

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

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(800) 553 – 6323

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(404) 639 – 0181

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TTY

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(800) 815 – 8152

International

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Recognition of Illness Associated with **Chemical Exposure**

EHHEinquiry@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

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

INTRODUCTION

■ Overt event

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





Castor Bean
(*Ricinus communis*)



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

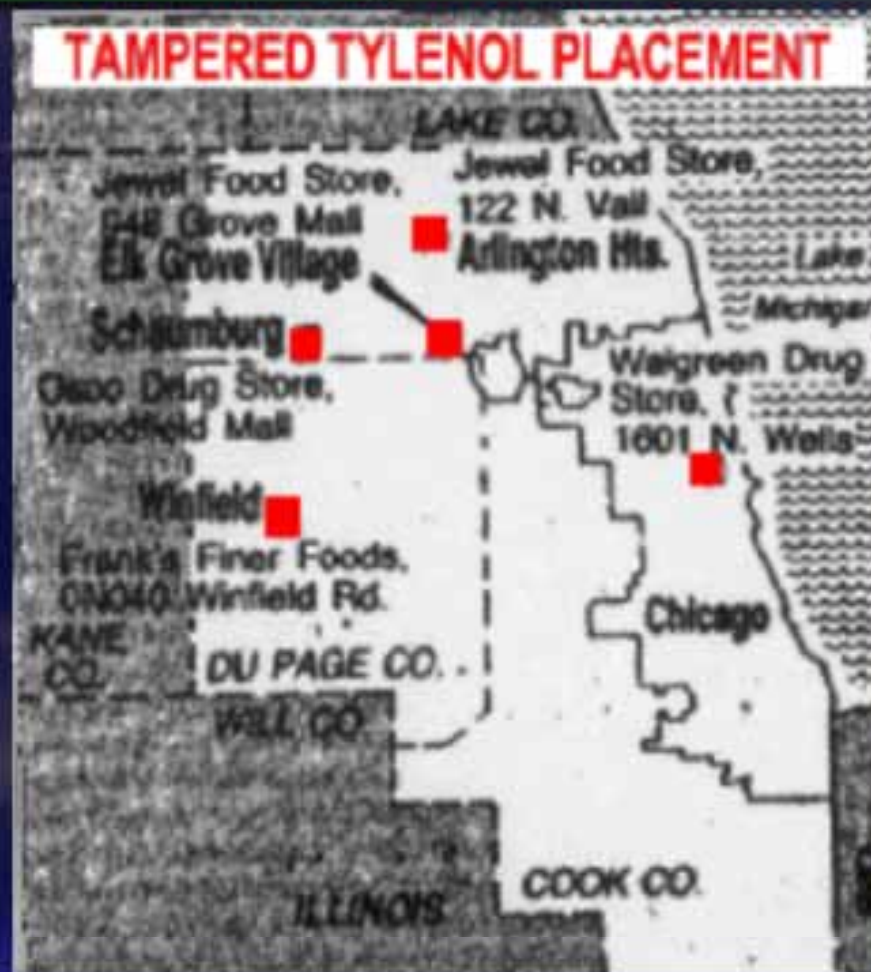


Tylenol Tampering Incident 1983

- 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

■ 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, H₂S, 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

- Ideally would be burden-free

- Who:

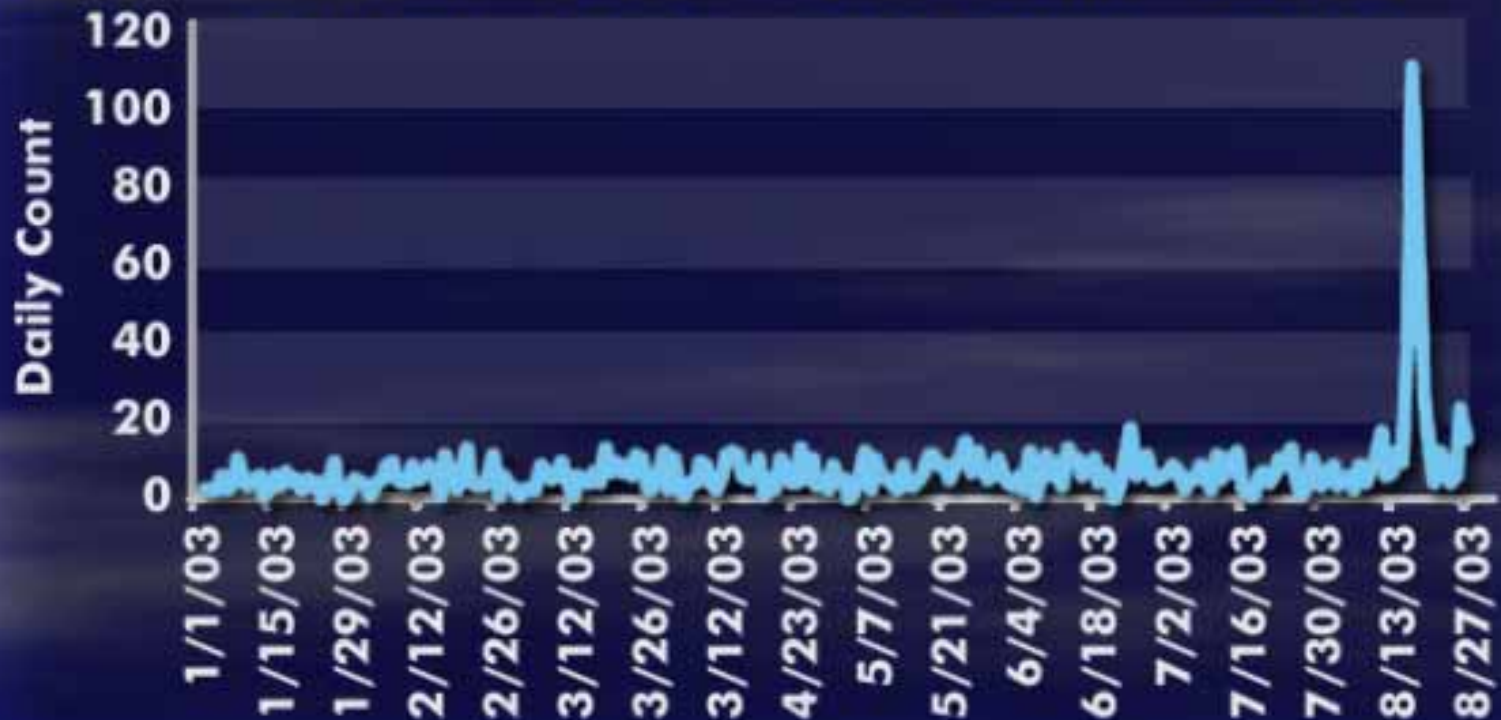
- Poison control center
- Health department
- Hospital infection control nurse

