



VIRGINIA EPIDEMIOLOGY BULLETIN

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Arboviral Infections of the Central Nervous System -- United States, 1990*

Introduction

In 1989, state and local health departments reported 108 cases of arboviral encephalitis to CDC. An outbreak of St. Louis encephalitis (SLE) in California's Central Valley was the largest outbreak in the state since 1959. Sporadically occurring SLE cases were reported elsewhere from Los Angeles County (one case); Lyon County, Nevada (one case); and Houston (four cases, one fatal) (Figure 1). In an eastern equine encephalitis (EEE) outbreak on the Atlantic and Gulf coasts, 194 equine cases and nine human cases (five fatal) occurred (Figure 2). Central nervous system infections from viruses of the California serogroup, principally La Crosse encephalitis, were reported among 65 persons from six midwestern and two eastern states where the disease is endemic. No human cases of western equine encephalitis (WEE) were reported.

St. Louis Encephalitis

From August through early October, the SLE outbreak in Kern, Kings, and Tulare counties in the lower San Joaquin Valley of California resulted in 28 of the 29 cases reported in the state, a rate of 3.1 per 100,000 population. Cases were identified from passive reports and from a subsequent retrospective serosurvey of hospitalized persons with potential cases in the three-county

area. Seventeen cases occurred in males (male-to-female ratio of 1.6:1). The age-specific incidence rate per 100,000 population for children less than 15 years of age was 2.1; for persons 15-34 years of age, 2.9; for persons 35-54 years of age, 3.6; and for persons greater than or equal to 55 years of age, 2.6.

The other SLE case from California occurred in a 65-year-old man who resided east of the coastal mountains in Los Angeles County; this case was epidemiologically



unrelated to the outbreak in the Central Valley. Elsewhere, sporadically occurring SLE cases were reported in a 78-year-old man from Lyon County, Nevada, and in two men and two women (age range: 20-39 years) who resided in the inner city of Houston; one case was fatal (Figure 1).

