Guidelines for

Dengue and Dengue Haemorrhagic Fever

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Contents

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Dengue and Dengue Haemorrhagic Fever

Introduction

Dengue is a mosquito-borne infection, which in recent years has become a major international public health concern. Dengue is found in tropical and sub-tropical regions around the world, predominantly in urban and semi-urban areas.

Dengue Haemorrhagic fever (DHF), a potentially lethal complication, was first recognized in the 1950s during the dengue epidemics in the Philippines and Thailand, but today DHF affects most Asian countries and has become a leading cause of hospitalization and death among children.

There are four distinct, but closely related, viruses that cause dengue. Recovery from infection by one provides lifelong immunity against that serotype but confers only partial and transient protection against subsequent infection by the other three. There is good evidence that sequential infection increases the risk of more serious disease resulting in DHF.

Prevalence

The global prevalence of dengue has grown dramatically in recent decades. The disease is now endemic in more than 100 countries in Africa, the Americas, the Eastern Mediterranean, South-east Asia and the Western Pacific. South-east Asia and the Western Pacific are most seriously affected. Before 1970 only nine countries had experienced DHF epidemics, a number that had increased more than four-fold by 1995.

Some 2500 million people - two fifths of the world's population - are now at risk from dengue. WHO currently estimates there may be 50 million cases of dengue infection worldwide every year.

In 2001 alone, there were more than 609 000 reported cases of dengue in the Americas, of which 15 000 cases were DHF. This is greater than double the number of dengue cases, which were recorded in the same region in 1995.

Not only is the number of cases increasing as the disease is spreading to new areas, but explosive outbreaks are occurring. In 2001, Brazil reported over 390 000 cases including more than 670 cases of DHF.

Some other statistics:

- During epidemics of dengue, attack rates among susceptible are often 40 - 50%, but may reach 80 - 90%.
- An estimated 500 000 cases of DHF require hospitalization each year, of whom a very large proportion are children. At least 2.5% of cases die, although case fatality could be twice as high.
- Without proper treatment, DHF case fatality rates can exceed 20%. With modern intensive supportive therapy, such rates can be reduced to less than 1%.

The spread of dengue is attributed to expanding geographic distribution of the four dengue viruses and of their mosquito vectors, the most important of which is the predominantly urban species *Aedes aegypti*. A rapid rise in urban populations is bringing ever greater numbers of people into contact with this vector, especially in areas that are favourable for mosquito breeding, e.g. where household water storage is common and where solid waste disposal services are inadequate.

Transmission

Dengue viruses are transmitted to humans through the bites of infective female *Aedes* mosquitoes. Mosquitoes generally acquire the virus while feeding on the blood of an infected person. After virus incubation for 8-10 days, an infected mosquito is capable, during probing and blood feeding, of transmitting the virus, to susceptible individuals for the rest of its life. Infected female mosquitoes may also transmit the virus to their offspring by transovarial (via the eggs) transmission, but the role of this in sustaining transmission of virus to humans has not yet been delineated.

Humans are the main amplifying host of the virus, although studies have shown that in some parts of the world monkeys may become infected and perhaps serve as a source of virus for uninfected mosquitoes. The virus circulates in the blood of infected humans for two to seven days, at approximately the same time as they have fever; *Aedes* mosquitoes may acquire the virus when they feed on an individual during this period.

Characteristics

Dengue fever is a severe, flu-like illness that affects infants, young children and adults, but seldom causes death.

The clinical features of dengue fever vary according to the age of the patient. Infants and young children may have a non-specific febrile illness with rash. Older children and adults may have either a mild febrile syndrome or the classical incapacitating disease with abrupt onset and high fever, severe headache, pain behind the eyes, muscle and joint pains, and rash.

Dengue Haemorrhagic fever is a potentially deadly complication that is characterized by high fever, haemorrhagic phenomena--often with enlargement of the liver--and in severe cases, circulatory failure. The illness commonly begins with a sudden rise in temperature accompanied by facial flush and other non-specific constitutional symptoms of dengue fever. The fever usually continues for two to seven days and can be as high as 40-41℃, possibly with febrile convulsions and haemorrhagic phenomena.

In moderate DHF cases, all signs and symptoms abate after the fever subsides. In severe cases, the patient's condition may suddenly deteriorate after a few days of fever; the temperature drops, followed by signs of circulatory failure, and the patient may rapidly go into a critical state of shock and die within 12-24 hours, or quickly recover following appropriate volume replacement therapy.

Treatment

There is no specific treatment for dengue fever. However, careful clinical management by experienced physicians and nurses frequently saves the lives of DHF patients. With appropriate intensive supportive therapy, mortality may be reduced to less than 1%. Maintenance of the circulating fluid volume is the central feature of DHF case management.

Immunization

Vaccine development for dengue and DHF is difficult because any of four different viruses may cause disease, and because protection against only one or two dengue viruses could actually increase the risk of more serious disease. Nonetheless, progress is being made in the development of vaccines that may protect against all four dengue viruses. Such products may become available for public health use within several years.

Prevention and Control

At present, the only method of controlling or preventing dengue and DHF is to combat the vector mosquitoes.

In Asia and the Americas, *Aedes aegypti* breeds primarily in man-made containers like earthenware jars, metal drums and concrete cisterns used for domestic water storage, as well as discarded plastic food containers, used automobile tyres and other items that collect rainwater. In Africa it also breeds extensively in natural habitats such as tree holes and leaf axils.
In recent years, *Aedes albopictus*, a secondary dengue vector in Asia, has become established in: the United States, several Latin American and Caribbean countries, in parts of Europe and in one African country. The rapid geographic spread of this species has been largely attributed to the international trade in used tyres.

Vector control is implemented using environmental management and chemical methods. Proper solid waste disposal and improved water storage practices, including covering containers to prevent access by egg laying female mosquitoes are among methods that are encouraged through community-based programmes.

The application of appropriate insecticides to larval habitats, particularly those which are considered useful by the householders, e.g. water storage vessels, prevent mosquito breeding for several weeks but must be re-applied periodically. Small, mosquito-eating fish and copepods (tiny crustaceans) have also been used with some success. During outbreaks, emergency control measures may also include the application of insecticides as space sprays to kill adult mosquitoes using portable or truck-mounted machines or even aircraft. However, the killing effect is only transient, variable in its effectiveness because the aerosol droplets may not penetrate indoors to microhabitats where adult mosquitoes are sequestered, and the procedure is costly and operationally very demanding. Regular monitoring of the vectors' susceptibility to the most widely used insecticides is necessary to ensure the appropriate choice of chemicals. Active monitoring and surveillance of the natural mosquito population should accompany control efforts in order to determine the impact of the programme.

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