lbs of beef
- Jan 10: High nicotine concentrations identified

† CDC. *MMWR* 2003; 52(18); 413-416



# Obstacles to Recognizing a Chemical-Related Illness

1. Delayed health effects
2. Gradual presentation of cases
3. Exposure to multiple agents
4. Resemblance to other diseases
5. Lack of familiarity with chemical-related illness
6. Unique properties

# Obstacle 1- Delayed Health Effects

- Asymptomatic or mild illness initially

- Missed association between exposure and illness

- Pharmaceutical agents (e.g., digitalis)

- Metals (e.g., dimethylmercury, lead)

- Warfare agents (e.g., phosgene)

- Carcinogens (e.g., aflatoxin)

- Reproductive toxins  
(e.g., isotretinoin)



# Obstacle 2- Gradual Presentation of Cases

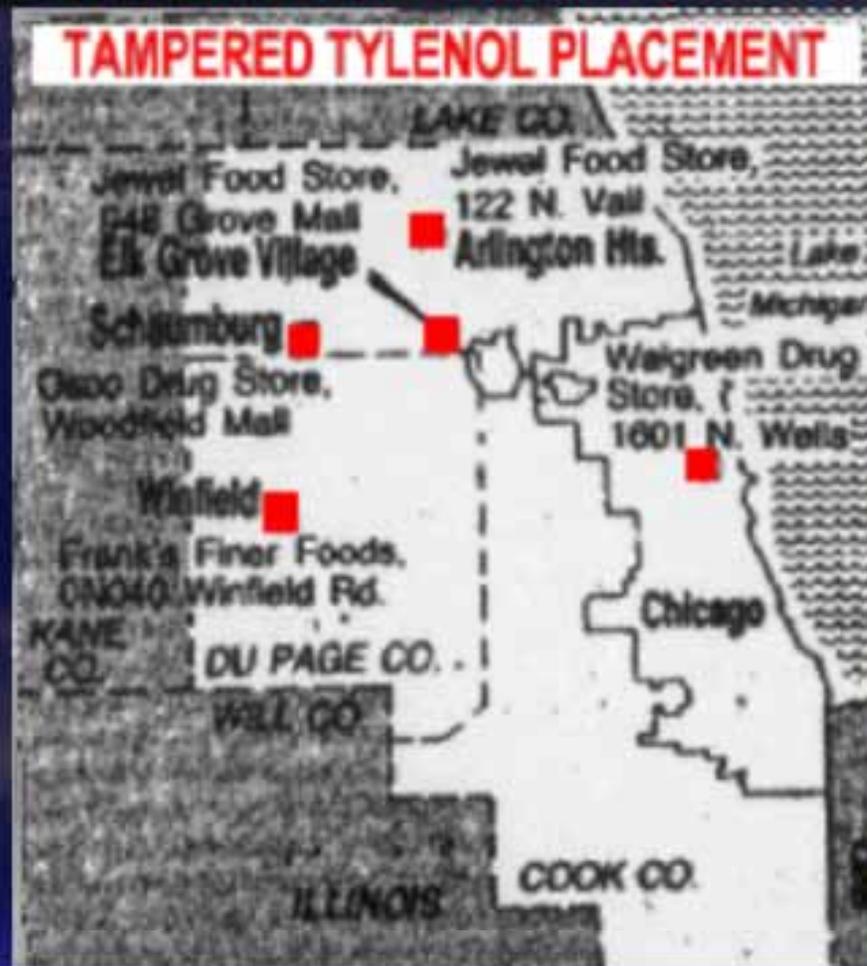


# Tylenol Tampering Incident 1983

- 7 sudden deaths
- Several different suburbs of Chicago
- Deaths occurred over a 2 day period
- 3 deaths in one family
- 12 year-old child died



# Tylenol Tampering Incident



# Tylenol Tampering Incident

- 2 lots of Extra-Strength Tylenol were recalled from the market
- FDA warned not to take any Extra-Strength Tylenol
- Nationwide concern
- No additional cyanide-laced capsules were found outside of the Chicago area

## Obstacle 3- Exposure to Multiple Agents

### ■ Nerve Agents & Arsenic

- Likely to see cholinergic-type clinical syndrome
- Recognition and treatment for nerve agent poisoning
- Potentially overlook arsenic poisoning

### ■ If varying symptoms, consider a wide differential

## Obstacle 4-

### Resemblance to Other Diseases

- Gastroenteritis (e.g., arsenic)
- Influenza-like illness (e.g., ricin)
- Neurologic emergencies (e.g., lead)
- Shock and acidosis (e.g., cyanide)

## Obstacle 5-

# Lack of Familiarity with Chemical-Related Illness

- Paraquat
- Cyanide
- Ricin
- Thallium
- Mercury
- Arsenic

## Obstacle 6- Unique Properties

- Toxins (e.g., ricin) and some chemicals present unique advantages for deliberate contamination because they tend to be odorless, colorless, and tasteless.