Eastern Equine Encephalitis

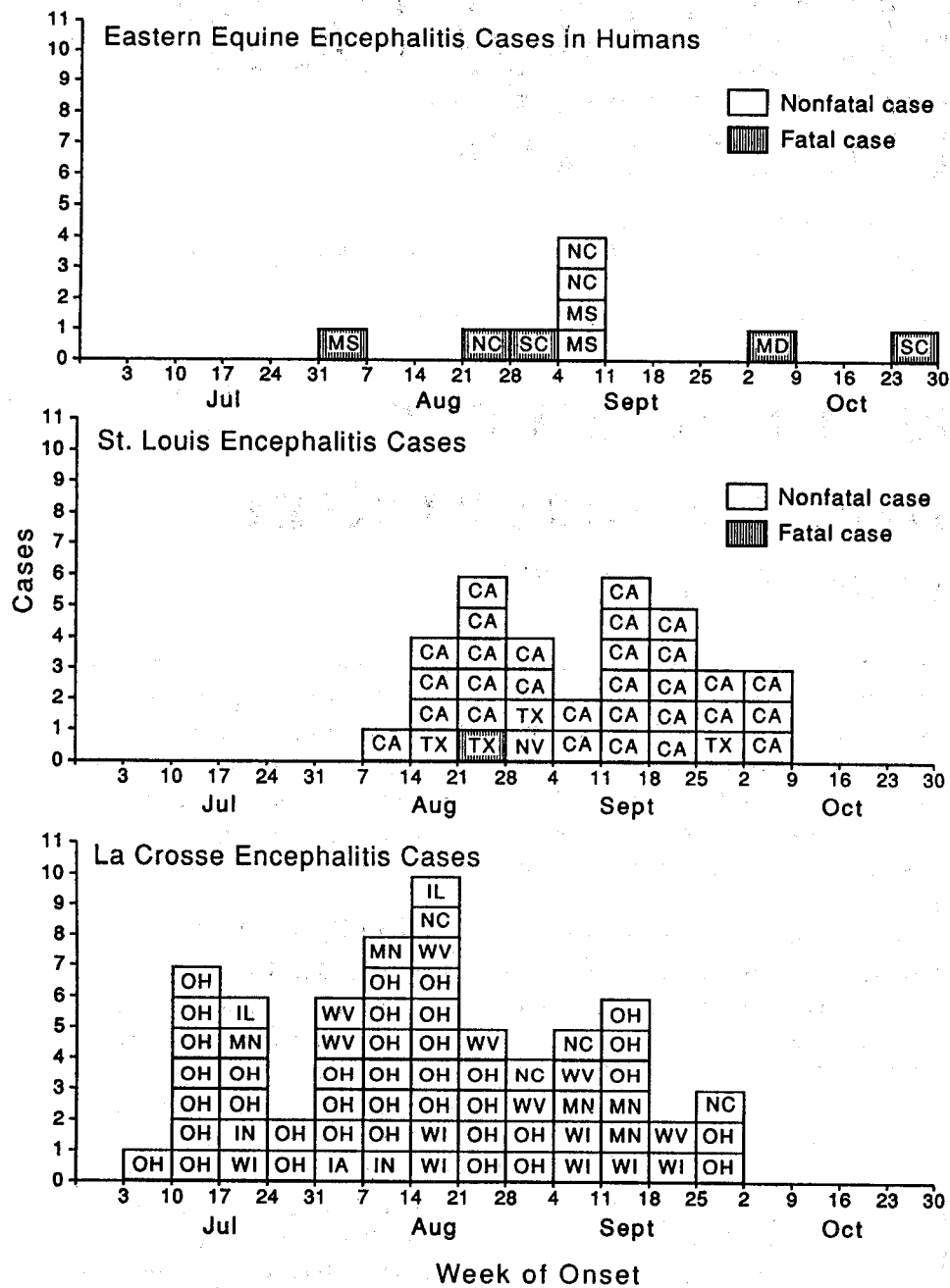
In 1989, evidence of EEE transmission was first documented in March among horses in Florida. In June and July, equine cases were reported from southeastern states, and by August, equine cases were reported from the northeast (Figure 2). The epizootic resulted in 194 cases from 116 counties in 14 states. The first human case was reported from Mississippi in August; eight additional human cases were reported through October from Maryland, Mississippi, North Carolina, and South Carolina. Of the nine cases, eight were in males; patients ranged in age from 5 months to 68 years. Five cases were fatal, and three of the surviving patients had neurologic sequelae.

La Crosse Encephalitis

Eight states reported 65 cases of La Crosse encephalitis: Ohio (37 cases); West Virginia and Wisconsin (seven cases each); Min-

Continued on Page 2

FIGURE 1. Arboviral infections of the central nervous system, by week of onset — United States, 1989



La Crosse Encephalitis (cont.)

nesota (five cases); North Carolina (four cases); Illinois and Indiana (two cases each); and Iowa (one case).

Cases occurred from early July through early October. Sixty-four cases were in persons less than 20 years of age. Forty-four cases occurred in males (male-to-female ratio of 2.1:1).

Editorial Note: SLE and WEE are endemic in the rural West. In most years, sporadic cases occur (1-3) and, occasionally,

small outbreaks occur. In the 1940s and 1950s, California's Central Valley was the site of recurrent combined SLE and WEE outbreaks (4,5). During 1945-1959, 646 cases of WEE and 387 cases of SLE were reported from the Sacramento and San Joaquin valleys. In the 1960s, reported cases gradually diminished; during the 1970s and 1980s, reports of these arboviral infections had virtually disappeared from the Central Valley.

Suggested hypotheses to explain the de-

cline in human cases include the increased use of agricultural pesticides, reduced outdoor exposure in local residents as a consequence of increased use of air conditioning, and other human behavioral factors (6,7). However, the reasons for the disappearance and subsequent recurrence of SLE in the Central Valley in 1989 are unclear. The absence of WEE cases in the outbreak is especially perplexing because SLE and WEE are transmitted by *Culex tarsalis* mosquitoes in the rural West and share a similar summer amplification cycle involving birds (1,3,4,8).

