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Evaluating Syndromic Data for Surveillance of Non-infectious Disease

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Objective

To evaluate several non-infectious disease related syndromes that are based on chief complaint (cc) emergency department (ED) syndromic surveillance (SS) data by comparing these with the New York Statewide Planning and Research Cooperative System (SPARCS) clinical diagnosis data. In particular, this work compares SS and SPARCS data for total ED visits and visits associated with three non-infectious disease syndromes, namely asthma, oral health and hypothermia.

Introduction

Syndromic surveillance data has predominantly been used for surveillance of infectious disease and for broad symptom types that could be associated with bioterrorism. There has been a growing interest to expand the uses of syndromic data beyond infectious disease. Because many of these conditions are specific and can be swiftly diagnosed (as opposed to infectious agents that require a lab test for confirmation) there could be added value in using the ICD9 ED discharge diagnosis field collected by SS. However, SS discharge diagnosis data is not complete or as timely as chief complaint data. Therefore, for the time being SS chief complaint data is relied on for non-infectious disease surveillance.

SPARCS data are based on clinical diagnoses and include information on final diagnosis, providing a means for comparing the chief complaint (from SS) to a diagnosis code (from SPARCS), for evaluating how well the syndrome is captured by SS and for assessing if it would be advantageous to get SS ED diagnosis codes in a more timely and complete manner.

Methods

Syndromes previously developed by the DOHMH were used for this work. Syndrome definitions are based on querying the cc field in SS data for terms associated with asthma, oral health and hypothermia. The asthma syndrome consists of search terms for 'ASTHMA', 'WHEEZING' and 'COPD'. The oral health syndrome uses ('TOOTH' or 'GUM') and ('ACHE', 'HURT') and excludes visits resulting from trauma (e.g., 'INJURY', 'ACCIDENT'). The hypothermia syndrome is limited to search for the word 'HYPOTHERMIA'. For the purpose of comparison of the SS data with SPARCS data for the three syndromes, the following ICD9 diagnosis codes were considered in SPARCS: 493 for asthma, 521-523, 525, 528-529 for oral health and 991 for hypothermia.

SS and SPARCS data for 2007 were used for this work as this was the most recent and complete SPARCS ED dataset that was available. Overall city-wide daily counts and hospital-level annual counts for total ED, asthma-, oral health- and hypothermia-related visits were computed for SS ED data and SPARCS ED data. A comparison of daily and hospital trends for SS and SPARCS for total and syndrome-related counts were conducted using correlation coefficients.

Results

There is a high correlation between total ED SS and SPARCS daily counts ($r=0.98$, p-value<0.001). On average, SPARCS daily counts are higher by approximately 75 visits (range: -674, 591) per day. Correlations between SS and SPARCS daily counts for asthma, oral health and hypothermia were 0.96 (p-value<0.001), 0.66 (p-value<0.001) and 0.45 (p-value<0.001), respectively. Correlations between SS and SPARCS hospital-level annual counts for asthma, oral health and hypothermia were 0.89 ($p<0.001$), 0.87 ($p<0.001$) and 0.07 ($p=0.61$). In 2007, less than 8% of individual SS records had a discharge diagnosis, and this was found to vary between hospitals (0-69%); therefore, a comparison between SS discharge diagnosis and SPARCS diagnosis data was not possible.

Conclusions

Overall, syndromic surveillance data was found to be a useful data source for public health surveillance of non-infectious disease. Total ED visits were found to be comparable between SS and SPARCS. While direct comparison of counts for syndromes is not possible, the daily syndrome counts between SS and SPARCS correlated well. However, the strength of correlation varied depending on the syndrome, with a better correlation for syndromes with larger volume of visits to the ED (e.g., asthma) and with more commonly used terms in the cc search (e.g., 'tooth ache') compared to syndromes with very specific search terms (e.g., 'hypothermia').

In certain instances, it is hypothesized that SS discharge diagnosis would provide more reliable and representative estimates than cc for tracking non-infectious disease. Future work will consider a period with more complete SS ED discharge diagnosis data for further comparisons and to test the hypothesis that more complete and timely SS ED discharge diagnosis data could improve surveillance efforts.

Keywords

chief complaint; syndromic surveillance; New York City; non-infectious disease; discharge diagnosis

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