# Contaminated Coffee

## Maine 2003

- New Sweden, ME
- 16 patients with gastroenteritis-like symptoms
  - vomiting, diarrhea, hypotension
- Church bake sale: 30+ attendees & 16 ill
- Infection control nurse involved
- Initial concern—infectious or foodborne GI illness

# Contaminated Coffee

## Maine 2003

- **Poison control center (PCC) is contacted**
  - 1 person in ICU with presumed "sepsis"
  - 5 persons with hypotension
- **PCC staff & toxicologist suggest chemical as cause of illness**
- **Epidemiological evidence suggests coffee**
- **Lab--chemical analysis**
  - Samples shipped (Monday AM), received (1700), and analyzed (1935)

# Arsenic-Contaminated Coffee

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## ■ Lack of familiarity with acute arsenic poisoning

- Recognition
- Treatment of arsenic poisoning
- Antidote availability
- Observation period
- Laboratory analysis
- Prognosis

# Epidemiologic Clue #1

An unusual increase in the number of patients seeking medical care

Northern New England PCC      Portland†

Hourly Human Exposure Volume Signals–  
Arsenic Event

Date	Hour	Expected	Observed
04/27/03	1900	13	17

## Epidemiologic Clue #2

Clusters of illness in persons who have potential for common exposure

### Contaminated Ground Beef Michigan, 2003

- Cluster of 4 families: 18 persons ill over 2 days
- Commonality: All ate beef
- Beef purchased from the same store
  - Importance of noting food/beverages consumed
- Onset of symptoms immediately after eating beef
  - Burning mouth, nausea, vomiting

## Epidemiologic Clue #3

Rapid onset of symptoms after exposure to a potentially contaminated medium

### Contaminated Coffee Maine, 2003

- Reports of "funny" taste of coffee
- Onset of illness within an hour of drinking coffee

## Epidemiologic Clue #4

Unexplained death of plants, fish,  
and/or animals

### Harmful Algal Blooms

Nebraska, 2004

- Investigation of unexplained death in dogs
- Dogs died within 2 hours of exposure to the lake
- Microcystins found in the dogs and the lake water
- Potential threat to humans from lake exposure

## Epidemiologic Clue #5

Unexplained deaths among young or healthy persons

### Contaminated Tylenol      Haiti, 1995†

- November, 1995 to July, 1996
- 109 previously healthy children developed acute renal failure
- No cases in previous 5 years
- 99 of 109 children died

† O'Brien KL et. al. JAMA. 1998;279:1175-1180

# Syndrome Recognition

- **Toxic Syndrome** - a constellation of clinical signs and symptoms in patients suggesting a disease associated commonly with a known chemical exposure.



# Examples of Syndromic Presentations

## *Syndrome--Cellular hypoxia*

### ■ Nonspecific signs and symptoms

- Mild: nausea, vomiting, headache
- Moderate-Severe: delirium, dyspnea, hypotension, seizures, metabolic acidosis

### ■ Hallmark = ACIDOSIS

### ■ Toxins: CN, CO, H<sub>2</sub>S, sodium monofluoroacetate, sodium azide

# Examples of Syndromic Presentations

## *Syndrome--Peripheral Neuropathy and CNS Effects*

- PN--muscle weakness, "glove-stocking" sensory loss, depressed reflexes
- CNS--memory loss, delirium, ataxia, encephalopathy
- Toxins--lead, thallium, organic mercury, inorganic arsenic, acrylamide, hexane, and carbon disulfide

# Acute Neuropathy Florida, 1988 †

- 3 family members acutely ill
- Parasthesias, extremity weakness, blurred vision, dry mouth, cranial nerve abnormalities, psychosis

† Desenclos JC et. al. *S Med J.* 1992;85:1203-1206.

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- Initially suspected to be botulism
- Alopecia developed 8 days after illness onset
- Urinary screening for heavy metals

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- Parasthesias, extremity weakness, blurred vision, dry mouth, cranial nerve abnormalities, psychosis
- Initially suspected to be botulism
- Alopecia developed 8 days after illness onset
- Urinary screening for heavy metals
- Thallium poisoning confirmed in all 3 patients

† Desenclos JC et. al. *S Med J.* 1992;85:1203-1206.

# Examples of Syndromic Presentations

## *Syndrome--Cholinergic Crisis*

- Excess Secretions: salivation, lacrimation, diarrhea/diaphoresis, bronchorrhea, urination
- Miosis, fasciculations, weakness, bradycardia or tachycardia, hypotension or hypertension, delirium, seizures
- Toxins: nicotine, organophosphates, nerve agents, carbamates

# Watermelon Pesticide Toxicity†

- June 29, 1985 Oregon
- Physician reported to the Health Division illness in 5 persons occurring 30 minutes after eating watermelon
- Illness consistent with organophosphate poisoning: vomiting, diarrhea, salivation, blurred vision, fasciculations



† Green MA et. al. *Am J Pub Health*. 1987;77:1431-1434.

