Monitoring Influenza Activity Using the BioSense System, 2003-2005

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Objective

To determine the utility of current CDC BioSense data sources in monitoring influenza activity at the national and state levels.

Background

One of the standard approaches to public health surveillance for influenza is to monitor the percent of visits to about 2000 sentinel physicians for influenza-like illness (%ILI; fever plus cough or sore throat). The BioSense System currently receives (among other data) ICD-9 discharge diagnoses from Veteran's Affairs (VA) and Department of Defense (DOD) outpatient clinics. A literature review found that, in addition to ICD-9 code 487 (the code specific for influenza), 29 other codes have been used previously to monitor influenza. We evaluated the utility of ICD-9 codes reported to BioSense for their utility in monitoring influenza.

Methods

We compared BioSense (the percent of records with ICD-9 code 487 [%487] and other codes) with standard surveillance (%ILI). Analyses were done at the national (one record for each week) and state levels (one record for each state each week). We calculated correlation coefficients between the percent of records with various ICD-9 codes and %ILI. For the state level, we evaluated the ICD-9 codes in quartiles, and used logistic regression to identify independent predictors of %ILI. We used principal components analysis to search for ICD-9 code combinations that were predictors of %ILI. We evaluated lagged data values to determine whether the seasonal increase in reporting of ICD-9 codes to BioSense was one week before or after the seasonal increase in ILI visits to sentinel physicians. Data were analyzed for the 2003-2004 (October 2003-April 2004) 2004-2005 (October 2004-March 2005) influenza seasons.

Results

In 2003-2004, standard surveillance showed 206,315 ILI compared with 21,765 records with ICD-9 code 487 reported to BioSense; in 2004-2005, the figures were 205,474 and 18,860. Approximately equal numbers of records with ICD-9 487 were received from the VA and DOD. ILI reports to standard surveillance involve younger patients than 487 reports to BioSense. The national analysis showed a high correlation between weekly %487 and %ILI (R=0.95 in 2003-2004 and R=0.98 in 2004-2005). In the state analysis, correlation between weekly %487 and %ILI was not as strong (R=0.56 in 2003-2004 and R=0.48 in 2004-2005). In the 2003-2004 state-level analysis, the logistic model showed that three codes were independent predictors of %ILI: 487, 460 (acute nasopharyngitis), and 490 (bronchitis not specified as acute or chronic); the area under the ROC curve for this model was 0.72. In the 2004-2005 state-level analysis, the logistic model showed that only 487 was an independent predictor. Principal components analysis did not identify any combinations of ICD-9 codes that were better predictors of %ILI. Analyses of lagged data did not show stronger correlations, indicating that seasonal increases ICD-9 code reports and ILI occur during similar weeks.

Conclusions

Nationally, %487 is an excellent predictor of %ILI and could be used to supplement standard surveillance for influenza activity. However, the number of records with ICD-9 code 487 currently reported to BioSense is too low to enable monitoring of influenza in many states. Our evaluation of 29 other ICD-9 codes found that none were independent predictors of %ILI in both seasons evaluated. The addition of more data sources to BioSense, as is planned, will be needed to increase the utility of BioSense for influenza monitoring.

References

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