DengueNet[1] – WHO's Internet-based System for Global Surveillance of Dengue Fever and Dengue Haemorrhagic Fever (Dengue/DHF) http://www.who.int/denguenet

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Dengue/DHF – global public health burden

The geographical spread of both the mosquito vectors and the viruses over the past 25 years has led to the global resurgence of epidemic dengue fever/dengue haemorrhagic fever (dengue/DHF), with the development of hyperendemicity in most urban centres in the tropics. Globally, 2.5 billion people live in areas where dengue viruses can be transmitted. Before 1970, only nine countries had experienced epidemic DHF; now the number has increased more than fourfold and continues to rise. In an unprecedented pandemic in 1998, 1.2 million cases of dengue fever and DHF were reported to WHO from 56 countries. Data for 2001-2002 indicate a comparable situation. It is estimated that 50 million dengue infections occur each year, with 500,000 cases of DHF and at least 12,000 deaths, mainly among children. Only a small proportion of cases are reported to WHO. The challenge for national and international health agencies is to reverse the trend of increased epidemic dengue activity and increased DHF incidence.

Rationale for global surveillance of dengue/DHF

Epidemiological and laboratory-based surveillance is required to monitor and guide dengue/DHF prevention and control programmes, regardless of whether control takes the form of mosquito control or possible vaccination if an effective and safe vaccine becomes available. The surveillance system should monitor dengue virus to show, at any point in time, where dengue transmission is occurring, what serotypes are involved, and what type of illness is associated with those serotypes. Case reports should be transmitted from the local level to the state/provincial and then national level, and from there to WHO for international reporting and use. However, the reporting of dengue/DHF is not standardized. Epidemiological and laboratory data are often collected by different institutions and

1 DengueNet has been developed in collaboration with the WHO Collaborating Centre for Electronic Disease Surveillance at the Institute national de la Sant et de lan Recherche mdicale, INSERM Paris, France

reported in different formats, resulting in delay and comparability problems at regional and international levels. To address these problems WHO has created DengueNet.

The DengueNet system responds to the WHO resolution on dengue fever/DHF prevention and control adopted at the 55th World Health Assembly in May 2002, asking Member States "to build and strengthen the capacity of health systems for surveillance, prevention, control and management of dengue and DHF", and emphasizing the critical importance of strengthening laboratory diagnosis in affected countries. It is in line with the principles developed by PAHO for epidemiological and laboratory surveillance of dengue/DHF in the Americas, as outlined in resolution CD43.R4 and working document CD43/12, adopted by the PAHO Directive Council in September 2001.

DengueNet – WHO's Internet-based system for global surveillance of dengue/DHF

WHO has created DengueNet as a central data management system to:

(1) collect and analyse standardized epidemiological and virological data in a timely manner, and to present epidemiological trends, as soon as new data are entered;

(2) display in real-time important indicators such as incidence data, case-fatality rates (CFR) for DHF, frequency and distribution of dengue and DHF cases, number of deaths, and distribution of circulating dengue virus serotypes, and

(3) provide both historical and real-time data.

The main features of this Internet-based surveillance tool are:

(1) password-protected capability for remote data entry by all DengueNet partners worldwide, with data updated on a real-time basis;

(2) inclusion of the state/province subdivisions of the countries for which data will be entered and indicators (such as incidence) calculated;

(3) dynamic query facility with analysis and presentation of data in graphic, tabular, map and free-text formats;

(4) use of GIS tools to provide a real-time map of the epidemiological situation;

(5) links to the dengue web pages of WHO offices, countries, collaborating centers, and research and medical institutions working worldwide on dengue/DHF prevention and control;

(6) an up-to-date directory of national and international partners in the DengueNet network;

At present, global dengue statistics from 1955 to 2001 can be accessed on DengueNet. As countries begin entering data into DengueNet, real-time updates of standardized epidemiological and virological

data will become available, when DengueNet is fully implemented, public health authorities and the general public will have immediate access to epidemiological data on dengue, DHF cases and deaths, based on standardized case definitions, and virological data on the circulating dengue virus serotypes 1, 2, 3 and 4 that have been entered into the DengueNet database via the Internet directly by the national health officials.

DengueNet will provide national and international public health authorities with epidemiological and virological information, by place and time, to guide public health prevention and control actions. Monitoring virus transmission and circulating serotypes by place and time in the inter-epidemic periods will provide early warning of dengue activity in neighbouring states/countries and help in the planning of prevention or control strategies. This is particularly important in the Region of the Americas, which is characterized by unstable dengue epidemic activity with emerging DHF cases.

The system also provides CFR information by place and time, and this can be used effectively to target training to countries and regions that need to improve hospital-based DHF case management to reduce CFR. This is particularly important in South-East Asia, where all four dengue viruses are endemic and DHF cases occur year after year; CFR are used to monitor progress in hospital case management and public education campaigns.