Poison Control Centers

- 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

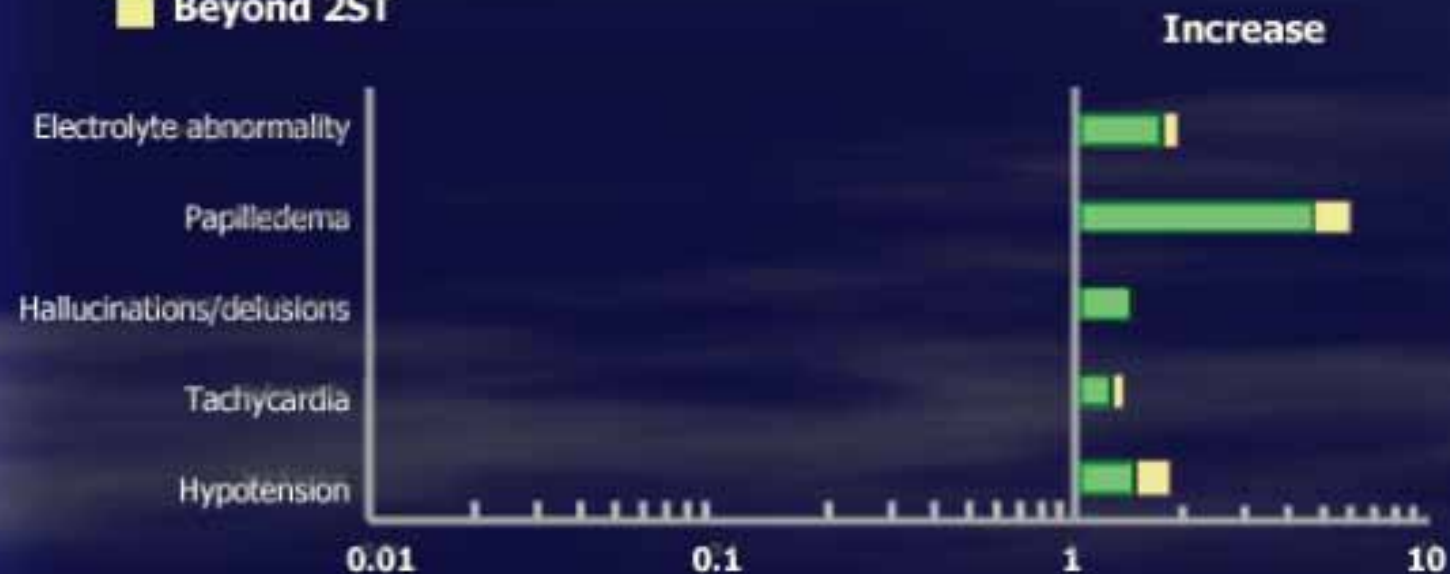
- 62 of 63 poison control centers in the U.S. upload case data every 4 to 10 minutes to the TESS (Toxic Exposure Surveillance System)
- Represents over 99% of the US population
- American Association of Poison Control Centers (AAPCC)

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

www.bt.cdc.gov

Emergency Preparedness and Response (EPR)

