

SURVEILLANCE OF WEST NILE VIRUS ACTIVITY USING BIOSENSE LABORATORY TEST ORDER DATA

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OBJECTIVE

To determine the feasibility of using BioSense laboratory test order data for West Nile disease surveillance in the United States

BACKGROUND

West Nile Virus (WNV) is a mosquito-borne virus that can cause meningitis and encephalitis. Since its discovery in New York City during an encephalitis outbreak in 1999, WNV has become endemic in North America. In the United States, 16,000 human WNV disease cases (including West Nile fever, meningitis, encephalitis, and unspecified clinical illness) and over 600 WNV-related deaths have been reported to the Centers for Disease Control (CDC) from 46 states. Perennial WNV epidemics occur during summer months, peaking during late August. BioSense Early Event Detection and Situation Awareness System receives daily laboratory test order data feed in HL7 from Laboratory Corporation of America (LabCorp). In this study, test orders were studied for their correlation with WNV activity.

METHODS

Five laboratory test orders were included. Three of them are WNV-specific laboratory test orders, including: West Nile virus antibody, cerebrospinal fluid (WNV-CSF); West Nile virus antibody, serum (WNV-Serum); and West Nile virus by real-time PCR (WNV-PCR). Two other lab tests for pathogens causing encephalomyelitis with similar symptoms to WNV, Enterovirus by real-time PCR (Entero-PCR) and Herpes Simplex virus Type I/II DNA by PCR (Herpes-PCR) were also included for comparison. Data were analyzed from 12/01/2003 to 4/10/2005. Each record in our data represented one submitted specimen, not necessarily one unique patient, due to lack of patient linkage capability in our dataset. A geographic analysis was performed to show the distribution of three WNV laboratory test orders. ICD-9 codes for order reasons associated with WNV laboratory test orders were summarized.

RESULTS

In the study period, there were a total of 14,330 orders for WNV-Serum, 1,542 for WNV-CSF, 655 for WNV-PCR, 2,594 for Entero-PCR, and 10,663 for Herpes-PCR. Top five states with counts of three WNV-specific laboratory test orders were Kansas

(1,582), Texas (1,493), Arizona (1,452), Colorado (1,135), and Minnesota (840). From a total of 16 ICD-9 codes associated with WNV laboratory test orders, three were identified as possible WNV disease presentation: 780.79 (Malaise and fatigue NEC), 28.63%; 780.6 (Fever), 10.80%; and 784.0 (Headache), 7.38%. Examination of daily count plots of five laboratory test orders revealed that WNV-Serum was the most abundant and increased from April, 2004, peaked in August, 2004 (figure 1). Note that a decline in LabCorp data availability was identified in the period from 5/18 - 6/1/2004 due to data transmission problem. The maximal daily count for WNV-Serum was 180 test orders on 8/30/2004. Although on a smaller number, WNV-CSF, WNV-PCR, and Entero-PCR showed trends similar to WNV-serum test orders. Herpes-PCR lacked such temporal variation. There was a similar seasonal pattern in the currently available CDC summary of 2003 WNV nationally reported human cases, which peaked in August 2003.

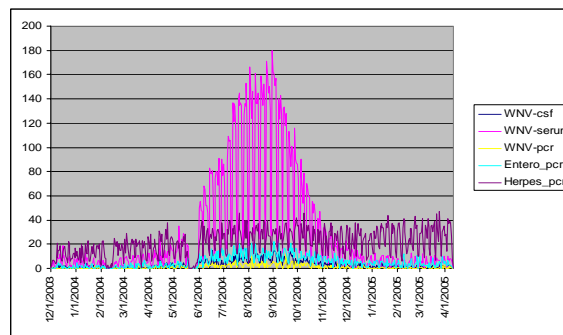


Figure 1 – Daily LabCorp counts of five laboratory test orders selected - 12/1/2003 to 4/10/2005.

CONCLUSIONS

Laboratory test orders have potential be used as supplementary indicators for West Nile surveillance. The automated data transmission in BioSense will improve timeliness without adding much cost in human resources.

REFERENCES

[1] O'Leary DR, Marfin AA, Montgomery SP, et al. The epidemic of West Nile virus in the United States, 2002. *Vector Borne Zoonotic Dis* 2004;4:61–9.

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