Investigating Syndromic Peaks Using Remotely Available Electronic Medical Records

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Background: One limitation of syndromic surveillance systems based on emergency department (ED) data is the time and expense to investigate peak signals, especially when that involves phone calls or visits to the hospital. Many EDs use electronic medical records (EMRs) which are available remotely in real time. This may facilitate the investigation of peak signals.

Objective: Our goals were to (1) determine the availability of pertinent data elements in an existing EMR and (2) investigate a structured "sub-syndrome" approach to investigating peaks identified for the respiratory syndrome (RESP) and the gastrointestinal syndrome (GI) in the New York State Department of Health (NYSDOH) ED syndromic surveillance system.

Methods: Design: Retrospective chart review of ED visits. Setting: Two hospitals in NY from May 2004 through December 2005 that used an EMR. Protocol: A data abstraction form was developed to capture the presence or absence of selected pertinent data elements for each visit, and also to assign each visit to one or more defined GI and RESP sub-syndromes. The data elements included those used in a New York City Department of Health and Human Services syndromic surveillance form for investigating peak signals. We defined sub-syndromes as follows. RESP: "ruled out", "asthma", "COPD", "pneumonia", "bronchitis", "pharyngitis", "sinusitis", "otitis media", "influenza like illness", "fever" and "other resp". GI: "ruled out", "lower GI bleed", "diarrhea", "upper GI bleed", "nausea & vomiting only", "undifferentiated abdominal pain" and "other". We next identified the RESP and GI visits in the database using the NYSDOH chief complaint classifiers. We then identified peak signal days using the NYSDOH method which is based on a modified CUSUM 7 statistic. We selected 4 peak signal days for each syndrome. For each peak signal day, we examined the EMRs falling into that syndrome on that day. Also, in order to establish a baseline for comparison for that peak day, we examined the EMRs falling into that syndrome during a baseline period of 4 days starting 7 days before the peak day. Three physicians then examined the available EMRs for the presence of pertinent data elements. We also determined which of the data elements were captured in a granular fashion as separate data points and which required review of the free text physician's note. The physicians classified the visits into sub-syndromes as noted above. We compared the proportions of sub-syndromes in each peak to its baseline using a 2 tail Fisher's Exact Test. To improve sensitivity, we used alpha ≤ 0.05 without correcting for multiple comparisons.

Results: A total of 434 charts were reviewed. The following data elements were captured in separate data fields in a granular fashion: date of visit, age, gender, chief complaint, vital signs (including temperature) and admission status. The physicians' notes included free text typed into insert points in a template. The following data elements were present in the physicians' note: past medical history 99%, onset and/or duration 97%, presence of prior fever 96%, pertinent physical 100%, disposition as noted in chart, 96%. There were no clinically important differences in these percentages between the RESP and GI syndromes. In addition, the percent of charts that had testing done were, for the RESP syndrome: Labs 42%, X-rays 41%, CT scans 4%, rapid antigen screens 4%, cultures 13%, and for the GI syndrome: Labs 77%, X-rays 24%, CT scans 18%, cultures 3%. We performed a chart review that included the physician's note for three RESP and four GI peaks for which we had complete data (388 cases). We found that visits for all peaks were classified easily into sub-syndromes. Except for one peak, there was no unusual increased sub-syndrome that would indicate a natural outbreak or bioterrorism event. For one RESP peak we found a statistically significant increase in fever visits ($p=0.03$). A scan of the summary data revealed the excess was due to visits by children on a Sunday**.**

Conclusion: The data elements of interest were present in a high percentage of the electronic medical records and many of them were captured in a granular fashion. The high capture rate of data elements in the physician's note may be related in part to the use of the particular charting template system. We found using the EMR to categorize visits into "sub-syndromes" enabled rapid evaluation of syndromic peaks in the New York State syndromic surveillance system. We speculate that the peak in pediatric fever visits was due to limited availability of pediatric services on a Sunday.