Fever as a Measure for Early Detection of Influenza Outbreaks in the Emergency Department

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OBJECTIVE

This paper describes the temporal relationship between numbers of cases of fever, recorded as discrete vital sign data in an electronic medical record, and ICD-9 Influenza Like Illnesses (ILI) in the Emergency Department at the University of Wisconsin Hospital.

BACKGROUND

Emergency Department surveillance methods currently rely on identification of acute illness by tracking chief complaint or ICD-9 discharge codes. Newer generation electronic medical records are now capturing additional information such as vital signs. These data have the potential for identifying disease syndromes earlier than the traditional methods

Our Emergency Department has deployed a fully functional electronic medical record (ASAP Epic Systems Corporation Madison, WI) that allows for health care providers to record such data as vital signs, review of systems (ROS) and physical exam data discreetly. In this paper, we explore the temporal associations between cases of fever and cases of ILI.

METHODS

Data was obtained from our syndromic surveillance system MARISSA (Madison Area ROS Integrated Syndromic Surveillance Application) from June 13, 2007 through June 11, 2008. Daily counts of ICD-9 ILI and fever were available for analysis. Fever was defined as a temperature at or above 100.4 F.

Temporal associations between series were assessed by (1) including the mean number of fevers over the prior 1, 3 or 7 days as potential predictors in a negative binomial regression model for the number of ICD-9 ILI on the current day and (2) including the mean number of ILI over the prior 1, 3 or 7 days as potential predictors in a negative binomial regression model for the number of fevers on the current day..

RESULTS

Daily counts of ICD-9 ILI and fever are presented along with a smoothed estimate of the mean count in Figures 1 and 2, respectively. There is a statistically significant relationship between mean number of fevers over the prior 3 or 7 days and the number of ICD-9 ILI on the current day (3 days: RR 1.08, 95% CI 1.03-1.12, p=0.001; 7 days: RR 1.12, 95% CI 1.05-1.19, p=0.0005). However, there is no relationship between mean numbers of ICD-9 ILI over the prior 3 or 7 days and the numbers of fevers on the current day (3 days: RR 1.02, 95% CI 0.98-1.05, p=0.34; 7 days: RR 1.02, 95% CI 0.98-1.06, p=0.30).

Date
Figure 1

Date
Figure 2
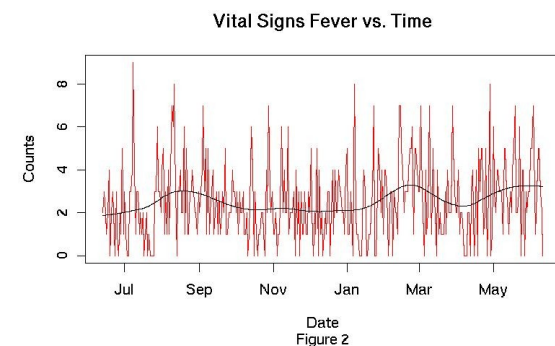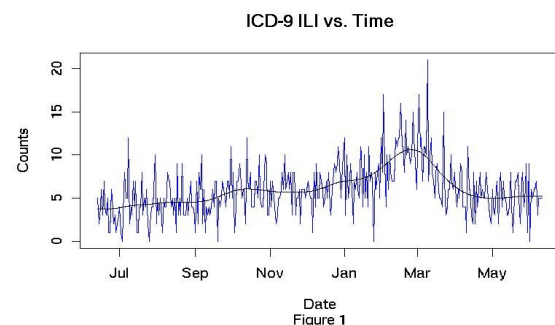
CONCLUSIONS

The mean number of cases of fever documented by vital signs in the 3 to 7 days prior to the current day correlates with the current number of ILI cases as defined by ICD-9 codes and thus may be able to serve as a useful early surrogate measure for on-going surveillance to detect influenza outbreaks.