# Other Clinical Clues for Chemical Exposure

*Emission of unexplained odors by patients*

- Tobacco-nicotine
- Garlic-arsenic & organophosphates
- Rotten eggs-hydrogen sulfide
- Hay-phosgene



# Reporting

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- Ideally would be burden-free
- Who:
  - Poison control center
  - Health department
  - Hospital infection control nurse

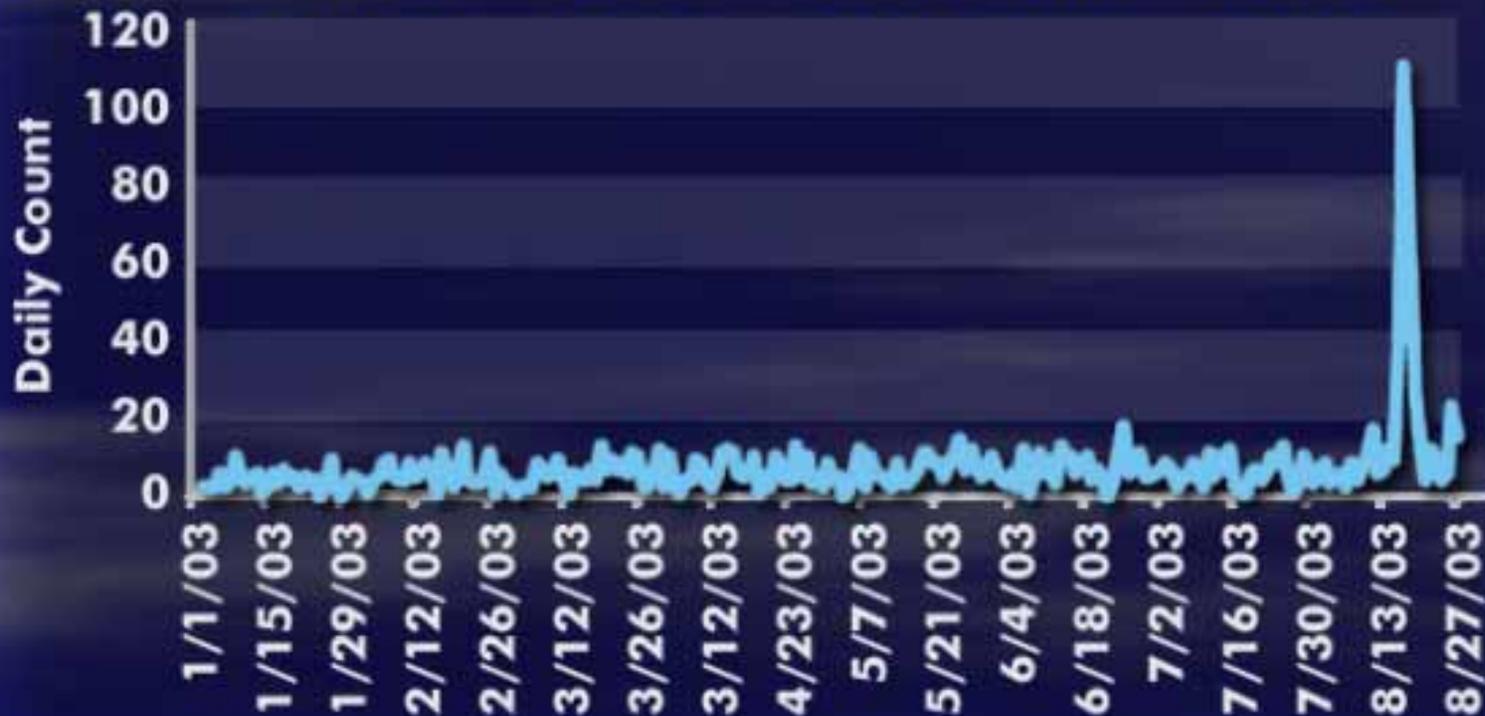
# Poison Control Centers

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- Poison control centers are contacted nationally using a single number (800-222-1222)
- Calls from the general public, persons in the workplace, and health care professionals
- Suspected or known exposure to a chemical or a request for information regarding a chemical
- Callers are usually seeking diagnostic or

