COACTION PUBLISHING

Case definition for real-time surveillance of influenza-like illness

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Objective

This study investigates additional signs and symptoms to further enhance the influenza-like illness case definition for real-time surveillance of influenza.

Introduction

The Centers for Disease Control and Prevention (CDC) case definition of influenza-like illness (ILI) as fever with cough and/or sore throat (1) casts a wide net resulting in lower sensitivity, which can have major implications on public health surveillance and response.

Methods

This is a retrospective cross-sectional study conducted August 1, 2009, to July 31, 2011, in the emergency department of an academic medical center. The sample consisted of 2661 patients who received a nasopharyngeal swab followed by polymerase chain reaction (PCR) testing for respiratory viruses.

Geographic Utilization of Artificial Intelligence in Real-Time for Disease Identification and Alert Notification (GUARDIAN)—a syndrome surveillance program—was utilized to review patients' records and detect the presence or absence of 37 influenza-associated symptoms (e.g., rhinorrhea, myalgias, headache and nausea among others) including reported and measured fever, cough and sore throat. Demographic factors such as age groups and gender were included in the analysis. Descriptive and χ^2 test were used to determine a subset of significant signs and symptoms. A binary logistic regression with backward selection option was employed to further narrow down significant symptoms.

Results

Females represented 53.4% of the sample. The percent of positive influenza cases based on PCR results was 9.2% (i.e., 245 cases). The majority of positive influenza cases (55.9%) occurred below 50 years of age. Positive influenza patients with fever, cough or sore throat were 207 (84.5%), 218 (89%) and 56 (22.9%), respectively. Based on χ^2 test, fever, sore throat, cough, myalgias or body aches, chills or rigors, rhinorrhea or nasal congestion or sinusitis or nasal symptoms, dyspnea, upper respiratory infection symptoms or viral illness, rash and age groups were statistically significant. Apart from fever and cough, myalgias and rhinorrhea were significant associated symptoms of influenza based on multivariate analysis (Table 1).

Conclusions

Based on these results, some of the recommended ILI case definitions could be (1) fever with cough and/or myalgias and/or rhinorrhea (i.e., based on only positive odds ratios among symptoms); (2) fever with cough (i.e., based on highest positive odds ratios among symptoms). The sensitivity (i.e., identifying positive influenza cases confirmed by PCR) for case definitions based on proposed definition 1, proposed definition 2 and CDC were 78.4%, 76.33% and 76.7%, respectively.

As sore throat was not found to be significant, it could be excluded from the existing CDC case definition. These definitions can help in clinical decision making for rapid bedside testing for influenza. Additional analysis is required to understand the effects of (1) varying influenza strains from year to year and (2) age group on ILI case definitions.

Table 1. Binary logistic regression results for influenza

Variables	*p*	*Odds ratios*
Fever*	<0.001	2.1
Cough*	<0.001	3.6
Sore throat	0.129	–
Myalgias/body aches*	<0.001	1.9
Rhinorrhea/nasal congestion/sinusitis/nasal symptoms*	0.01	1.7
Dyspnea*	0.019	0.6
Rash*	0.005	0.4
Chills or rigors	0.45	–
URI/viral illness	0.196	–
Gender	0.626	–
Age (0–4)*	0.008	2.6
Age (5–24)*	<0.001	6.7
Age (25–49)*	<0.001	3.9
Age (50–64)	0.063	–
Age 65+	Reference age group	

* Significant varibles at 95% confidence level.

Keywords

Influenza-like illness; case definition; syndromic surveillance

Reference

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