Biosurveillance: Some Background

Associate Professor Ronald D. Fricker, Jr.
November 16, 2010
What is Biosurveillance?

• Homeland Security Presidential Directive HSPD-21 (October 18, 2007)
  – “The term ‘biosurveillance’ means the process of active data-gathering … of biosphere data … in order to achieve early warning of health threats, early detection of health events, and overall situational awareness of disease activity.” [1]
  – “The Secretary of Health and Human Services shall establish an operational national epidemiologic surveillance system for human health…” [1]

• Syndromic surveillance
  – “…surveillance using health-related data that precede diagnosis and signal a sufficient probability of a case or an outbreak to warrant further public health response.” [2]

Idea of Biosurveillance: Leverage Secondary Health Data

Data Collection
- Emergency Room Chief Complaints
- Laboratory Test Results
- Emergency Medical Services (EMS)
- Over-the-Counter Medicine Sales
- Absenteeism Records
  - Other “Early Detection” Data

Data Management
- Clean Data & Impute as Necessary
- Parse Text & Build Syndrome Indicators

Analysis
- Temporal analyses and signals
  - Univariate
  - Multivariate
  - Spatio-temporal analyses and signals

Reporting
- Time series plots
- Geo-spatial plots
- Data “drill down” capability
“Early Event Detection (EED) is the ability to detect at the earliest possible time events that may signal a public health emergency. EED is comprised of case and suspect case reporting along with statistical analysis of health-related data.” [1]

“Health Situational Awareness is the ability to utilize detailed, real-time health data to confirm, refute and to provide an effective response to the existence of an outbreak. It also is used to monitor an outbreak’s magnitude, geography, rate of change and life cycle.” [1]

Existing Biosurveillance Systems

- **BioSense** developed by the CDC
- **Early Aberration Reporting System (EARS)** developed by the CDC
- **Electronic Surveillance System for the Early Notification of Community-Based Epidemics (ESSENCE)** developed by the Department of Defense
- **Real-time Outbreak Detection System (RODS)** developed by the University of Pittsburgh
- **Google Flu Trends** developed by Google
Biosurveillance Use Widespread

- In 2007-2008, Buehler et al. surveyed public health officials in 59 state, territorial, and large local jurisdictions
  - 52 responded (88% response rate), representing areas comprising 94% of US population
  - 83% reported conducting syndromic surveillance for a median of 3 years
  - ER data most commonly used (84%), followed by:
    - Outpatient clinic visits (49%)
    - OTC medication sales (44%)
    - Calls to poison control centers (37%)
    - School absenteeism (37%)
  - Two-thirds said they are “highly” or “somewhat” likely to expand use of biosurveillance in next 2 years
Today’s Briefings

• Completed
  – LT Katie Hagen: Assessing the Effectiveness of the Early Aberration Reporting System (EARS) with Application to Bioterrorism

• In-progress
  – LCDR Manny Ganuza: Assessing the Effectiveness of Cumulative Sum Poisson- and Normal-based Tests for Detecting Rare Diseases
  – LT Jay Dao: Assessing the Effectiveness of Biosurveillance via Discrete Event Simulation
  – LT Randi Korman: Assessing the ESSENCE Biosurveillance System as Used by the Navy and Marine Corps: User Training, System Employment, and Perceived Value
• Associate professor, Naval Postgraduate School, Monterey, CA
• Contact information
  – Phone: 831-656-3048
  – E-mail: rdfricker@nps.edu
  – My NPS website: http://faculty.nps.edu/rdfricke/
• Reference material:
  – Students & theses: http://faculty.nps.edu/rdfricke/frickerth.htm
  – Papers: http://faculty.nps.edu/rdfricke/frickerpa.htm
  – Presentations: http://faculty.nps.edu/rdfricke/frickerpr.htm
  – Text and associated course: http://faculty.nps.edu/rdfricke/Biosurveillance.htm
The New Status Quo?

THEN

Atchoo!

Bless you

NOW

Atchoo!

Hello CDC?