In addition, DengueNet contains valuable historical and current data that may be useful for public health researchers to support their research and for national and international agencies for advocacy purposes.

A key objective is to ensure that data of the highest possible quality are reported in a timely manner to DengueNet. This necessitates standards for surveillance, laboratory procedures and quality control supported by a strong partnership between the network partners involved, including national programmes, WHO collaborating centres and WHO country, regional and global levels.

DengueNet implementation

The first meeting on DengueNet implementation in the Americas was held on 9-11 July 2002 in Puerto Rico.[2] The specific objective was to launch pilot testing by building on the existing reporting systems and the network of dengue laboratories in the Americas.

Purpose and objective

Forty participants[3] (surveillance epidemiologists and laboratory specialists) from 15 countries participated in this first meeting on implementation of DengueNet. The overall objective was to describe and demonstrate DengueNet to prospective users and to

2 This meeting was organized by the WHO Department of Communicable Disease Surveillance and Response, Global Alert and Response, jointly with the PAHO Division of Communicable Disease Prevention and Control and the WHO Collaborating Centre for Dengue Reference and Research at the Dengue Branch of the Division of Vector-Borne Infectious Diseases, US Centers for Disease Control and Prevention.

3 National programmes from Brazil, el Salvador, French Guyana, Guatemala, Mexico, Nicaragua, Puerto Rico, Venezuela; CAREC (Trinidad and Tobago), the subregional surveillance network for 20 island countries in the Americas; WHO Collaborating Centres and research institutions in Argentina, Brazil, Canada, Cuba, United States; participants from Indonesia, Thailand, and Viet Nam who will assist WHO in organizing a DengueNet meeting in 2003 for high-burden countries in South-East Asia and the Western Pacific; WHO/HQ, PAHO and WHO/PAHO Country Offices in Brazil and Nicaragua.

develop a framework for DengueNet implementation with emphasis on quality of data entered and the active participation of national programmes. Technical discussion focused on (1) the challenge of and need for global epidemiological and laboratory surveillance of dengue and DHF; (2) national epidemiology and laboratory capacities in participating countries in the Americas; (3) presentation of DengueNet and a "hands-on" session with the Internet site. Two working groups were convened. The first defined the epidemiological data and reporting requirements for DengueNet, modifications needed to its present format, identification of countries for pilot testing, and the roles and responsibilities of national and international partners. The second group reviewed laboratory standards and quality control issues for dengue serological diagnosis and virus isolation, building on the recommendations of two previous WHO meetings on dengue laboratories in the Americas.[4]

Meeting outcomes

The first meeting marked the start of the phased implementation of DengueNet starting with the Americas in 2002 and expanding to South-East Asian and Western Pacific Regions in 2003. There was very active participation of participants from national programmes and laboratories, WHO collaborating centres and WHO/HQ, PAHO and country offices. The key outcomes of these discussions are summarized below.

4 The 2 WHO meetings were held in Cincinnati (USA), in 1994 and in Rio de Janeiro (Brazil), in 1996.

Data collection

Epidemiological data

Countries will provide these data by epidemiological week at state/department level for the large countries and at the island level for island countries. The data reported in DengueNet will include the clinical categories of dengue fever, DHF, both suspected and confirmed cases, and only confirmed dengue deaths.

Case-fatality rate will be calculated as follows:

CFR = confirmed deaths/confirmed cases of DHF

Virus serotype data – all available

In the pilot test, these data will be provided for the entire country and be displayed in DengueNet as the cumulative number of isolations of each serotype in the country from 1 January.

DengueNet will calculate the number of isolations of each serotype as a percentage of total isolations of all four serotypes in the country from 1 January, as, for example:

% Den-1 = [Den-1/(Den-1+Den-2+Den-3+Den4] X 100

General considerations

Data will be provided only by the central level of each country (one source of data per country). DengueNet will link to the country web pages for additional information. The data entered during the pilot testing period will include a disclaimer stating that the

system is being tested and that the data for this period are provisional.

Roles and responsibilities of the partners in this network

Countries will collect, validate and provide epidemiological and laboratory data, and will designate the participating centres. The WHO collaborating centres will continue to provide laboratory support, proficiency panels and training to national laboratories. PAHO will support the country implementation activities, and WHO/HQ will maintain and moderate the DengueNet web site. Both PAHO and WHO/HQ will seek financial support for dengue surveillance activities.

Country participation

A major outcome of the meeting was that all the representatives of countries in the Americas expressed interest in participating in the DengueNet pilot test, and the representatives of South-East Asian countries indicated interest in the system being expanded to include their Region. The participants will approach their country authorities to obtain official authorization to participate in DengueNet. WHO country representatives will support the participants in presenting the DengueNet proposal to the national authorities. The pilot testing of DengueNet in the Americas will be conducted over a period of 3-6 months. The lessons learnt will be built into the implementation framework for high-burden countries in the South-East Asian and Western Pacific Regions in 2003.