Novel Data Sources for Epi Modeling

- or -

Enhancing influenza surveillance by monitoring age-specific trends in emergency department chief complaint data

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You're going to be told lots of things.  
You get told things every day that don't happen.

It doesn't seem to bother people…
It's printed in the press.
The world thinks all these things happen.
They never happened.

Everyone's so eager to get the story
Before in fact the story's there
That the world is constantly being fed
Things that haven't happened.

All I can tell you is,
It hasn't happened.
It's going to happen.
Influenza
OBJECTIVE

Characterize influenza season epidemiology using emergency department data by Age
Local health officers shall exercise due diligence in ascertaining the existence of outbreaks of illness or the unusual prevalence of diseases, and shall immediately investigate the causes of same.

New York State Sanitary Code, 10 NYCRR Chapter 1, Section 2.16(a)
What is Syndromic Surveillance?

“Real-time” public health surveillance using data that is routinely collected for other purposes
What are its Goals?

• Early detection of large outbreaks
• Characterization of size, spread, and tempo of outbreaks once detected
• Monitoring of disease trends
48 (75%) of 64 NYC EDs
90% of ED visits
Coding chief complaints into syndromes

Respiratory illness
key words: cough, shortness of breath, URI, pneumonia
excludes: cold symptoms

Non-specific febrile illness
key words: fever, chills, body aches, flu/influenza, viral syndrome

Gastrointestinal illness
key words: diarrhea, vomiting
excludes: abdominal pain alone, nausea alone
Update: Influenza Activity --- United States, 2001--02 Season

Although data collected from the four components of the CDC influenza surveillance system* are preliminary, national influenza activity appears to have peaked during the week ending February 23, 2002 (week 8). During the 2000--01 and 1999--2000 influenza seasons, peak activity occurred during week 4 and week 51, respectively. The viruses most commonly isolated during the 2001--02 season have been influenza A (H3N2). These viruses were well-matched antigenically by the 2001--02 influenza A (H3N2) strain in the vaccine. This report summarizes influenza activity in the United States† during September 30, 2001--March 23, 2002, and updates previous summaries from this season (1,2).

For the weeks ending January 26 (week 4) through March 23 (week 12), the period covered since the last report, the percentage of respiratory specimens testing positive for influenza viruses, a key indicator of the level of influenza activity, ranged from 17.6% (week 4) to 25.9% (week 8) (Figure 1). Since September 30, 2001, World Health Organization (WHO) and National Respiratory and Enteric Virus Surveillance System (NREVSS) collaborating laboratories in the United States tested 72,677 specimens for influenza viruses; 12,017 (16.5%) were positive, of which 11,399 (95%) were influenza A viruses and 418 (3%) were influenza B viruses. Approximately one-third of the influenza B viruses were isolated in the Mid-Atlantic region of the United States. Of the 3,479 influenza A viruses that have been subtyped, 3,426 (98%) were H3 viruses, and 53 (2%) were H1 viruses.

CDC has characterized antigenically 391 influenza isolates collected in the United States since September 30. Of these, 279 were influenza A (H3N2) viruses, 14 were influenza A (H1N1) viruses, and 96 were influenza B viruses. Of the 14 A (H1) viruses, five were A (H1N1) viruses and nine were A (H1N2) viruses. These nine A (H1N2) viruses came from patient specimens collected in Wisconsin in December 2001. Two other A (H1N2) viruses were isolated from patient specimens collected during July and September in Texas and Nevada, respectively. The influenza A (H3N2) and A (H1) viruses were similar antigenically to the vaccine strains A/Panama/2007/99 (H3N2) and A/New Caledonia/20/99 (H1N1) viruses, respectively.
FIGURE 1. Number and percentage of specimens testing positive for influenza, World Health Organization and National Enteric and Respiratory Virus Surveillance System Collaborating Laboratories — United States, 2001–02 Season*

*As of April 3, 2002.
RAPID COMMUNICATION


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[Diagram of influenza virus genetic lineages]
Methods

Data

fever & respiratory ED visits
viral influenza isolates

Statistical Approach
Serfling regression

Analytical Approach
excess visits (observed – expected)
relative excess (observed / expected)
influenza type, subtype & strain “signatures”
ED fever/respiratory & viral data in NYC

Weekly fever/respiratory ED visits (/1000 pop)

All ages

Weekly WHO viral laboratory isolates

influenza A

influenza B

A/H3N2 Fujian

A/H3N2 California & A/Fujian

B/Victoria & B/Yamagata

Olson, DOHMH, NYC - DIMACS 1/27/06
ED fever/respiratory chief complaint data in New York City impact by Age

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FINDINGS

Syndrome data can be used to retrospectively describe

- impact by influenza season
  specific to influenza type, subtype & strain

- impact within-season
  consistent with early spread among kids
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