Enhanced Emergency Department Surveillance System Following the World Trade Center Disaster
New York City, September 14 - October 10 2001

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Background
Pre 9/11 Bioterrorism (BT) Detection Systems

• Passive reporting
  – Dependent on clinician/laboratory
• EMS 911 surveillance system
• Unexplained death surveillance
Post 9/11 BT Detection Systems

- Heightened alert for BT
  - E-mail and Fax broadcasts alerts
- NYCDOH infrastructure problems
  - Communications disrupted
  - Temporary relocation
Objectives

• Detect clusters of mild/non-specific illness representing prodromal stages of:
  – BT event
  – Other outbreaks
• Improve upon existing systems by
  – Clusters by time/space
  – Detect early BT illness
Methods
Enhanced Syndromic Surveillance

• 30 to 50 Epidemic Intelligence Service Officers (EISOs) stationed at Emergency Departments (EDs)
  – Sept 13 - 27
    • 15 hospitals emergency departments
    • 24 hour basis
  – Sept 29 - Oct 10 (due to resource limitations)
    • 12 hospitals emergency departments
    • 18 hour basis
Hospitals In Surveillance System
NEW YORK CITY DEPARTMENT OF HEALTH ENHANCED EMERGENCY ROOM SURVEILLANCE

Instructions: FOR EACH PATIENT SEEN AT THE EMERGENCY DEPARTMENT
1. Stamp form at top left with patient imprint card
2. Triage/registration and health care provider fill out respective sections
3. Place in drop box

Triage/Registration Complete This Section

Date of visit: ____________________
Age: ____________________
Home Zip Code: ____________________ Work Zip Code: ____________________

Was patient in southern Manhattan (below Canal St) on Tuesday, September 11th after the attack? (circle one)
YES  NO  Don't Know

Health Care Provider Complete This Section

Please check the ONE PREDOMINANT syndrome from the following list that best represents the PRIMARY condition of the patient:

- None of the following
- Trauma
- Smoke or dust inhalation
- Exacerbation of underlying respiratory condition (Asthma/ COPD)
- Anxiety reaction (including somatic complaints, insomnia)
- Diarrhea / gastroenteritis (including vomiting or abdominal cramps)
- Upper or lower respiratory infection WITH fever
- Sepsis or non-traumatic shock
- Rash WITH fever (do NOT check unless both are present)
- Meningitis, encephalitis, or unexplained acute encephalopathy
- Botulism-like syndrome (cranial nerve impairment and weakness)
- Unexplained death with a history of fever

IF YOU HAVE ANY QUESTIONS OR NEED TO REACH THE NYC DEPARTMENT OF HEALTH, PLEASE CALL 212-447-2676 AND ASK FOR THE DOCTOR ON DUTY. IF NO ONE IS AVAILABLE AT THAT NUMBER, CALL THE POISON CONTROL CENTER AT 212-744-7667.
Syndromes

- Diarrhea/Gastroenteritis
- Botulism-like syndrome
- Upper/Lower respiratory infection WITH fever
- Sepsis/Non-traumatic shock
- Rash With Fever
- Meningitis/Encephalitis/Encephalopathy
- Unexplained death WITH history of fever
- Trauma
- Smoke/Dust Inhalation
- Exacerbation of an underlying respiratory condition
- Anxiety reaction
- None of the above
Daily Analysis

- Frequencies
- Cumulative Sum Statistic (CUSUM)
- Spatial scan statistic
- Alarm defined as $p < 0.02$
Follow-Up of Alarms

• Goals
  – Rapid investigation
  – Verify cluster of patients
  – Verify if BT-related illness

• Facilitated by EISOs at EDs
  – Review individual charts
  – Review lab results
  – Call patients at home
  – Follow up on hospitalized patients
## Results

<table>
<thead>
<tr>
<th>Condition</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total visits reported</td>
<td>65,535</td>
</tr>
<tr>
<td>Trauma</td>
<td>12.7%</td>
</tr>
<tr>
<td>Asthma</td>
<td>5.3%</td>
</tr>
<tr>
<td>Gastrointestinal illness</td>
<td>3.1%</td>
</tr>
<tr>
<td>Respiratory infection with fever</td>
<td>3.0%</td>
</tr>
<tr>
<td>Anxiety reaction</td>
<td>1.4%</td>
</tr>
<tr>
<td>Other syndromes (Sepsis, Rash, etc.)</td>
<td>&lt;1%</td>
</tr>
</tbody>
</table>

*For both staffing periods*
Citywide CUSUM “Alarms”

<table>
<thead>
<tr>
<th>Syndrome</th>
<th># Alarms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sepsis/Non-traumatic shock</td>
<td>3</td>
</tr>
<tr>
<td>Rash with fever</td>
<td>1</td>
</tr>
<tr>
<td>Respiratory Infection with fever</td>
<td>3</td>
</tr>
<tr>
<td>Exacerbation/respiratory condition</td>
<td>8</td>
</tr>
<tr>
<td>Gastrointestinal illness</td>
<td>5</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>20</strong></td>
</tr>
</tbody>
</table>

*For both staffing periods*
# Spatial Cluster “Alarms”

<table>
<thead>
<tr>
<th>Syndrome</th>
<th>Hospital</th>
<th>Zip</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory with fever (Adult)</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Rash with fever (Adult)</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Sepsis/non-traumatic shock (All ages)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Gastrointestinal illness (All ages)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td><strong>6</strong></td>
<td><strong>14</strong></td>
</tr>
</tbody>
</table>

*For both staffing periods

*α = 0.02
Summary

• “Alarms” occurred on 15 (63%) of 24 analyzable surveillance days
• No BT-associated outbreaks detected
• 85% completeness for 24 hr staffing vs. 75% for 18 hr staffing ($\chi^2$, p < 0.001).
Resources

- Daily personnel resources
  ~30 EISOs onsite
  ~9 NYCDOH/~4 CDC staff at main office
- Transportation resources
  ~5 drivers on call 24-hours
- Monetary
  >$1 million in CDC funds (excluding salaries)
  >$50,000 in DOH funds for overtime staffing
Discussion

- Substantial resources to implement
- Alleviate concerns for BT
- Utility of having onsite staff to investigate “alarms”
Epilogue
Electronic ED system

• 33 hospitals, 67% of NYC ED visits
• Daily electronic data submission
• 7-day/wk system
• Temporal and spatial analysis of key syndromes
  – Febrile illness
  – Respiratory syndromes
  – Diarrheal/gastrointestinal syndromes
• Investigation of clusters
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NYCDOH
Communicable Disease Program
Management Information Systems
STD Control Program
Environmental Risk Assessment and Communication
Tuberculosis Control Program
HIV Services
Vaccine Preventable Diseases
Integrated Surveillance Program
Public Health Laboratories