Japanese encephalitis

Key Facts

- Japanese encephalitis (JE) is a flavivirus related to dengue, yellow fever and West Nile viruses, and is spread by mosquitoes.
- JE is the main cause of viral encephalitis in many countries of Asia with nearly 68,000 clinical cases every year.
- Although symptomatic JE is rare, the case-fatality rate among those with encephalitis can be as high as 30%. Permanent neurologic or psychiatric sequelae can occur in 30%–50% of those with encephalitis.
- 24 countries in the WHO South-East Asia and Western Pacific regions have endemic JE transmission, exposing more than 3 billion people to risks of infection.
- There is no cure for the disease. Treatment is focused on relieving severe clinical signs and supporting the patient to overcome the infection.
- Safe and effective vaccines are available to prevent JE. WHO recommends JE vaccination in all regions where the disease is a recognised public health problem.

Japanese encephalitis (JE) is the most important cause of viral encephalitis in Asia. It is a mosquito-borne flavivirus, meaning it is related to dengue, yellow fever and West Nile viruses. The first case of JE was documented in 1871 in Japan.

The annual incidence of clinical disease varies both across and within countries, ranging from <10 to >100 per 100,000 population. A recent literature review estimates nearly 68,000 clinical cases of JE globally each year, with up to 20,400 deaths due to JE (Bulletin of WHO, October 2011). JE primarily affects children. Most adults in endemic countries have natural immunity after childhood infection, but individuals of any age may be affected.

Signs and symptoms

Most JE virus infections are mild (fever and headache) or without apparent symptoms, but approximately 1 in 250 infections result in severe disease characterized by rapid onset of high fever, headache, neck stiffness, disorientation, coma, seizures, spastic paralysis and death. The case-fatality rate can be as high as 30% among those with disease symptoms.

Of those who survive, 20%–30% suffer permanent intellectual, behavioural or neurological problems such as paralysis, recurrent seizures or the inability to speak.

Transmission

24 countries in the WHO South-East Asia and Western Pacific regions have JE transmission risk, which includes more than 3 billion people.

JE is transmitted to humans through bites from infected mosquitoes of the Culex species (mainly Culex tritaeniorhynchus). Humans, once infected, do not develop sufficient viraemia to infect feeding mosquitoes. The virus exists in a transmission cycle between mosquitoes, pigs and/or water birds (enzootic cycle). The disease is predominantly found in rural and periurban settings, where humans live in closer proximity to these vertebrate hosts.

In most temperate areas of Asia, the Japanese Encephalitis Virus (JEV) is transmitted mainly during the warm season, when large epidemics can occur. In the tropics and subtropics, transmission can occur year-round but often intensifies during the rainy season and pre-harvest period in rice-cultivating regions.
Diagnosis

Individuals who live in or have travelled to a JE-endemic area and experience encephalitis are considered a suspected JE case. To confirm JE infection and to rule out other causes of encephalitis requires a laboratory testing of serum or, preferentially, cerebrospinal fluid.

Surveillance of the disease is mostly syndromic for acute encephalitis. Confirmatory laboratory testing is often conducted in dedicated sentinel sites, and efforts are undertaken to expand laboratory-based surveillance. Case-based surveillance is established in countries that effectively control JE through vaccination.

Treatment

There is no antiviral treatment for patients with JE. Treatment is supportive to relieve symptoms and stabilize the patient. Clinical care guidelines have been developed by PATH.

Prevention and control

Safe and effective JE vaccines are available to prevent disease. WHO recommends having strong prevention and control activities, including JE immunization in all regions where the disease is a recognized public health problem, along with strengthening surveillance and reporting mechanisms. Other control measures such as mosquito control or amplifying pig control have shown to be less reliable.

There are four main types of JE vaccines currently in use: inactivated mouse brain-based vaccines, inactivated cell-based vaccines, live attenuated vaccines, and live chimeric vaccines. Traditionally, the most widely used vaccine was a purified inactivated product made from either Nakayama or Beijing strains propagated in mouse brain tissue. It is still produced and used in several countries.

Over the past years, the live attenuated SA14-14-2 vaccine manufactured in China has become the most widely used vaccine in endemic countries, and it was prequalified by WHO in October 2013. Cell-culture based inactivated vaccines have also been licensed (and one product WHO prequalified), as has a live, recombinant product based on the yellow fever vaccine strain. In November 2013, GAVI opened a funding window to support JE vaccination campaigns in eligible countries.

All travellers to Japanese encephalitis-endemic areas should take precautions to avoid mosquito bites to reduce the risk for JE. Personal preventive measures include the use of repellents, long-sleeved clothes, coils and vaporizers.

Disease outbreaks

Major outbreaks of JE occur every 2-15 years. JE transmission intensifies during the rainy season, during which vector populations increase. However, there has not yet been evidence of increased JE transmission following major floods or tsunamis. The spread of JE in new areas has been correlated with agricultural development and intensive rice cultivation supported by irrigation programmes.

WHO responds to JE by:

- providing global recommendations for JE control, including the use of vaccines. WHO recommends JE immunization in all regions where the disease is a recognized public health problem and supports implementation.
- providing technical support for JE surveillance, JE vaccine introduction and large-scale JE vaccination campaigns.