Use of Syndromic Surveillance of Emergency Room Chief Complaints for Enhanced Situational Awareness during Wildfires, Florida, 2008

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OBJECTIVE

We used the syndromic surveillance system ESSENCE (Electronic Surveillance System for the Early Notification of Community-based Epidemics) to evaluate emergency room (ER) visits with respiratory related chief complaints in an area with decreased air quality associated with wildfires affecting South Florida, 2008.

BACKGROUND

By mid-May 2008, the State of Florida had 102 active wildfires affecting approximately 40,000 acres. In addition, the Mustang Corners Fire in Everglades National Park started on May 14 and burned throughout the month affecting another 40,000 acres of federal land. Smoke from several wildfires cast a haze over parts of south Florida, prompting the National Weather Service to issue a dense smoke advisory. The Governor declared a State of Emergency, the EOC was activated and ESF-8 requested that the Agency for Health Care Administration open a wildfire event in the Emergency Status System to track census and bed availability in the local hospitals.

METHODS

The time period for this analysis was 5/1/08 – 5/31/08, with a control period of 5/1/07 – 5/31/07. Three data sources were used, including; ER chief complaint data from 14 hospitals in Broward County (ESSENCE), air quality data from the Florida Department of Environmental Protection (PM2.5 $\mu g/m^3$), and smoke plume imaging maps from NOAA to determine the smoke location each day. ESSENCE automatically codes free text chief complaints into syndrome categories, and allows free text querying of chief complaint data. The system defined syndrome categories for respiratory illness, bronchitis, asthma, and cough were monitored. A free text query designed during the surveillance period to more specifically capture fire smoke related respiratory chief complaints, while also excluding words suggestive of infection, was developed. The regression and exponentially weighted moving average algorithms in ESSENCE were used to determine significant increases in daily counts for each of the syndromes/queries. Pearson's correlation coefficients were used to compare syndrome and free text query daily counts with average daily PM2.5($\mu g/m^3$) values. The ratio of observed counts per day to expected counts per day were calculated.

A nonparametric Mann-Whitney test compared the control (no fire period) ratios to the ratios during 6 days of alerts during the event.

RESULTS

The respiratory, bronchitis, and cough syndrome categories did not show statistically significant increases in daily ER visits during the month of May, and only cough was significantly correlated with daily PM2.5($\mu g/m^3$) measurements, $r^2=0.31$, $r^2=-0.02$, $r^2=0.43$ (p<0.05), respectively. The asthma category detected significant increases on 5 days during the event, and was better correlated with daily PM2.5($\mu g/m^3$), $r^2=0.54$ (p<0.01). The free text query showed significant daily increases on 6 days during the event, and was significantly correlated with daily PM2.5($\mu g/m^3$), $r^2=0.62$ (p<0.01). The ratio of observed to expected counts for the free text query during the 6 alerting days was 1.44, and 0.88 for the control period; Z=-3.75, p<0.01. Satellite smoke plume maps indicate fire smoke was impacting parts of Broward County to varying degrees from 5/12/08 to 5/19/08.

Free Text Query for Respiratory related ER Visits and PM 2.5 Daily Averages, Broward County, Florida, 2008
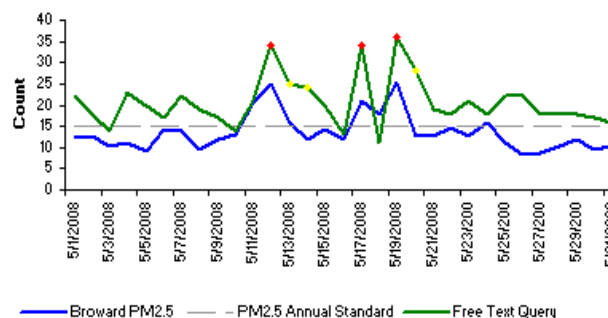
CONCLUSIONS

ESSENCE was able to detect increases in ER visits for respiratory related chief complaints during days when both PM2.5 and the presence of smoke were elevated. The refined free text query improved the detection of fire-related respiratory ER visits and correlated best with the PM2.5 data when compared with the predefined syndrome categories. ESSENCE is a useful tool to monitor ER visits during wildfire events and can be used to inform Incident Command with enhanced situational awareness of ER capacity during times of emergency response.