Notification procedures for state and local health officials

www.bt.cdc.gov/agent/agentlistchem.asp

Fact sheets

Case definitions

Toxic syndromes

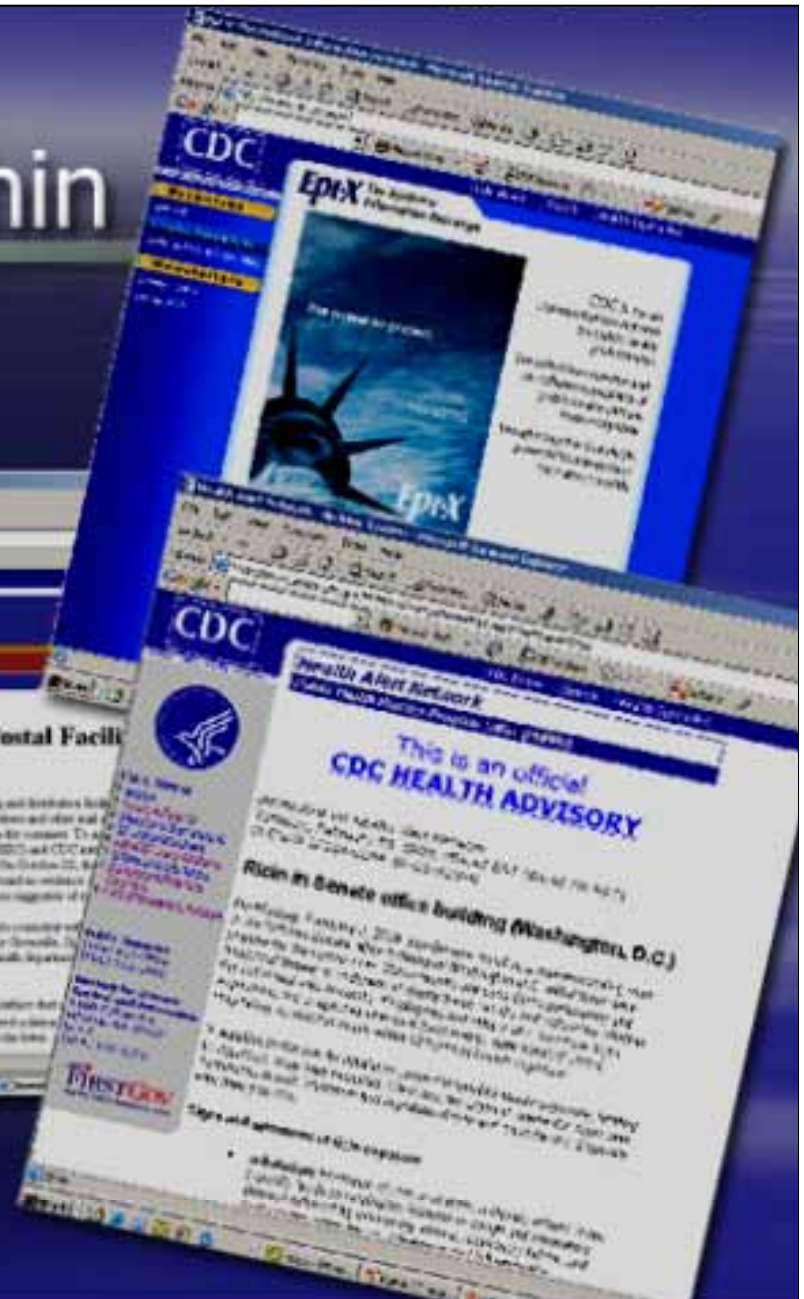
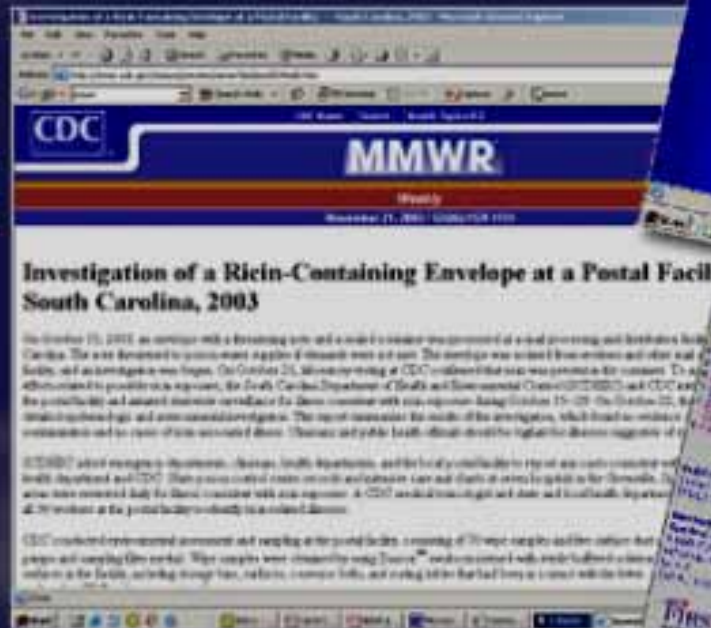
ToxFAQs and Toxicological profiles

Medical management guidelines

Webcasts

Communication Within the PH Community

EPI-X
HAN
MMWR



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

- 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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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