ABSTRACT

Florida's ESSENCE system—from syndromic surveillance to routine epidemiologic analysis across syndromic and non-syndromic data sources

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Objective

Use of the Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE) in Florida has evolved from early event detection based on emergency department (ED) chief complaints to routine descriptive epidemiologic analysis, data visualization, and reporting across four different data sources, using and building on tools originally developed for syndromic surveillance.

Introduction

Federal laws and national directives have focused attention on the development of more robust biosurveillance systems intended to detect events of public health interest in a timelier manner. Presidential Decision Directive 21 calls for integrated biosurveillance data, enhanced clinician awareness, and an epidemiologic surveillance system with sufficient flexibility to tailor analyses to new syndromes and emerging diseases. In 2007, a statewide syndromic surveillance system (ESSENCE) was implemented and hospitals were recruited to participate. Experience with ESSENCE in the context of the ED data analysis, visualization, and reporting prompted the exploration of integrating new data sources into ESSENCE and new analyses specific to these new data. The purpose of the ESSENCE system is now to provide an intuitive environment for state and local epidemiologists to conduct routine descriptive epidemiologic analysis, to monitor morbidity and mortality trends over time and space and across multiple data sources, thereby providing information that can assist with making decisions on how to improve population health.

Methods

The Florida ESSENCE system is a multi-tiered, automated, and secured (https) web-based application. Microsoft SQL (One Microsoft Way, Redmond, WA, USA) databases are used in data ingestion, statistical analysis, and web databases. System development is primarily in Java (Oracle Corporation, Redwood Shores, CA, USA). It can be accessed via username and password by state-level epidemiologists, county health department epidemiologists, and staff at hospitals that participate. Enhancements to the system are developed through close collaboration with the Johns Hopkins University Applied Physics Laboratory, paying close attention to feedback from state and local epidemiologists in Florida.

Results

The system in Florida now includes four different data sources, each with its own module: (1) ED record data from 145 hospitals (updated once daily); (2) Merlin reportable disease case data from the Merlin system (updated once an hour); (3) Florida Poison Information Network consultation data (updated every 20 min); and (4) Florida Office of Vital Statistics death data (updated once daily). All records have individual identifiers removed.

Users can produce time-series graphs, maps, and tables by a number of possible stratification variables per data source. Several data sources can be combined in the same view. Time-series analysis can be conducted on daily, weekly, monthly, quarterly, and annual time resolutions. Statewide pneumonia and influenza mortality from the Office of Vital Statistics death data feed to ESSENCE is displayed as weekly counts and a weekly proportional mortality, and uses a Serfling regression model for analysis. Death certificates can be analyzed on the basis of analysis of literal text with a five-week delay and on assigned International Classification of Diseases and Related Health Problems 10th revision (ICD-10) codes with a 12-week delay. ED data are analyzed by sub-day time intervals to

identify clusters by the time patients are registered at the ED by hospital and sub-syndrome category. The Merlin reportable disease data are now processed through ES-SENCE's spatial scan statistic to assist with detecting spatial clusters of public health significance.

Conclusions

A number of barriers often exist for users attempting to access public health data. Data are sometimes siloed within organizations, and often very specialized skill sets are needed to manipulate and analyze data in statistical and mapping software programs. The integration of four data sources into the Florida ESSENCE system creates one location, where users can go to access data and create epidemiologic reports and 'data dashboards' that describe the morbidity and mortality for a given region in Florida. This functionality has allowed for more timely and routine analysis of data that was previously not available, or required significant effort to access, and has helped close the public health surveillance loop with our partners in the clinical community.

Acknowledgements