

The validity of emergency department influenza-like illness (ILI) for laboratory-confirmed influenza in children

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Objective

Estimate and compare the accuracy of various ILI syndromes for detecting lab-confirmed influenza in children.

Introduction

Syndromic surveillance systems use electronic health-related data to support near-real time disease surveillance. Over the last 10 years, the use of ILI syndromes defined from emergency department (ED) data has become an increasingly accepted strategy for public health influenza surveillance at the local and national levels. However, various ILI definitions exist and few studies have used patient-level data to describe validity for influenza specifically.

Methods

A retrospective design was used to evaluate clinical records for a predictive model of lab-confirmed influenza. Children who presented to the ED at Seattle Children's Hospital between January 1, 2001 and May 31, 2005 were eligible for inclusion in the study. The accuracy of four syndrome definitions were compared for identifying lab-confirmed influenza: (1) ILI from chief complaint (CC) or diagnoses codes ("ILI"); (2) ILI from CC alone; (3) febrile illness from CC or diagnoses ("Febrile"); and (4) febrile illness from CC alone. We evaluated syndrome validity over two distinct time periods: (1) the "discrete" 2003–04 influenza season, which had relatively less co-circulation of influenza and respiratory syncytial virus (RSV) compared to most years, and (2) the "concomitant" 2000–05 influenza seasons (excluding 2003–04), when influenza and RSV co-circulation was high. Analyses during the concomitant years were further stratified by age <5 years and ≥5 years. Multiple imputation was used to address missing viral lab results. The imputation model was based on testing guidelines in place at the hospital during the time of study.

Results

We studied approximately 14,000 visits during the discrete year and 32,000 visits during concomitant years. Viral results were unavailable for approximately 75% of respiratory visits and multiple imputation was used to impute values. During the discrete year, sensitivity and specificity were 0.49 (95% Confidence Interval [CI]: 0.30, 0.68) and 0.72 (CI: 0.70, 0.74) respectively, for the "Febrile" definition and 0.29 (CI: 0.13, 0.54)

and 0.89 (CI: 0.87, 0.90) for the "ILI" definition. ILI sensitivity was 2.05 (CI: 1.08, 3.91) times greater and its false positive fraction 44% (CI: 37%, 49%) lower in concomitant years compared to the discrete year. Greater sensitivity and false positive fractions (1-specificity) tended to be produced by the febrile definitions than by the ILI definitions; and by definitions derived from CC or diagnoses as compared to those from CC alone. The false positive fraction of all syndrome definitions was higher in younger children compared to older children.

Conclusions

Although the sensitivity of syndromic ILI definitions was not high by clinical standards, our interest was to understand the proportion of influenza cases in the community being captured by the system. ED ILI may provide a more robust estimate of the burden of disease than laboratory surveillance, which captures only a subset of patients seen by a healthcare provider and who were tested. The higher specificity of the ILI definitions suggests it is best used for situational awareness during influenza outbreaks and for distinguishing influenza from other viral agents. The use of several definitions throughout the season may be most appropriate in some settings. Public health practitioners should bear in mind that syndrome performance may vary by season and year. Higher syndrome specificity among older children suggests specificity in adults should be higher than that observed for younger populations. However, the generalizability of these results to adult populations and other hospitals is uncertain and should be further studied.

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