Female *Aedes aegypti* mosquito

## Lessons Learned

- *Syndromic surveillance can be used to identify cases of arboviral disease.* This case illustrates that arboviral disease records may be identifiable in the syndromic surveillance data *before* laboratories or healthcare providers are required to report.

- *Syndromic surveillance can improve situational awareness of arboviral diseases.* Syndromic surveillance best serves as part of an integrated approach to surveillance. In the absence of other surveillance, such as mosquito surveillance, syndromic data may be useful.

# Syndromic Surveillance for Arboviral Diseases in Arizona

## Public Health Problem

Arizona reports an average of 116 cases of West Nile virus (WNV) each year, and in 2015, Arizona saw a reemergence of St. Louis encephalitis (SLE) virus. In addition, Arizona is at risk for importation of viruses such as chikungunya, dengue, and Zika due to an abundance of *Aedes aegypti* mosquitoes in many parts of the state. Rapid identification of potential cases of arboviral disease (borne by mosquitoes and ticks) is critical to implementing appropriate public health responses. These include mosquito surveillance and control to eliminate infected mosquitoes and education about mosquito avoidance to prevent further transmission during the viremic period, when people are either symptomatic or asymptomatic and can transmit the virus.

## Actions Taken

In 2015, Arizona's BioSense Exploratory Analysis Subgroup, which includes representatives from the Arizona Department of Health Services (ADHS) and seven Arizona counties, collaborated to develop a query and standard procedure for identifying potential arboviral disease cases by using the National Syndromic Surveillance Program's (NSSP) BioSense Platform. In Arizona, syndromic surveillance data contains emergency department and inpatient hospital records, including chief complaint (CC) and discharge diagnosis (DD) fields. The arboviral query identifies keywords and ICD-9-CM and ICD-10-CM diagnosis codes for chikungunya, dengue, SLE, WNV, and Zika in the combined "CC and DD" field. The query results are monitored by ADHS twice a week during the primary WNV season and once a week during the rest of the year, and ADHS staff notifies the county health departments when a record is identified for their jurisdiction. County investigators can use a "Case Investigation Decision Tree," which is part of the standard protocol, to determine if the record is "High," "Low," or "No" priority for follow-up.

Records are classified based on a diagnosis of an arboviral disease, mention of symptoms consistent with arboviral disease (fever, rash, muscle/joint pain, encephalitis, etc.), or other indicators of increased risk. High-priority cases are investigated, and low-priority cases may be investigated as resources allow. Investigators are able to use information in the syndromic data (such as date of birth, medical record number, date of service, facility name, etc.) to search for the cases in Arizona's Medical Electronic Disease Surveillance Intelligence System (MEDSIS) database. If the case is identified in the surveillance database, then that case was already reported, and public health actions may be taken. If the record is not identified, investigators can obtain medical records from the facility. If appropriate, the case is then entered into MEDSIS and is flagged as having been first identified through syndromic surveillance.

In July 2017, ADHS notified the Maricopa County Department of Public Health (MCDPH) of a record identified by the syndromic surveillance query. MCDPH investigators evaluated the record and determined it was high priority based on the presence of a WNV ICD-10-CM diagnosis code. MCDPH obtained medical records, which further supported this was a true case of WNV. At the time the case was identified in the syndromic surveillance system, the case had not been reported through any other mechanism, although the case was reported through two additional channels (self-report and laboratory report) later in the same day.

## Outcome

While syndromic surveillance for arboviral diseases has been in use in Arizona since 2015, this identification of a neuroinvasive WNV case was the first example of syndromic surveillance being the *first method of detection*. A diagnosis by a healthcare provider or positive laboratory result for chikungunya, dengue, SLE, or WNV must be reported within 5 working days, and Zika virus must be reported within 24 hours as an emerging or exotic disease per Arizona Administrative Code (A.A.C. R9-6-204). The syndromic surveillance query identified this WNV case on the third day after a positive laboratory test and several hours before additional reports were received. Notification of this case allowed public health to implement mosquito control actions, potentially preventing additional cases of WNV from the infected mosquitoes in the area.

> IN THIS CASE, SYS WAS THE FIRST METHOD OF DETECTION.

Prior to this case, Arizona's arboviral syndromic surveillance query and protocol had not identified any cases earlier than traditional surveillance reporting. This case illustrates that arboviral disease records may be identifiable in the syndromic surveillance data before laboratories or healthcare providers are required to report.

MCDPH is currently evaluating results of the syndromic surveillance protocol from August 2015 through December 2016 (before transition to ESSENCE). The evaluation will analyze how many records identified by the query were true cases of disease, how many of the true cases reported in Maricopa County were identified in the syndromic surveillance database at any point, and the timeliness of syndromic surveillance compared with traditional surveillance. It is possible that more frequent monitoring of the syndromic surveillance query could identify additional cases before traditional surveillance reporting. Ultimately, rapid detection of potential cases of arboviral disease is imperative to facilitate appropriate and timely public health interventions.

## Contacts

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**This success story shows how NSSP:**
    Improves Data Representativeness
✓ Improves Data Quality, Timeliness, and Use
✓ Strengthens Syndromic Surveillance Practice
✓ Informs Public Health Action or Response