

Background

- Harris County has a population of over 4.3 million people, and 2.1 million are under the jurisdiction of HCPHES
- West Nile Virus (WNV) and Saint Louis Encephalitis (SLE) are endemic to the area
- While ~80% of those infected are asymptomatic¹, WNV and SLE can cause severe and debilitating symptoms
- Between 2010-2014, HCPHES received 295 arbovirus reports leading to 133 WNV, 4 SLE, and 2 unspecified flavivirus cases

Objectives

Surveillance System

- Monitor morbidity and mortality due to arboviruses
- Detect outbreaks
- Identify geospatial patterns and changes over time
- Recognize distribution of cases vs mosquitoes
- Inform control and prevention efforts

Evaluation

- Evaluate the HCPHES WNV and SLE surveillance system during 2010-2014
- Examine utility of the data for outbreak detection
- Recognize strengths and weaknesses in system
- Determine timeliness for each step
- Establish if set goals are met
- Identify where improvements can be made

Methods

Used the CDC recommendations in the Updated Guidelines for Evaluating Public Health Surveillance Systems.²

Simplicity

Assessed using system map and investigation factors

Data Quality

Completeness measured as the proportion of missing or unknown responses for essential variables

Timeliness

Measured by calculating median times between important investigation steps and determining the percent of the investigations that meet the pre-defined goals

Representativeness

Annual crude rates of HCPHES cases were compared to rates in Texas and the United States

Control Measures

A standard arbovirus season of 162 days was created using the earliest and latest infection dates of all cases. Daily rate was calculated by dividing cases infected before and after aerial spraying by the number of days before and after, respectively. Predicted cases was computed by applying the pre-spray rate to the remainder of the season.

Results

Importance

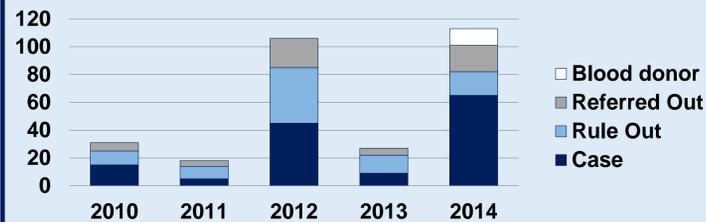


Figure 1. Arbovirus report outcomes revealing 2012 and 2014 as outbreak years

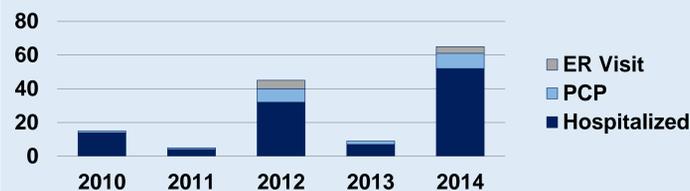


Figure 2. Form of healthcare sought by arbovirus cases depicting the annual burden on the healthcare system

Simplicity

Surveillance for arboviruses is complex and requires more than surveillance for other diseases. Complexity combined with delays in the investigation can yield lengthy investigations.

The items required for complete investigations include:

- Patient interviews
- Medical records
- Initial lab results
- Confirmatory lab results with specimen retrieval
- Two surveillance forms

Data Quality

The data quality of the arbovirus system is generally accurate and robust because it goes through numerous quality assurance checkpoints. Race and ethnicity are often more difficult to obtain; however, having only one can still reveal important information about the individual.

Variable	N	Missing	% Missing
Last Name	139	0	0.00%
First Name	139	0	0.00%
Address	139	0	0.00%
DOB	139	0	0.00%
Sex	139	0	0.00%
Reported By	139	0	0.00%
Confirmation Method*	51	2	3.92%
Upload Date†	70	0	0.00%
Onset Date	139	2	1.44%
Missing Race/Ethnicity	139	11	7.91%
Only Missing Ethnicity	139	30	21.58%
Only Missing Race	139	13	9.35%

Table 1. Data completeness for arbovirus cases, 2010-2014

*Confirmation method only required for probable cases

†Includes only cases from 2013-2014

Timeliness

From	To	N	Median	Max days	Within 7
Onset	Reported	290	8	93	45.86%
Collection	Reported	286	5	93	76.92%

Table 2. Assessment of reporting promptness using dates of onset and collection as potential first suspected dates and the 7 day reporting requirement set by DSHS

Year	Cases		Rule Outs		Max Days Open	Within 30 Days
	N	Median	N	Median		
2010	15	9	10	7.5	198	84.00%
2011	5	7	9	11	29	100.00%
2012	45	10	40	5.5	54	95.29%
2013	9	10	13	18	66	90.91%
2014	65	14	17	6	49	90.24%
Overall	139	12	89	7	198	92.07%

Table 3. Analysis of days to close investigations by year

From	To	N	Median Days	Max Days	Within 7
Completed	Case Upload*	72	7	40	58.33%

Table 4. Examination of case review process length

* Date available starting in 2013

From	To	N	Median Days	Min	Max	Within 30
Reported	Final Item Sent to DSHS	157	32	5	227	48.41%

Table 5. Timeliness of entire process at the local level

Representativeness



Figure 3. HCPHES annual case rate trends typically follow what is seen throughout Texas and the United States with some notable differences in outbreak years

Control Measures

Year	2011	2012	2014
Total Cases	4	45	65
Spray Date	8/17/2011	8/22/2012	8/7/2014
% Into Season	51.23%	54.32%	45.06%
Pre-spray Daily Rate	0.04	0.43	0.67
Post-spray Daily Rate	0.01	0.09	0.18
% Change	-64.98%	-78.09%	-73.22%
Predicted Post-spray Cases	2.86	31.95	59.74
Cases Prevented	1.86	24.95	43.74

Table 6. Analysis of aerial sprays used between 2010-2014 shows a drastic reduction in the case rate after the spray and substantial potential case prevention

Conclusions

- Strong arbovirus surveillance is important to prevent morbidity and mortality in Harris County residents
- The system produces robust data in a manner that meets quality and timeliness goals
- Investigations are complex and require a substantial amount of time at every step
- Arbovirus data can be used to inform control measures

Recommendations

- Evaluate timeliness annually to ensure improvements and quickly discover issues
- Update the surveillance system to collect laboratory information
- Improve collection of data for race and ethnicity of cases
- Increase collaboration with Mosquito Control

Limitations

- Due to the high proportion of asymptomatic cases, the true incidence of arbovirus infections can never be known
- Many timeliness issues are out of the control of the Epidemiology program and would be difficult to improve

Acknowledgement

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References

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- German, R. R., et al. (2001). Updated guidelines for evaluating public health surveillance systems: recommendations from the Guidelines Working Group. *MMWR Recomm Rep*, 50(RR-13), 1-35.

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