WEEKLY EPIDEMIOLOGICAL REPORT

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EPIDEMIOLOGY OF JE—PART I

Japanese encephalitis (JE) is a vector-borne, viral zoonosis that may also affect humans. JE occurs in practically all Asian countries, whether temperate, subtropical, or tropical, and has episodically intruded upon areas without enzootic transmission such as the Torres Strait Islands off the Australian mainland. Nearly 3 billion people live in JE-endemic regions, where more than 70 million children are born each year. However, the annual incidence of clinical disease differs considerably from one country to the other as well as within affected countries, ranging from <10 to >100 per 100 000 population. The disease periodically becomes hyperendemic in areas such as northern India, parts of central and southern India, southern Nepal, northern Viet Nam as well as in areas of South-East Asia where vaccination programmes have not yet been instituted, e.g. Cambodia.

Anthropophilic culicine mosquitoes transfer the virus to humans from animal amplifying hosts, principally domestic pigs and wading birds. *Culex tritaeniorhyncus*, the most important vector species, breeds in water pools and flooded rice fields. Although majority of the human cases occur in rural areas, transmission can also occur in peri-urban and urban centers.

In temperate locations, the period of transmission typically starts in April or May, and lasts until September or October. In tropical and subtropical areas, transmission exhibits less seasonal variation, or intensifies with the rainy season. Where irrigation permits mosquito breeding throughout the year, transmission may occur even in the dry season. In many Asian countries, major outbreaks of JE occur at intervals of 2–15 years. So far, no evidence that JE epidemics follow major floods, including tsunamis, has been found. Several aspects of the JE epidemiology require further studies.

Whereas all age groups have been affected in regions where the virus has been introduced recently, serological surveys show that most people living in JE-endemic areas are infected before the age of 15 years. Only 1 in 250–500 JE viral infections are symptomatic. In hyperendemic areas, half the number of JE cases occur before the age of 4 years, and almost all before 10 years of age. Some endemic regions where childhood JE vaccination has been widely implemented have experienced a shift in the age distribution of cases towards an increasing proportion of cases occurring in older children and adults.

In countries such as Japan and Korea, and in some regions of China, the incidence of JE has decreased during several decades, primarily as a result of extensive use of JE vaccines. Improved socioeconomic conditions, changed life styles and control measures such as centralized pig production and the use of insecticides may also have contributed to this development.

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Permethrin-impregnated mosquito nets have been shown to provide some protection against JE in one study. However, mosquito nets and other adjunctive interventions should not divert efforts from childhood JE vaccination. Whereas JE is believed to be grossly underreported among residents of endemic regions, the disease is very uncommon among short-term visitors and tourists to such areas.

The pathogen :

Japanese encephalitis virus belongs to the mostly vector borne Flaviviridae, which are single-stranded RNA viruses. JE virus is antigenically related to several other flaviviruses that are prevalent in Asia, including dengue virus and West Nile virus. The envelope glycoprotein of the JE virus contains specific as well as cross-reactive, neutralizing epitopes. The major genotypes of this virus have a different geographical distribution, but all belong to the same serotype and are similar in terms of virulence and host preference. Following an infectious mosquito bite, the initial viral replication occurs in local and regional lymph nodes. Viral invasion of the central nervous system occurs probably via the blood. Confirmation of a suspected case of JE requires laboratory diagnosis.

The etiological diagnosis of JE is mainly based on serology using IgM-capture ELISA which detects specific IgM in the cerebrospinal fluid or in the blood of almost all patients within 7 days of the onset of disease. Other methods include conventional antibody assays on paired sera for the demonstration of a significant rise in total JE-specific antibody, as well as a dot-blot IgM assay, suitable for use in the field. The virus is rarely recovered in tissue culture from blood or CSF, but may be found in encephalitic brains at autopsy. JE-viral RNA is rarely demonstrated in the CSF.

Protective immune response:

Protection against JE is associated with the development of neutralizing antibodies. Based on animal models as well as on clinical vaccine trials, a threshold of neutralizing antibodies 1:10 has been accepted as evidence of protection. A role for cell-mediated immune mechanisms in protection against JE virus has been demonstrated in experimental studies on mice.

Clinical picture:

Clinical JE follows an incubation period of 4–14 days and is mostly characterized by sudden onset of fever, chills, myalgia, mental confusion and sometimes nuchal rigidity. In children, gastrointestinal pain and vomiting may be the dominant initial symptoms and convulsions are very common. JE may present as a mild disease, leading to an uneventful recovery, or may rapidly progress to severe encephalitis with mental disturbances, general or focal neurological abnormalities and coma. Out of the approximately 50 000 cases of JE that are estimated to occur each year, about 10 000 end fatally, and about 15 000 of the survivors are left with neurological and/or psychiatric sequelae, requiring rehabilitation and continued care. Reports of JE disease in pregnant women are limited, as most infections occur in childhood, but studies from Uttar Pradesh (India), indicate a high risk of JE-associated abortion during the first two trimesters. The potential impact of concurrent infections, in particular HIV, on the outcome of JE virus infection is not yet established.

