Discrete Data from Electronic Medical Records - Next Generation Data Sets for Syndromic Surveillance

Marc A Bellazzini MD, James E Svenson MD

Division of Emergency Medicine University of Wisconsin School of Medicine and Public Health

OBJECTIVE

This paper describes the integration of novel data sets from an Emergency Department Electronic Medical Record into a syndromic surveillance application.

BACKGROUND

Traditionally Emergency Department syndromic surveillance methods have relied on ICD-9 codes and chief complaints. The implementation of electronic medical record keeping has made much more information available than can potentially be used for surveillance. For example, information such as vital signs, review of systems and physical exam data are being stored discreetly. These data have the potential to detect specific diseases or outbreaks in a community earlier that the traditionally used ICD-9 and chief complaint.

Vital signs provide important information about a patient's clinical condition and can be used to help monitor specific illnesses within a community. For example fever as a nonspecific marker for infectious disease, respiratory rate and pulse oximetry as markers for respiratory illness, and age specific BP and heart rate as monitors for critical illness.

The review of systems (ROS) is a comprehensive method of screening a patient's symptoms by organ system obtained by a health care provider. For example, patients are asked if they have any respiratory symptoms such as cough, difficulty breathing or nasal discharge. Such a comprehensive survey could make the ROS a useful tool for disease surveillance. Influenza can be modeled in review of systems surveillance by grouping positive findings such as muscle ache, sore throat, cough, fever and headache.

METHODS

The Emergency Department of the University of Wisconsin deployed a fully integrated electronic medical record system (ASAP Epic Systems Corporation Madison, WI) as of April, 2008. This system captures chief complaint, ICD-9 discharge diagnosis, vital signs, review of systems and physical exam data. A 24 hour ED encounter data set, stored in CSV format, is transmitted each morning to a surveillance server via SFTP. The data set currently contains encounter date and time, vital signs, chief complaint, ICD-9 discharge code, birth date and zip code. It will soon include ROS and physical exam data. ROS data will be grouped to model for specific syndromes. For example, a gastrointestinal syndrome grouping contains some of the following ROS: nausea, vomiting, diarrhea, abdominal pain.

Physical exam data is also grouped to model for specific syndromes. For example, any positive physical exam finding such as crackles, wheezes, tachypnea, stridor will be assigned into a respiratory syndrome. A complete outline of ROS and physical exam syndrome grouping is available through the link at the end of this abstract.

Aberrant signals in ROS, physical exam and vital sign syndromes are generated by the CUSUM C1C2C3 method.

RESULTS

Our surveillance system currently monitors ICD-9, CC, and temperature vital sign data. The grouping of physical exam, ROS and vital sign data into syndromes will provide additional avenues for acute disease surveillance. We intend to compare these novel data sets to traditional surveillance methods and study their performance as surveillance tools in the next phase of our project.

CONCLUSIONS

Advanced medical record systems allow for storage of discrete data such as physical exam, vital signs and ROS. These data can be grouped into syndromes and used as novel methods for syndromic surveillance.

LINKS

M.A.R.I.S.S.A

marissa.emed.wisc.edu