The sex distribution of patients in the California outbreak was typical of rural SLE outbreaks, probably reflecting increased outdoor exposure among males because of occupational and other activities (1,4). In addition, the age distribution of patients, which indicated equal risk of the disease across all age groups, is typical of the epidemiology of SLE in the rural West (1,4).

In the South, SLE is transmitted by *Cx. quinquefasciatus*, a peridomestic mosquito often present in greatest abundance in old neighborhoods, where breeding sites in discarded containers and open ditches may be prevalent (1,3,8). In Houston, old central city neighborhoods have consistently been the areas of greatest risk for SLE (9). Risk of clinical encephalitis after infection with SLE virus increases with age, and most cases are identified among the elderly (1,2,9). Thus, the predominance of relatively younger patients in Houston in 1989 was atypical.

EEE is rare in humans; since 1955, a median of three cases have been reported annually in the United States. Only one major outbreak of EEE has been reported in the United States; in 1959, 32 cases occurred in coastal New Jersey (10). Epizootics among horses have occurred more frequently; however, the size of these outbreaks has diminished with the use of equine vaccines.

In 1989, record numbers of *Culiseta melanura*, the principal enzootic vector of EEE, were observed in some eastern seaboard locations where the mosquito's abundance has been monitored longitudinally (11). Mosquitoes of various species that could serve as epizootic vectors (e.g., *Aedes sollicitans*) also were present in unprece-

dent numbers in some coastal locations (12). The effect of locally heavy rainfall in the last quarter of 1988 through the spring of 1989 may have contributed to the expansion of vector populations and increased EEE virus transmission in these areas.

The encephalitis associated with EEE is fulminant and causes death in 30%-69% of cases (2,10,13). The sex distribution of patients reported in 1989 was unusual and remains unexplained.

La Crosse encephalitis is endemic in the upper midwest and in areas of the Appalachian states and parts of the Southeast (2,13). The epidemiologic characteristics of cases reported in 1989 were typical. Cases occurred almost exclusively in children and were slightly more predominant in males, probably because of increased exposure to the woodland mosquito vector, *Ae. triseriatus*.

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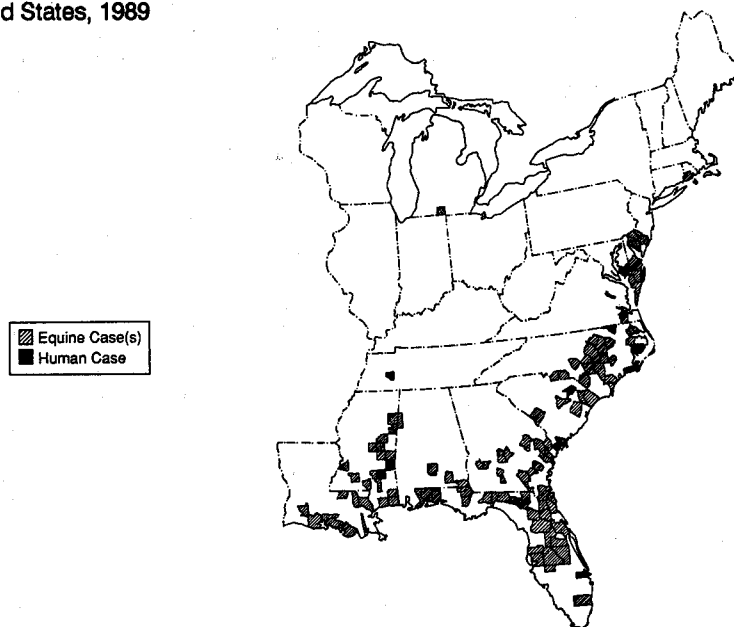
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* Reprinted from MMWR 1990;39:407, 413-417.

Figure 2. Equine and human eastern equine encephalitis cases, by county - United States, 1989



Erratum: The following table should be substituted for "Table 1; Drugs Used in the Prophylaxis of Malaria" which appeared in the June 1990 issue of the Bulletin. This corrected table may be pasted over the original.

