Dengue Collaborating Center Activities
Centers for Disease Control and Prevention
Dengue Branch
San Juan, Puerto Rico

State of the Art: Prevention and Control of Dengue in the Americas
PAHO Washington DC
May 28-29, 2014

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Dengue Branch Staff

• Epidemiology Activity
  – Epidemiologists – MD, PhD
  – Nurse epidemiologist
  – MPH research associates
  – Statistician
  – Postgraduate fellows

• Immunodiagnostics Laboratory
  – Virologists (PhD)
  – Diagnostics technicians
  – Postgraduate fellows

• Molecular Diagnostics Laboratory
  – Molecular virologists (PhD)
  – Diagnostic technicians
  – Postgraduate fellows

• Entomology and Ecology Activity
  – Entomologist (PhD)
  – Entomologists (MS)
  – Field biologists
  – Postgraduate fellows

• Public Health Management Activity
  – Public Health Advisor
  – Computer programmers
  – IT support technicians

• Communications Unit
  – Health educators – MS
  – Psychologist
Resources

- Funding primarily from CDC budget process as part of Division of Vector Borne Diseases budget
- In-kind support of activities, including travel and postgraduate students
- Outbreak response activities supported through CDC’s Emergency Operations Center (EOC)
Terms of Reference - I

• TOR 1: DENV strain collection
• TOR 2: Diagnostic testing proficiency and quality assurance - provide characterized materials
• TOR 3: Evaluate dengue diagnostic tests - commercial or laboratory developed
• TOR 4: Provide technical information on dengue
• TOR 5: Conduct training in research and applications - laboratory, epidemiologic, entomologic and vector control
• TOR 6: Outbreak response and investigation
• TOR 7: Conduct research
Tools for Dengue Prevention and Control

- Integrated Vector Control
- Vaccines
- Case Management
- Diagnostics
- Surveillance Education

Primary Prevention
Secondary Prevention
Data Sources for CDC Dengue Program

Sentinel Surveillance
Sentinel Enhanced Dengue Surveillance System (SEDSS)

Passive Surveillance
PR Passive Dengue Surveillance System (PDSS)

vaccine effectiveness
participatory surveillance
Outbreak Responses
descriptive epidemiology
economic/burden of disease
vector control
clinical management
diagnostics
analytic epidemiology
What is Happening in our Program Areas
Vector Control and Ecology
CDC Autocidal Gravid Ovitrap (AGO trap)

Advantages

- Comparable to BG traps
- Lower cost
- Lower maintenance
- No pesticides
Evaluation of AGO Traps

Autocidal Sticky Gravid Ovitraps

— Surveillance tool
  • comparable to BG traps, less expensive easier to use

— Control tool
  • Shown to reduce vector density in field studies
  • Demonstrate effectiveness in long-term studies
Dengue Vaccines: Preparing for Evaluation Effectiveness
Dengue Epidemiology
A Challenge to Vaccine Evaluation

- Dengue is an acute febrile illness (AFI) syndrome
  - Only defined by diagnostic testing
  - Other AFI’s in dengue endemic areas: malaria, influenza, leptospirosis, melioidosis, hepatitis A

- Incidence: high endemic + cyclical epidemics

- Highly seasonal

- Several circulating virus types (serotypes)

- Peak age of incidence varies by region

- Safety - severe dengue is natural progression of disease

Puerto Rico Dengue Surveillance to Evaluate Vaccines and Vector Control

- Passive Dengue Surveillance System (PDSS)
- Sentinel Enhanced Dengue Surveillance System (SEDSS)
- Enhanced Fatal Dengue Case Surveillance

No single surveillance system can answer all the questions about dengue
Dengue Diagnostics
Dengue Diagnostic

Acute (febrile) Phase

PCR (DENV RNA)

NS1 antigen detection (immunoassay)

IgM anti-DENV

Incubation Period

Days Post Onset of Fever
Diagnostics Activities

• Member of RELDA

• Dengue Diagnostic Testing Workshops
  – 2013 – two workshops for public and private sector
  – 2014 – PAHO-CDC workshop for RELDA members

• Molecular epidemiology of DENV

• Improved NS1 antigen detection immunoassay

• Prognostic tests for severe dengue
Identification of DENV Strains Before and After Reformulation of DENV-1-4 RT-PCR Assay

Phylogenetic analysis of current strains

Adapted from: Santiago et al. PlosNTD 2013; 7: e2311
Dengue Clinical Case Management
Dengue Clinical Case Management Course

- 2009-2010: classroom course taught in PR to all licensed physicians - 4 CME credits based on 2009 WHO Dengue Guidelines

Course Content
- Clinical and laboratory diagnosis of dengue, including differential diagnosis
- How to recognize stages of dengue, warning signs of severe dengue, and understand mechanisms of dengue pathogenesis
- How to monitor patients and best practices in fluid management
- Epidemiology of dengue, and dengue prevention and control

Dengue Clinical Case Management Course

**CME version:**
- 4 CME AMA PRA Category 1 credits for physicians / 0.4 CEU ANSI/IACET credits for non-physicians
- **Course link:**
  [https://cdc.train.org/DesktopModules/eLearning/CourseDetails/CourseDetailsForm.aspx?courseId=1047604](https://cdc.train.org/DesktopModules/eLearning/CourseDetails/CourseDetailsForm.aspx?courseId=1047604)

**Non-CME version:**
- For U.S. and international healthcare providers who would like to learn about dengue but do not need U.S. CME
- **Course link:**
Dengue Surveillance
Surveillance

- Transition of PDSS to Puerto Rico Department of Health
- Sentinel Enhanced Dengue Surveillance System (SEDSS) funded through Cooperative Agreement
- Development and validation of serologic approaches for surveillance for incident DENV infections
- Validation of participatory surveillance for AFI / dengue
- Developed and validated methodology for enhanced surveillance for fatal dengue
Epidemic Aid Responses

- Federated States of Micronesia – (2012 -13)
- Leogone, Haiti (2013)
- St. Croix, Virgin Islands (2013)
- Luanda, Angola (2013)
- Mombasa, Kenya (2013)
- Dar es Salaam, Tanzania (2013)
- Fiji (2014)
CDC Dengue Branch