Treatment options

There is no specific therapy for Japanese encephalitis so the care for JE patients is only supportive. JE requires excellent critical care and careful attention for early rehabilitation. By providing diligent care, case fatality rates can be greatly reduced. In India in a retrospective study of 12,506 cases, the commonest causes of death were aspiration, hypoxia, hypoglycemia, and uncontrolled seizures. Supportive care, therefore, focuses on airway management, seizure control, decreasing cerebral oedema, fluids and nutrition, fever control, and managing secondary infections.

Different approaches to control JE :

Control programs for JE have been focused on four major areas;

vaccination.
mosquito control,
amplifying host (pig) control,
Environmental control and

Sources:

Weekly Epidemiological Report, World Health Organization No. 28, 2005, 80, 241–248.
[http://www.who.int/wer]

Vector Born Viral Infections - Japanese Encephalitis, WHO Fact sheet.
[F:/JE/WHO Vector—Borne Viral infections.htm]

Proceedings of the Sri Lanka National Immunization Summit—2007 , Epidemiology Unit , Ministry of Health Sri Lanka.

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Part II of this article will be continued in the next issue

Table 1: Vaccine-preventable Diseases & AFP

16th – 22nd Feb 2008 (8th Week)

Disease	No. of Cases by Province									Number of cases during current week in 2008	Number of cases during same week in 2007	Total number of cases to date in 2008	Total number of cases to date in 2007	Difference between the number of cases to date between 2008 & 2007
	W	C	S	N	E	NW	NC	U	Sab					
Acute Flaccid Paralysis	00	01 KD=1	01 HB=1	00	00	00	00	00	00	02	00	10	13	-23.1%
Diphtheria	00	00	00	00	00	00	00	00	00	00	00	00	00	00.0%
Measles	00	00	01	06	00	00	00	00	00	07	03	18	07	+157.1%
Tetanus	00	00	00	00	00	01 KR=1	00	00	00	01	02	06	09	-33.3%
Whooping Cough	00	00	00	00	00	00	00	00	01 RP=1	01	01	06	07	-14.3%
Tuberculosis	63	09	07	01	15	09	05	11	107	227	108	1572	1480	+6.2`%

Table 2: Newly Introduced Notifiable Diseases

16th – 22nd Feb 2008(8th Week)

Disease	No. of Cases by Province									Number of cases during current week in 2008	Number of cases during same week in 2007	Total number of cases to date in 2008	Total number of cases to date in 2007	Difference between the number of cases to date between 2008 & 2007
	W	C	S	N	E	NW	NC	U	Sab					
Chicken-pox	16	13	11	01	09	09	05	07	20	91	64	801	420	+90.7%
Meningitis	06 GM=1 CO=3 KL=2	03 KD=2 NE=1	05 GL=1 MT=1 HB=3	01 VA=1	01 KM=1	02 KR=2	02 PO=2	02 BD=2	11 KG=8	33	00	305	36	+747.2%
Mumps	05	03	05	00	09	07	03	01	04	37	15	351	104	+237.5%

Key to Table 1 & 2

Provinces: W=Western, C=Central, S=Southern, N=North, E= East, NC=North Central, NW=North Western, U=Uva, Sab=Sabaragamuwa.
DPDHS Divisions: CB=Colombo, GM=Gampaha, KL=Kalutara, KD=Kandy, ML=Matale, NE=Nuwara Eliya, GL=Galle, HB=Hambantota, MT=Matara, JF=Jaffna, KN=Killinochchi, MN=Mannar, VA=Vavuniya, MU=Mullaitivu, BT=Batticaloa, AM=Ampara, TR=Trincomalee, KM=Kalmunai, KR=Kurunegala, PU=Puttalam, AP=Anuradhapura, PO=Polonnaruwa, BD=Badulla, MO=Moneragala, RP=Ratnapura, KG=Kegalle.

Table 3: Laboratory Surveillance of Dengue Fever

16th – 22nd Feb 2008 (8th Week)

Samples	Number tested		Number positive *		Serotypes									
					D_1		D_2		D_3		D_4		Negative	
	GT	AH	GT	AH	GT	AH	GT	AH	GT	AH	GT	AH	GT	AH
Number for current week	07	03	01	01	00	00	01	01	00	00	00	00	00	00
Total number to date in 2008	43	18	05	06	00	00	03	02	00	00	00	00	02	00

Sources: Genetech Molecular Diagnostics & School of Gene Technology, Colombo [GT] and Genetic Laboratory Asiri Surgical Hospital [AH]
* Not all positives are subjected to serotyping.
NA= Not Available.