Table 1. Drugs used in the prophylaxis of malaria

Drug	Adult Dose	Pediatric Dose
Chloroquine phosphate (Aralen®)	300 mg base (500 mg salt) orally, once/week	5 mg/kg base (8.3 mg/kg salt) orally once/week, up to maximum adult dose of 300 mg base
Hydroxychloroquine sulfate (Plaquenil®)	310 mg base (400 mg salt) orally, once/week	5 mg/kg base (6.5 mg/kg salt) orally, once/week, up to maximum adult dose
Mefloquine (Lariam®)	228 mg base (250 mg salt) orally, once/week*	15-19 kg: 1/4 tab/wk* 20-30 kg: 1/2 tab/wk* 31-45 kg: 3/4 tab/wk* >45 kg: 1 tab/wk*
Doxycycline	100 mg orally, once/day	>8 years of age: 2 mg/kg of body weight orally/day up to adult dose of 100 mg/day
Proguanil	200 mg orally, once/day in combination with weekly chloroquine	<2 years: 50 mg/day 2-6 years: 100 mg/day 7-10 years: 150 mg/day >10 years: 200 mg/day
Primaquine	15 mg base (26.3 mg salt) orally, once/day for 14 days	0.3 mg/kg base (0.5 mg/kg salt) orally, once /day for 14 days

*The dose (250 mg for an adult) should be taken once each week for 4 weeks, followed by one dose every other week, as indicated in Figure 2.

Cases of notifiable diseases, Virginia, for the period June 1 through June 30, 1990.

DISEASE	Total Cases Reported This Month						Total Cases Reported to Date		
	REGIONS						THIS YEAR	LAST YEAR	5 YR AVG.
	STATE	N.W.	N.	S.W.	C.	E.			
Acquired Immunodeficiency Syndrome	66	5	23	5	13	20	325	214	123
Campylobacter Infections	69	11	14	15	15	14	243	283	248
Gonorrhea	1288	--	--	--	--	--	8604	7640	7791
Hepatitis A	38	0	8	2	5	23	153	170	134
B	19	4	2	3	5	5	112	145	202
Non A-Non B	9	0	2	1	1	5	24	26	35
Influenza	0	0	0	0	0	0	762	1806	2050
Kawasaki Syndrome	3	0	1	1	0	1	13	8	14
Legionellosis	1	0	0	1	0	0	7	2	6
Lyme Disease	14	0	2	0	3	9	32	14	7
Measles	18	2	1	0	15	0	68	20	45
Meningitis - Aseptic	17	1	6	2	6	2	87	72	71
Bacterial*	10	2	1	2	2	3	79	106	111
Meningococcal Infections	7	1	1	0	3	2	33	30	39
Mumps	19	2	5	1	2	9	77	55	52
Pertussis	4	0	0	3	0	1	13	6	16
Rabies in Animals	22	8	4	0	7	3	105	139	146
Reye Syndrome	0	0	0	0	0	0	1	1	1
Rocky Mountain Spotted Fever	0	0	0	0	0	0	2	3	7
Rubella	1	0	0	0	0	1	1	0	3
Salmonellosis	128	15	33	13	35	32	512	499	583
Shigellosis	15	1	5	3	2	4	74	254	111
Syphilis (Primary & Secondary)	66	4	14	10	25	13	408	267	194
Tuberculosis	36	10	5	6	6	9	159	170	187

Localities Reporting Animal Rabies: Albemarle 1 raccoon, 1 skunk; Arlington 1 raccoon; Augusta 1 raccoon; Bath 1 raccoon; Clarke 1 raccoon; Culpeper 1 cow; Gloucester 2 raccoons; Hopewell 1 raccoon; King George 1 fox; King William 1 raccoon; Loudoun 3 raccoons; Nottoway 3 raccoons; Prince George 3 raccoons; Warren 1 raccoon.

Occupational Illnesses: Asbestosis 2; Byssinosis 1; Carpal Tunnel Syndrome 48; Coal Workers' Pneumoconiosis 33; Loss of Hearing 15; Occupational Asthma 1; Repetitive Motion Disorder 2; Silicosis 1.

*other than meningococcal

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