Monitoring Hospital Emergency Department Visits for Chief Complaints of Insect Bites after a Major Flood

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OBJECTIVE

This retrospective analysis of text fragments in emergency department chief complaints illustrates the usefulness of syndromic surveillance in providing timely situational awareness of insect prevalence in post-flood situations.

BACKGROUND

On August 20th and 21st, 2007, Ohio sustained heavy rains which resulted in severe flooding over a nine-county area in the north-central part of the state†. Increased hospital emergency department (ED) visits were expected for gastrointestinal illnesses, but this was not observed. After a media report on September 4, 2007 suggested swarms of mosquitoes were plaguing residents, ED character-specific data were analyzed to see if these data could confirm the report.

METHODS

Emergency department (ED) visit data, including chief complaints (CC), were downloaded from Ohio's syndromic surveillance system for the time period in which mosquitoes are prevalent in Ohio (early May through September). The data were merged, cleaned, organized, and selected using SAS 9.1 (SAS Institute Inc., Cary, NC). A "bug bite" syndrome category was developed that included any of the following character-specific matches in the CC: "MOSQ", "BUG BIT", and "INSECT". Matches included misspellings of mosquito and mosquitoes, tense differences in the CC (bug bites or bug biting), and insect(s). Bug bite CC of flood region residents were compared to bug bite CC among residents outside the flood region using a relative risk. A day-of-week corrected CuSum algorithm[1] was calculated to determine if increases in bug bite ED visits exceeded a threshold of two standard deviations above the predicted value.

RESULTS

An increased relative risk of 4.7 was found for bug bite CC for residents of the flood region compared to non-flood region residents of Ohio for the period from September 2-4, 2007. ED visits increased to statistically significant levels in the flood region on 9/1/2008 and the five subsequent days in the flood region (fig. 1)[1]. This is earlier and longer than the non-flood region, which was found to be statistically significant on only September 3-4, 2008 at two standard deviations.

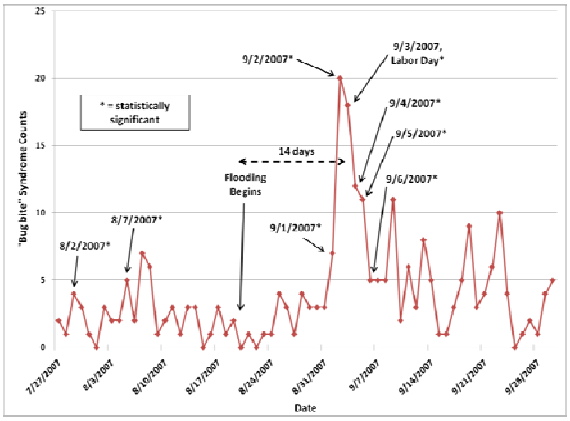

Figure 1 - Mosquito, Bug Bite, Insect Chief Complaints in the Flood Region†.

CONCLUSIONS

Specific CC text fragment searches of hospital ED visits may provide public health with a tool to track increases in insect biting levels either on an ongoing basis or after flooding. It should be noted that the first day of the peak falls approximately 14 days after the flood. This is relevant, as mosquitoes have life-cycles of 7-14 days in warmer climates[2]. This type of surveillance may be useful in areas that do not routinely conduct mosquito pool testing and/or for assistance in deciding whether or not to spray for mosquitoes or to issue public service announcements. Analysis of character-specific phrases in hospital ED visit data likely has applicability to monitoring other issues of public health importance.

REFERENCES

1. Burkom, Howard. Alerting Algorithms (mcWeeks.xls, workshopDataSets.xls). International Society for Disease Surveillance Conference, Seattle, WA. September 12, 2005.

2. West Umatilla Vector Control District. Mosquito Life Cycle. Online. Internet. 23 Jul. 2008. Available from: http://www.wuvcd.org/mosquito/lifecycle.html

† A federal disaster area was declared for the flooded counties of Allen, Crawford, Hancock, Hardin, Putnam, Richland, Seneca, Van Wert, and Wyandot.