Data Sources:
Weekly Return of Communicable Diseases: Diphtheria, Measles, Tetanus, Whooping Cough, Human Rabies, Dengue Haemorrhagic Fever, Japanese Encephalitis, Chickenpox, Meningitis, Mumps.
Special Surveillance: Acute Flaccid Paralysis.
National Control Program for Tuberculosis and Chest Diseases: Tuberculosis.

Table 4: Selected notifiable diseases reported by Medical Officers of Health

16th – 22nd Feb 2008 (8th Week)

DPDHS Division	Dengue Fever / DHF*		Dysentery		Encephal-itis		Enteric Fever		Food Poisoning		Leptos-pirosis		Typhus Fever		Viral Hepatitis		Human-Rabies		Returns Re-ceived Timely**
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	%
Colombo	34	312	02	28	00	04	03	32	02	49	00	19	00	00	01	24	00	00	**92**
Gampaha	13	212	03	23	01	03	00	13	00	13	03	26	00	01	01	28	00	00	**86**
Kalutara	07	100	05	65	00	04	01	10	00	04	03	35	00	02	01	10	00	00	**83**
Kandy	09	41	10	44	00	01	01	07	00	07	03	34	02	15	05	38	00	00	**88**
Matale	03	16	01	42	00	00	01	09	00	00	06	115	00	01	02	06	00	00	**100**
Nuwara Eliya	01	04	07	21	00	00	11	33	00	00	03	09	00	11	04	31	00	01	**100**
Galle	00	22	03	27	00	06	01	04	00	00	01	44	00	06	00	02	00	02	**76**
Hambantota	04	32	00	23	00	02	00	02	01	01	02	19	01	18	00	03	00	00	**91**
Matara	09	55	04	39	00	01	02	13	00	02	06	28	06	39	00	02	01	02	**94**
Jaffna	00	20	04	21	00	00	03	46	00	02	00	00	06	64	00	07	00	00	**63**
Kilinochchi	00	00	00	01	00	00	00	00	00	00	00	01	00	00	00	01	00	00	**25**
Mannar	02	08	01	01	00	06	03	49	00	00	00	00	00	00	00	04	00	00	**50**
Vavuniya	00	09	00	09	00	01	01	01	02	02	00	00	00	00	00	02	00	00	**100**
Mullaitivu	00	00	00	01	00	00	00	03	00	00	00	00	00	00	01	04	00	00	**60**
Batticaloa	02	36	03	16	00	00	00	03	00	00	00	00	00	00	01	30	00	02	**73**
Ampara	00	06	08	54	00	00	00	00	00	00	00	05	00	00	00	01	00	00	**86**
Trincomalee	19	74	01	15	00	00	01	02	00	01	00	03	00	04	00	06	00	00	**70**
Kurunegala	10	103	05	85	01	05	01	13	00	01	02	06	03	10	00	10	00	00	**89**
Puttalam	23	96	01	22	00	01	01	27	00	01	00	02	01	07	01	08	00	00	**78**
Anuradhapur	05	53	01	18	00	03	00	03	00	04	00	17	00	06	00	02	00	00	**63**
Polonnaruwa	03	21	04	22	00	01	02	07	00	04	00	05	00	00	03	08	00	00	**100**
Badulla	00	13	04	75	00	01	01	18	00	01	00	06	03	20	01	37	00	01	**73**
Monaragala	01	09	09	39	00	01	00	07	02	07	00	11	06	23	00	05	00	00	**82**
Ratnapura	02	69	03	41	02	12	00	27	00	42	00	20	02	42	12	23	00	00	**75**
Kegalle	09	55	14	103	01	12	02	06	00	00	02	14	00	12	11	79	00	00	**91**
Kalmunai	00	03	01	39	00	00	00	00	00	03	00	00	00	01	03	09	00	00	**62**
SRI LANKA	**156**	**1369**	**94**	**874**	**05**	**64**	**35**	**335**	**07**	**144**	**36**	**419**	**30**	**282**	**47**	**380**	**01**	**08**	**81**

Source: Weekly Returns of Communicable Diseases (WRCD).
***Dengue Fever / DHF** refers to Dengue Fever / Dengue Haemorrhagic Fever.
****Timely** refers to returns received on or before 1 March , 2008 Total number of reporting units =290. Number of reporting units data provided for the current week: 238

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