Dengue Epidemiology in Valencia, Venezuela 2010: Improving Disease Surveillance through Interinstitutional Collaboration

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Introduction

Dengue represents a great global health challenge. Nearly 2.5 billion people worldwide live in areas of risk with an estimate of 100 million cases annually. Dengue, a flavivirus, circulates as four distinct serotypes transmitted by the mosquito vector, Aedes aegypti and Aedes albopictus, and principally affects subtropical regions. In the Americas, the campaign to eradicate the vector by the Panamerican Health Organization (PAHO) in the sixties resulted in the interruption of dengue transmission. Nevertheless, urbanization and the expansion of the vector instigated a resurgence of dengue in the region over recent decades. The first epidemic of dengue hemorrhagic fever in Venezuela occurred in 1969 with more than 6,000 cases and 73 deaths. Recently, the incidence rate was 138 cases per 100,000 inhabitants, 7.5% of which were hemorrhagic, in the year 2007.

The vector transmission of dengue requires preventive measures and analysis of strategies to reduce the incidence and the burden of disease. Urbanization, migration, and climate change contribute to the spread of the disease. The Municipality of Naguanagua in Carabobo, Venezuela, experienced a boom in population growth. Consequently, there is great need to characterize the population at risk as well as the actual burden of disease with the objective of combating dengue in the municipality. Epidemiologic surveillance is crucial in this process.

Materials and Methods

This epidemiologic profile of dengue in the Municipality of Naguanagua 2010 arises from the database constructed by the Department of Epidemiology from the Ministry of Health and Social Development of the province of Carabobo. The surveillance and subsequent evaluation of the surveillance system were part of a public health internship and collaboration between the University of Carabobo, Oregon Health & Science University, and INSALUD, the governmental public health authority in Carabobo.

Epidemiologic Profile of Dengue in Naguanagua

The epidemiologic profile of dengue in Naguanagua 2010 demonstrates that dengue disproportionately affects children under the age of fifteen. Infants less than one-year-old had the highest incidence rate of 679.3 cases per 100,000 infants, followed by an incidence rate of 580 cases per 100,000 children between five and fourteen-years-old in the year 2010.

A comparison between children less than fifteen-years-old and all children and adults over fifteen-years of age showed a relative risk of 2.66 (95%CI 2.44-2.90).

Evaluation of the Dengue Surveillance System in Naguanagua

Sensitivity

The sensitivity of the dengue surveillance system in Naguanagua depends on both the ability to detect outbreaks and the proportion of cases notified compared to the total number of cases in the community. The endemic channel created by the Department of Epidemiology exemplifies this tool to detect outbreaks and guide the necessary actions in an essential goal of the surveillance system. Nevertheless, a passive surveillance system, such as that in the Municipality of Naguanagua, inherently introduces difficulties with respect to the sensitivity and underreporting, estimated between one case reported for every three to five actual cases of dengue.

Timeliness

The average time between the onset of symptoms and the notification of cases in Naguanagua in 2010 was 8.3 days. The epidemic phase is within the first five days of febrile, indicating that much of the vector control occurs after the patient passes the phase of transmission.

Simplicity

Data Quality

Representativeness

Flexibility

Endemic Channel of Confirmed Dengue Cases in Naguanagua

The Organization of Social Networks (or Barrio Networks) in the Municipality of Naguanagua

INSALUD uses an endemic channel in order to guide public health action in the municipality. This represents the number of dengue cases for each endemic channel week over the past seven years. Based on the number of standard deviations above the average number of cases, public health officials discern whether the current situation is safe (<1SD), on alert (1-2SD) or an epidemic (>2SD).

The Strategy of Integrated Management demonstrates the complexity of the various components comprising the dengue surveillance system.

Utility of the System

Early detection of epidemics, measurement of the burden of dengue in Naguanagua, the evaluation of prevention programs and the allocation of resources are the four principal objectives of a dengue surveillance system as established by WHO. In Naguanagua, the system focuses on the first objective, to detect cases and execute intervention for vector control in order to prevent additional cases, which supports its utility. The measurement of disease burden represents a challenge, especially with respect to the possible implementation of a vaccine on the horizon.

Discussion

Establish Alliances with the University of Carabobo

Studies are needed to improve sensitivity in the measurement of true disease burden, which is crucial for the introduction of a potential vaccine in the future. Partnerships with local universities, in both Venezuela and other dengue endemic countries, would serve this public health need of the community. The University of Carabobo in Venezuela is currently revising its curriculum to include additional public health field experiences to enhance the training of its health care professionals, an innovative strategy to overcome limited local resources to address the global health challenge of dengue and other diseases.

References


Acknowledgments

IDSA RRF Medical Scholar Program
OHSU Tartar Trust Fellowship
OHSU Global Health Center Travel Scholarship
Professor Mirna Stamare, Dr. Kevin Wontzep, Dr. Carmen Garcia, Dr. Trisbay Hurtado


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