Using the Early Aberration Reporting System (EARS) to Analyze Influenza Sentinel Provider Surveillance and Influenza Rapid Test Reports

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Objective: Use the Early Aberration Reporting System (EARS) to analyze influenza sentinel provider surveillance data and positive rapid influenza test reports to identify weeks where influenza activity was significantly increased in South Carolina (SC). Demonstrate the utility of using EARS to detect increases in influenza activity using existing surveillance systems.

Background: The South Carolina Department of Health and Environmental Control (SC DHEC) uses multiple surveillance systems to monitor influenza activity from October to May of each year, including participating in the U.S. Influenza Sentinel Providers Surveillance Network (ISPSN). A percentage of influenza-like-illness (ILI) surpassing the national 2.5% baseline is considered evidence of increased influenza activity by the CDC; this baseline is historical and does not change throughout the influenza season. Though not a part of the national influenza surveillance, SC also requires health care providers in the state to report positive rapid influenza tests, by number, on a weekly basis. Currently, only a trend analysis is used on weekly reports of positive rapid influenza test data for SC. A more robust method for determining statistically significant increases in activity for these two influenza surveillance systems is needed, and would provide a more accurate assessment of the status of seasonal influenza activity in SC.

Methods: Positive rapid influenza test data was queried from the Carolinas Health Electronic Surveillance System (CHESS) by county and MMWR week for the 2005-2006 influenza season. These data were stratified into the eight (8) SC public health regions for analysis by MMWR week. Data on ILI for 2005-2006 were queried from the ISPSN and also stratified by region and MMWR week. Both datasets were analyzed using CUSUM algorithms in EARS-X v1.2 beta for both regional and state-level data. Trends were identified and weeks where aberrations were present in each dataset were compared to determine if significant increased activity was present at the same time in both systems. Recommendations on how to use this analysis for the 2006-2007 influenza season in SC were then identified.

Results: Aberrations (C1, C2, and C3 flags) were detected in 36.4% (12/33) of reporting weeks and in seven (87%) health regions for ILI data; no aberrations were detected in state-level ILI data. The week ending February 4, 2006 demonstrated significantly increased positive rapid influenza test data for seven (87%) health regions and for the state; ILI data demonstrated increased activity in five regions (62%) while no corresponding increased activity was detected in state-level data. When comparing the ratio of aberrations reported by dataset, a greater number were reported in the positive rapid influenza test dataset as opposed to the ILI dataset (4.7:1); 91% (30/33) of reporting weeks demonstrated at least one region or state-level data with increased reports of positive rapid influenza test results. State level data demonstrated significantly increased reports of positive rapid influenza test results for 36% (12/33) of the weeks of the season compared to none for ILI activity. Positive rapid influenza test data was available for all regions for all weeks of the influenza season; while, the mean number of regions reporting ILI for any given week during the surveillance season was 61%.

Conclusions: SC DHEC was able to demonstrate proof of concept for using EARS to detect increases in influenza rapid tests and ILI activity. We found that EARS allows for the application of statistical indicators for the analysis of positive rapid influenza test data. We recommend that EARS be used during the 2006-2007 seasonal influenza season to monitor positive rapid influenza tests for both the regional and state level. ILI data were not adequate for detecting aberrations using short-term syndromic surveillance algorithms; CUSUM calculations rely on complete data for the period of analysis and data was not available from providers in every region for every reporting week for ILI. A more geographically-representative enrollment of providers and consistent reporting of ILI for all weeks is needed in order for EARS to accurately assess statistically significant increases in ILI influenza activity.