# Northeast Blackout Poison Center Contaminated Water Calls - 2003

## TESS - Contaminated Water Calls - 2003



# Poison Control Centers

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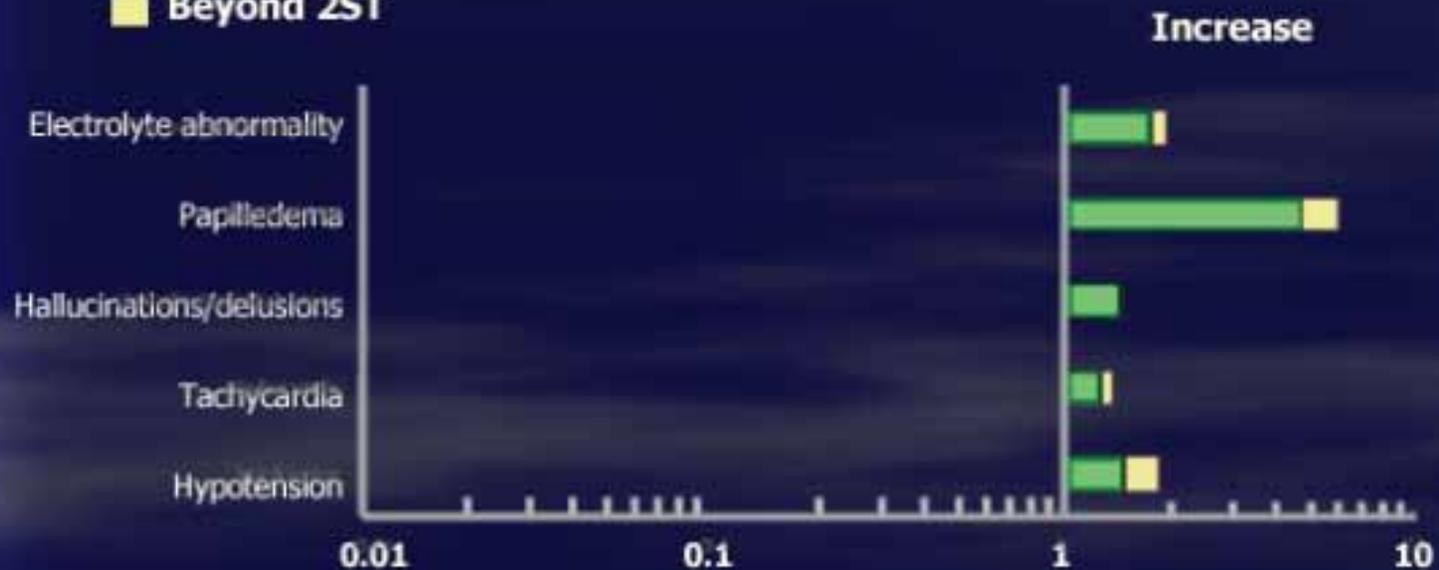
- 62 of 63 poison control centers in the U.S. upload case data every 4 to 10 minutes to the TESS (Toxic Exposure Surveillance System)
- Represents over 99% of the US population
- American Association of Poison Control Centers (AAPCC)

# Clinical Effect Outliers

## April 27, 2003

■ 4/27/2003 Outlier effects compared to mean historical baseline (14 days per year for 3 years)

■ Beyond 2ST



# Public Health Strategies

- Providing information or reminders to health-care providers and clinical laboratories:
  - State and local health departments should educate health-care providers to recognize unusual illnesses that might indicate release of a chemical agent.

# CDC EPR Information

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**[www.bt.cdc.gov](http://www.bt.cdc.gov)**

Emergency Preparedness and Response (EPR)

Notification procedures for state and local health officials

**[www.bt.cdc.gov/agent/agentlistchem.asp](http://www.bt.cdc.gov/agent/agentlistchem.asp)**

Fact sheets

Case definitions

Toxic syndromes

ToxFAQs and Toxicological profiles

Medical management guidelines

Webcasts



# Ricin-Containing Envelope South Carolina, 2003

- Oct 15, 2003—white powder with threatening note at a postal facility
- Assessment of human health effects—no ricin cases
  - Interviewed postal workers
  - Statewide surveillance (EDs and ICUs)
  - Regional & national PCC surveillance
- Identified cases of multiorgan failure & nonspecific illness---No ricin cases

# Watermelon Pesticide Toxicity Cooperative Relationships

- Sheriff's office
- Regional poison control center
- FDA
- Oregon Department of Agriculture
- Physicians

# Key Points

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- Vital role of astute physician
- Epidemiologic clues and clinical signs or patterns of illness may suggest covert chemical release
- Reporting and surveillance is essential to early recognition
- Public health strategies for responding to intentional chemical releases are available

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## Recognition of Illness Associated with **Chemical Exposure**

Videotapes and CD-ROMs will be available from the Public Health Foundation shortly after the webcast for \$25 per copy.

Order online at

<http://bookstore.phf.org> or by calling 877-252-1200.

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**Good Day  
from  
Atlanta**