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[on assignment from CDC]
Overview

- What is public health?
- Barriers to use of computing in public health
- Bioterrorism preparedness and response
- Biodefense IT requirements: detection
- Biodefense computing research needs
What is public health?

Core Functions

- Assessment – What is the health status of the community?
- Policy Development – What laws, policies, and regulations are needed to protect the health of the community?
- Assurance – What can be done to assure improved health in the community?
What does public health do?

- Prevents epidemics and the spread of disease
- Protects against environmental hazards
- Prevents injuries
- Promotes and encourages healthy behaviors
- Responds to disasters and assists communities in recovery
- Assures the quality and accessibility of health services
Public Health v. Medicine

**Patient**
- Public Health: Population
- Medicine: Individual

**Intervention**
- Public Health: Assess, Policy, Assurance
- Medicine: Medical, Surgical Care

**Process**
- Public Health: System Management
- Medicine: Patient Management

**Outcome**
- Public Health: Healthy Community
- Medicine: Healing
## Public Health v. Medicine (2)

<table>
<thead>
<tr>
<th>Data Sources</th>
<th>Public Health</th>
<th>Medicine</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Clinical, lab, environmental, motor vehicle accidents, justice records, occupational safety, ...</td>
<td>Clinical, lab</td>
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Organization of Public Health

- Local
  - Perform public health functions in the community
  - Can be county or state agencies
  - Usually very small
    - 2/3 serve populations of <=50K
    - 75% have fewer than 25 employees
  - Limited ability to perform specialized functions
  - Often provide personal health services
Organization of Public Health (2)

- State
  - Primary responsibility for health of citizens
  - Independent or part of larger agency
  - Program coordination
  - Specialized functions
    - Epidemiology
    - Laboratory testing
  - Data collection and dissemination
  - Consultation to LHDs
Organization of Public Health (3)

- Federal
  - Health Resources and Services Administration (HRSA)
  - Centers for Disease Control and Prevention (CDC)
  - Agency for Toxic Substances and Disease Registry (ATSDR)
  - Food and Drug Administration (FDA)
Barriers to IT in Public Health

- Information
- Infrastructure
- Informatics
Information

- Surveillance data
  - Only 15-20% of reportable cases reported
  - Delays of days to weeks
  - Not typically in electronic form
- Other relevant data not electronically available
  - Environmental, injury, etc.
  - Guidelines
  - Contacts
  - Training materials
Infrastructure

- **Information technology**
  - Only 48.9% of local health departments have high-speed continuous internet connections (NACCHO, 1999)

- **Workforce**
  - 83% of local health departments indicate that computer training is a key need (NACCHO, 1996)
Informatics

- Definition: the systematic application of computer & information science and technology to public health practice, research, and learning

- Management skills
  - IT projects expensive and high risk
  - Interdisciplinary teams required
  - New skills needed by public health managers
Life cycle of a bioterrorism event
Biodefense IT Requirements

- Monitor
- Detect
- Respond
Biodefense IT Requirements

- Monitor
  Continuously collect clinical, lab, 911, absenteeism, selected retail sales, other relevant data streams

- Detect

- Respond
Biodefense IT Requirements

- **Monitor**: Continuously collect clinical, lab, 911, absenteeism, selected retail sales, other relevant data streams

- **Detect**: Compare incoming data to known patterns to detect important anomalies; generate notifications upon detection

- **Respond**
Biodefense IT Requirements

- **Monitor**: Continuously collect clinical, lab, 911, absenteeism, selected retail sales, other relevant data streams
- **Detect**: Compare incoming data to known patterns to detect important anomalies; generate notifications upon detection
- **Respond**: Validate anomalies detected; initiate response, establish command & control, engage established operation plans, activate information sharing
Biodefense IT Requirements

**Detection System**
- Continuously collect clinical, lab, 911, absenteeism, selected retail sales, other relevant data streams
- Compare incoming data to known patterns to detect important anomalies; generate notifications upon detection

**Response System**
- Validate anomalies detected; initiate response, establish command & control, engage established operation plans, activate information sharing
Biodefense IT Requirements

Detection System

- Continuously collect clinical, lab, 911, absenteeism, selected retail sales, other relevant data streams
- Compare incoming data to known patterns to detect important anomalies; generate notifications upon detection
Current Detection System

- Reporting threshold
- Clinician Observers
- Detection threshold
- Events

Phone call to Public health

Time ➔
Needed Detection System

- Reporting threshold
- Clinician Observers
- Detection threshold
- Events
- Potential detection
- Phone call to Public health

Time ➔
Needed Architecture:
National Biodefense Information Service

- Selected Pharmacy Purchases
- Laboratory Information
- Clinical Information
- Selected Grocery Purchases
- Absenteeism Information
- 911 Calls
- Other Relevant Sources

Data Repository

Problem?

Reports

yes Alerts

yes
Biodefense Computing Research Needs

- Pattern Recognition/Anomaly Detection/Data Mining
  - High Sensitivity – detect events
  - High Specificity – reasonable costs

- Automatic Database Linkage (middleware)
  - Schema level
  - Use metadata to find, map and link “equivalent” data elements
  - Data integration “on the fly”
THANK YOU!

- Questions?

- Contact information:

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Public Health Informatics Institute (PHII)

- **Goals**
  - Foster collaborative information system development by multiple public health agencies (to meet shared requirements)
  - Facilitate exchange and distribution of successful information systems among public health agencies
  - Avoid “reinventing the wheel”
PHI Institute (continued)

- Non-profit, independent
  - Funded by Robert Wood Johnson Foundation
  - Outcome of the Spring 2001 AMIA meeting

- Additional activities
  - Clearinghouse of information about public health information systems
  - Executive education workshop in PHI