

REAL-TIME SURVEILLANCE: CUTTING-EDGE TECHNOLOGY IN NH

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OBJECTIVE

This paper describes the use of technology to create an automated, real-time surveillance system with the capacity for early detection and alerting of potential health threats, and the capability to facilitate prompt investigation and increased efficiency for both New Hampshire hospital and the Division of Public Health Service resources.

BACKGROUND

The Automated Hospital Emergency Department Data (AHEDD) System was designed to detect early indicators of bioterrorism and naturally occurring health risks. Initial development includes real-time data collection from four pilot hospitals, an automated syndromic surveillance application, and the capability of raw data analysis for further investigation and follow-up. This automated system frees hospital and State staff from manual reporting and analysis; and has a broad application for Public Health, collecting both chief complaint and diagnosis codes. As the project expands we plan to add the remaining 22 acute care hospitals; include poisoning, asthma, and injury surveillance; and assess electronic disease reporting from diagnosis codes and data linkage with other public health data stores, such as Environmental Health Tracking, and pre-hospital data.

METHODS

Real-time transmissions from the four hospitals are loaded into an Oracle database. An automated Java-based surveillance system then assigns and charts emergency department chief complaints and diagnosis codes promptly into eight syndromes by hospital, town, county, and state. A signal alert is determined by a number of indicators: The # of standard deviations; or when counts cross the 3rd Sigma, Confidence Interval lines (from the Shewhart Control Chart [1]), or any of the Zhang [2] alert levels (which are based, monthly, on all historical data). Raw data MS Access investigation tools empower State surveillance staff with greater investigation capacity.

RESULTS

Presently, this system includes over 100,000 hospital encounter records containing data fields such as chief complaint, diagnosis, disposition, town, county and zip code. Raw data investigation allows State surveillance staff to quickly detect non-outbreaks from outbreaks for efficient follow-up, as well as investigation by either syndrome or symptom (a chief complaint text field value). In comparing the manual sys-

tem to the automated one, what once took hours for State surveillance staff to investigate and follow-up with hospitals, now takes minutes. Figure 1 below illustrates one of the tools.



Figure 1 – The MS Access raw data alert analysis tool allows State surveillance staff to prioritize work, investigate by syndrome, and follow-up with hospitals. Syndrome, hospital, town, county, or state alerts are displayed in descending order by count. When the user clicks on an alert entry, associated chief complaints are grouped and counted in the display window below. A printed report or data export can be generated, which provides the user with detailed patient follow-up information.

CONCLUSIONS

The system, which runs in parallel with existing infectious disease surveillance applications, allows for comparison and validation, and has proven to be complete, consistent, and sensitive in the detection of alert signals. State surveillance staff internally investigated and closed a Constitutional syndrome spike caused by a flu clinic, an Other syndrome spike caused by a mass casualty exercise, and Respiratory and Gastrointestinal syndrome spikes caused by Monday holiday activity after Christmas and New Years day. Application enhancements planned include: adding more hospitals and system functionality, and providing hospitals access to view their syndrome charts and receive real-time data discrepancy feedback.

REFERENCES

- [1] "Control chart" reference from Wikipedia, *The Free Encyclopedia*. (Last Modified June 18, 2006). Retrieved June 27, 2006, from http://en.wikipedia.org/wiki/Control_chart.
- [2] *The "Zhang Methodology" by Scientific Technologies Corporation*. Retrieved June 27, 2006, from <http://www.sthome.com/downloads/Handouts/Zhang%20Methodology.pdf>.

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