

Ten years of syndromic surveillance in New Hampshire: innovation, experience and outcomes

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Objective

To illustrate development of syndromic surveillance in NH, share innovation experience with the public health community and contribute to the syndromic surveillance body of knowledge in the new public health information technology landscape.

Introduction

In response to the terrorist attack of September 11, 2001, the NH Department of Health and Human Services (NH DHHS) engaged state and external partners in the design of an early warning surveillance system to support bioterrorism and emergency preparedness. Initially, NH DHHS began collecting four syndrome counts from 13 hospital emergency departments (EDs) by fax. Automation began in 2002, when an over-the-counter (OTC) syndromic surveillance pilot system was implemented by Scientific Technologies Corporation (STC). In 2003–2004 this system, the Syndromic Tracking and Encounter Management System (STEMS), was expanded to include school absentee and occupational health reports. Over time, an internal death data application was automated to query vital record deaths, and in 2005, a real-time ED surveillance pilot, the Automated Hospital ED Data System (AHEDD), was developed by STC to replace manual ED surveillance. Over the past decade, NH continued to expand the original concept with innovative approaches to identify undetected or underreported disease outbreaks.

Methods

NH's surveillance consists of assessing individual but compatible surveillance systems for (1) rapid detection of a covert bioterrorism attack and (2) early detection of naturally occurring outbreaks (i.e., influenza).

The OTC pharmaceutical system was implemented with automated data processing and alerting within an enterprise architecture. Modified Shewhart charting was developed with dynamic system modeling using a knowledge base technique. Community health status was charted with a set of state syndrome variables and dynamic processes, where baselines, thresholds, trend analysis and alerts from historic data were automatically charted (1). This technical framework was implemented in STEMS with OTC data, school absentee data and occupational health data, then later in AHEDD. The AHEDD system also used the Real-Time Outbreak and Disease Surveillance CoCo chief complaint classifier with electronic data feeds from four hospitals. AHEDD was later expanded to include drill down custom querying for all 26 acute care hospitals (allowing NH to realize statewide ED surveillance).

Over time, custom querying included data mining techniques adapted from the death data application, (2) to detect narrowly defined chief complaint health conditions and cluster activity.

This together with a 'Google'-like query tool allow NH surveillance staff to quickly assess any situation. Recently, a single portal infrastructure, based on AHEDD, was created to receive all external syndromic surveillance, Electronic Lab Reporting and immunization transmissions, helping hospital partners meet Meaningful Use (MU), which paves the way for integration with a statewide Health Information Exchange.

Results

Over the past 10 years, the usefulness of NH's surveillance systems has been demonstrated repeatedly. STEMS detected influenza and school norovirus outbreaks (3), and AHEDD tracked H1N1 and acute respiratory illness during the flu season, detected anthrax exposures during a gastrointestinal anthrax investigation and identified reportable disease occurrences (i.e., Lyme disease) and nonreportable clusters (i.e., carbon monoxide). These narrowly defined chief complaint queries have been found to be more useful than broad-based queries in detecting daily illness and health risks. Results of individual surveillance systems assessed together validate individual system detections (i.e., increased sales of OTC antiviral medication and increased school ILI absenteeism validate ED flu spikes).

Conclusions

Ten years of NH syndromic surveillance tool development has established a critical biosurveillance infrastructure with emergency preparedness response capability during disease outbreaks and natural disasters. These syndromic surveillance tools are now integral to the daily efforts of epidemiologists and public health professionals.

Keywords

Informatics; disease surveillance; Meaningful Use

References

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