Early Detection of Influenza-like Illness: Developing a Multi-Variate Approach

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OBJECTIVE

This paper describes data that was available in Ohio for analysis and considered valuable to determine the occurrence of influenza-like illness (ILI). These data sources were studied to determine their value to ILI surveillance and to develop an improved method of establishing influenza activity levels.

BACKGROUND

The 2003/04 influenza season included a more pathogenetic organism and had an earlier onset. There were noticeably more deaths in otherwise healthy children than in previous seasons. Following this season, States were asked by the Centers for Disease Control and Prevention to increase their surveillance efforts for influenza illness [1].

Determination of influenza activity has historically remained mostly a subjective task. Since the vast majority of persons with influenza is not diagnosed or even seeks treatment, ILI is used as a proxy for influenza but includes cases of other similar disease in addition to true influenza [2]. In the past, influenza surveillance in Ohio was done using ILI reports from sentinel providers, class B aggregate reports from local health districts, and institutional and school outbreak and closure reports. The difficulty in determining the appropriate level of influenza activity has included the capability of detecting ILI.

METHODS

We studied sales of non-prescription medications, chief complaints from hospital emergency department visits, school absentee reports, diagnostic laboratory reports, visits to physician's offices, visits to Veterans Administration and Department of Defense clinics, and reports from local health departments in three urbanized counties of Ohio for the three previous influenza seasons (2002/03, 2003/04, and 2004/05).

Serfling's regression method, using pneumonia and influenza (P&I) death data from the 122 Cities Mortality Reporting System, provided the gold standard for influenza outbreaks. Cross correlation analysis was used to compare the time-series from the study data with the gold standard. Those data with correlation coefficients >0.5 were selected for further study using various statistical algorithms to identify the changes that resulted from increases in the number of ILI cases.

RESULTS

Seven datasets had correlation coefficients >0.5 (0.5052 to 0.5955) and lead times of 3.7 to 4 weeks. These data include sales of thermometers, adult cough and cold medicine, pediatric cough syrup, pediatric cold relief medication, adult cold relief medication, respiratory-related emergency department visits, and positive isolates from diagnostic laboratories. Detection of increases in the counts for these categories was possible using more common detection algorithms.

CONCLUSIONS

Based on these results, we have developed an influenza level decision matrix. Using surveillance from these data sources we are better able to quantify ILI trends when determining the influenza activity level. Much of these data are available to public health through existing systems and we feel that others might find these results beneficial to their own ILI surveillance programs.

REFERENCES

[1] 2003-04 U.S. Influenza Season Summary. http://www.cdc.gov/flu/weekly/weeklyarchives2003-2004/03-04summary.htm

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