APHL Position Statement

Sustaining US Public Health Laboratory Capacity for Mosquito-borne Disease Testing

A. Statement of Position

Public health laboratories (PHLs) must maintain high quality testing capacity to effectively detect and respond to emerging and endemic mosquito-borne diseases relevant to their jurisdiction

B. Scope

The Association of Public Health Laboratories (APHL) acknowledges that there are important vector-borne diseases beyond those spread by mosquitos. However, since the spread of disease through different vectors would most likely require different laboratory capabilities and capacities and a different surveillance system, APHL has chosen to focus on mosquito-borne diseases only for this particular position statement.

C. Implementation

1. APHL will communicate the importance of mosquito-borne disease testing in PHLs to key federal and other policy makers.
2. APHL will encourage PHLs to explore partnerships with clinical, public health, and commercial laboratories to ensure that arboviral testing and surveillance needs of all populations are met during outbreak and non-outbreak situations.
3. APHL will continue to collaborate with the Centers for Disease Control and Prevention (CDC) to ensure CDC-supplied testing reagents, technical assistance, and training for the mosquito-borne assays are available to PHLs.
4. APHL will support the evaluation and implementation of new testing and reporting methodologies that improve accuracy and timeliness of test results for either diagnosis or surveillance.
5. APHL will work with CDC, Council for State and Territorial Epidemiologists (CSTE) and other relevant partners to define the appropriate level of laboratory capacity at the national, state, and local levels to test for mosquito-borne diseases to meet surveillance requirements.

D. Background/Data Supporting

In recent years the US has been confronted with a series of unpredictable mosquito-borne diseases including those caused by the Zika, dengue and chikungunya viruses. Mosquito-borne diseases are transmitted through a bite from an infected mosquito and can be especially unpredictable and emergent due to the ubiquity of mosquitoes as a vector. The threat continues with a yellow fever outbreak in Brazil as of March 2017, and the emergence of Mayaro virus in the Caribbean region in November of 2016.[1] The responses to these and future outbreaks will rely on PHLs' ability to rapidly implement testing that provides accurate identification of the presence of the

disease in particular areas and diagnosis of individuals infected with these novel illnesses.

Although they garner far less attention, PHLs are also relied on to detect the presence of less common endemic mosquito-borne diseases (e.g. Eastern equine encephalitis) that cause severe symptoms or even death. A public health system that is adequately prepared to respond to the next mosquito-borne disease threat, requires PHLs with the infrastructure and resources necessary to surveil, detect and respond to both endemic and emerging diseases. CDC has called for improved response to mosquito-borne diseases including a strengthened laboratory system able to "identify and mobilize for action against existing and emerging threats."[2] For the public health system to accurately reflect trends of mosquito-borne disease activity over time and respond to threatening or unusual events, the underlying capacity to consistently collect accurate laboratory data must be sustained.

Currently, PHLs provide mosquito-borne disease testing using infrastructure including staff, equipment and expertise that was largely built in response to the introduction of West Nile virus (WNV) to the US in 1999. Federal dollars supported the development of a national arbovirus surveillance infrastructure, led by CDC that relies on a system of distributed testing and data collection in state and local public health departments. These data contributed to knowledge of vector populations and the arbovirus activity in those vectors, animal and human hosts, which in turn guided public health action (i.e., local mosquito control programs, assessments of disease risks, educational messaging). CDC acknowledges that this system requires laboratories with the ability to identify current and past mosquito-borne disease infection in human, mosquito and animal hosts.[2]

By 2004, the federal support that was disseminated to all 50 states and 6 of the largest local health departments (3) enhanced mosquito-borne laboratory testing capacity and supported the establishment of a network of PHLs prepared to rapidly implement or scale up testing when needed to respond to emerging threats. For those emerging arboviral diseases, CDC was able to deploy assay protocols and specific reagents to this laboratory network. This laboratory network approach also facilitated rapid communication of unusual events (e.g., changes in arbovirus activity, detections of novel or introduced arboviral pathogens) detected at the state or local level.

From its peak in 2004, federal annual funding declined 61% by 2012,[4] the same year the US experienced its highest incidence of WNV neuroinvasive disease in almost a decade and the highest WNV-related mortality ever recorded. Also, between 2004 and 2012, dengue and chikungunya viruses spread to the Americas, and by 2015, Zika virus explosively spread to this region. Evidence of local transmission of each of these exotic viruses has been detected within the continental US.

Over this same time period, state and local public health programs experienced the deterioration of their arbovirus surveillance capabilities. Formal assessments of the capacity of these arbovirus surveillance systems in 2012 revealed that most health departments had experienced decreased capacity in all areas of mosquito, human, and animal surveillance systems. While most state health departments maintained molecular testing (e.g., PCR) for WNV, many fewer laboratories maintained serology testing for WNV and most departments had no systematic disease-based surveillance for arboviruses other than WNV.

Endemic and emerging infectious disease threats are unpredictable. After years of steady disease activity, there was a spike of WNV disease and associated deaths in 2012 leading to increased demand on public health for testing and response. The Brazilian Zika outbreak, which precipitated a greater awareness of the disease as it spread through the Americas, highlighted an

an alarming trend of Zika infection occurring during pregnancy and an increase in babies born with neurological disorders and congenital abnormalities. Maintaining rigorous laboratory-based surveillance of endemic and emerging mosquito-borne diseases, not only increases the ability to detect early signs of an outbreak, but also increases the likelihood of detecting a novel disease, making early public health intervention and timely communication of accurate information to the public possible.

E. References

1. Lednicky, J., De Rochars, V., Elbadry, M., Loeb, J., Telisma, T., Chavannes, S....Morris, J. (2016). Mayaro Virus in Child with Acute Febrile Illness, Haiti, 2015. *Emerging Infectious Diseases*, *22* (11), 2000-2002. Retrieved March 22, 2017 from: https://dx.doi.org/10.3201/eid2211.161015.

2. Centers for Disease Control, National Center for Emerging and Zoonotic Infectious Diseases (2017). Improving the national response to vector-borne diseases.

3. Centers for Disease Control. National capacity for surveillance, prevention, and control of West Nile Virus and other arbovirus infections—United States, 2004 and 2012. MMWR 2014;63:281–4. Retrieved March 22, 2017 from: https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6313a2.htm.

4. Hadler, J. L., Patel, D., Nasci, R. S., Petersen, L. R., Hughes, J. M., Bradley, K....Engel, J. (2015). Assessment of Arbovirus Surveillance 13 Years after Introduction of West Nile Virus, United States. *Emerging Infectious Diseases*, *21*(7), 1159-1166. Retrieved March 22, 2017 from: https://dx.doi.org/10.3201/eid2107.140858.

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