

Evaluation of a Systematic Emergency Department Chief Complaint System for Near Real-Time Public Health Surveillance

Laura McDonald MSc, Victoria Edge PhD, Jeff Aramini PhD, Kara McDonald MSc.

Foodborne Waterborne and Zoonotic Infections Division, Public Health Agency of Canada

Objective

To determine the predictive abilities of systematic emergency room chief complaints for the detection of acute infectious diseases in the Winnipeg population.

Background

Emergency room (ER) chief complaints are commonly used in early event detection systems as they can easily be classified into broad syndromes and fed into an analytical engine housing aberrant event detection algorithms. In Winnipeg, Manitoba, a pilot syndromic surveillance system, The Canadian Early Warning System (CEWS), is being tested. Triage nurses in Winnipeg hospitals use a system named eTRIAGE to accurately classify patients based on their symptomatic presentation. Pick lists and drop down menus are used to arrive at a final chief complaint 'diagnosis'. This final chief complaint is sent to CEWS for near real-time analysis.

Materials and Methods

1600 charts were randomly selected from the eTRIAGE records over a one-year period. Charts were manually reviewed by two epidemiologists. The eTRIAGE complaint was compared to the final chart diagnosis.

The first stage of analysis determined if the chart diagnosis matched with the eTRIAGE chief complaint, while the second stage determined how often the chief complaints were indicative of a diagnosis of an acute infectious respiratory or gastrointestinal (GI) illness.

Results

Of the 1415 charts reviewed in this study, 129 were excluded for a number of reasons including cases where: the ER record could not be found in the file (41%), patients left without being seen (31%), charts were illegible or had nonsensical diagnoses (15%) and finally, ER records with no diagnosis (13%). When the diagnoses were compared with the chief complaints, they matched well for both the respiratory and GI

categories. Overall, 511/551 complaints matched in the GI category (92.7%) while 682/735 (92.8%) matched in the respiratory category. When diagnoses were categorized as being an acute infectious diseases or not, the proportion of matches decreased compared to simply matching chief complaint to diagnosis. Overall, results showed that this proportion varied substantially depending on complaint, hospital and patient age. Examination of individual chief complaints revealed that some were superior indicators of acute infectious disease. In the respiratory syndrome category, the two best indicators were 'cough' and 'sore throat', with positive predictive values (PPV) of 84.9% and 84.8% respectively. The worst indicators of acute infectious illness were 'chest pain' (10%) and 'shortness of breath' (23.9%). A similar trend was seen in the complaints that made up the GI syndrome. 'Diarrhea' and 'nausea and vomiting' were highly predictive of infectious illness with PPVs of 87.5% and 57.8% respectively. 'Abdominal pain, no trauma' and 'GI bleeding', were not good indicators as shown by their low PPVs of 6.9% and 7.1% respectively.

Conclusions

This study showed that eTRIAGE did an excellent job of classifying patients into chief complaint categories, demonstrating that systematic complaint systems such as eTRIAGE are a valuable addition to hospital emergency departments. The ability of the system to classify chief complaints into GI and respiratory syndromes varied depending upon which complaints were included. Syndrome definitions require tuning in order to optimize them for the use in near real-time surveillance. It is our hope that this study will help to guide future researchers in the field of syndromic surveillance in creating more accurate syndrome definitions in order to make systems with greater accuracy and precision in their detection of disease.