

Epidemiology and risk of Japanese encephalitis in U.S. travelers

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Japanese encephalitis (JE)

- Caused by a mosquito-borne flavivirus
- Occurs in most of Asia and Western Pacific
- Estimated 68,000 cases annually
 - Highest incidence in rural agricultural areas
 - Seasonality varies by region
- Clinical disease is often severe
 - 20–30% case fatality
 - 30–50% survivors have sequelae



JE vaccine in the United States

- Inactivated Vero cell culture-derived JE vaccine (JE-VC; Ixiaro) only JE vaccine available in the U.S.
- JE-VC is manufactured by Valneva
- Inactivated mouse brain-derived vaccine (JE-MB; JE-VAX) no longer available in the U.S.

ACIP recommendations for use of JE-VC

2009: FDA licensed JE-VC for use in adults and
ACIP approved recommendations for primary series in adults

2010: Updated MMWR Recommendations and Reports from 1993

2011: ACIP approved recommendations for booster dose in adults
and published policy note in MMWR

2013: ACIP approved recommendations for primary series in
children and published policy note in MMWR

Existing ACIP recommendations for prevention of JE among travelers

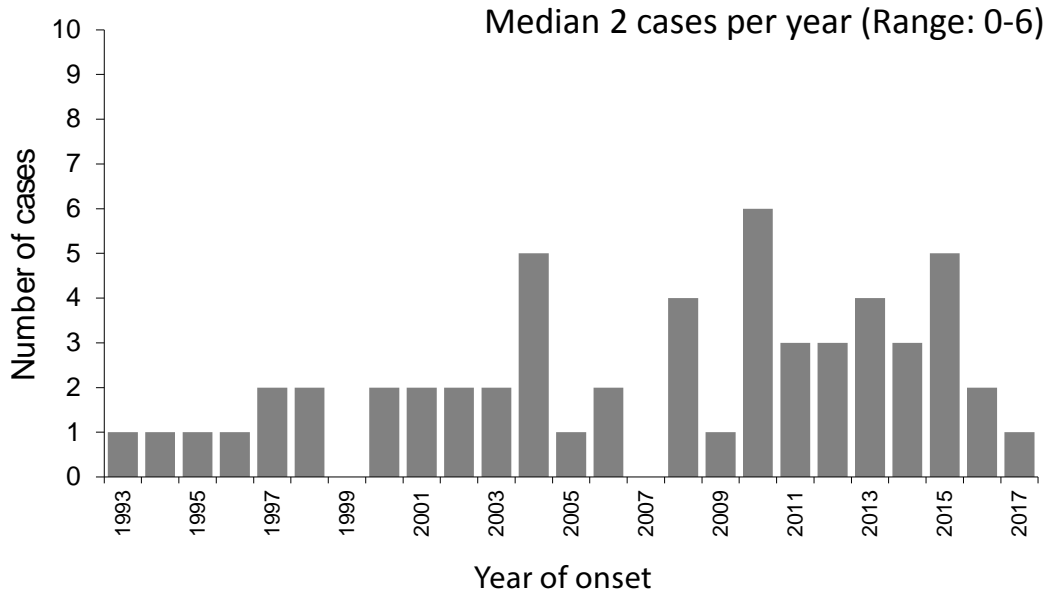
- For all travelers, discuss risks of JE and need to take precautions to avoid mosquito bites
- For some travelers, JE vaccine can further reduce the risk for infection
 - take into account planned itinerary including travel location, duration, season, and activities
- Providers should weigh
 - overall low risk for JE
 - high morbidity and mortality of JE
 - low probability of serious adverse events following vaccination
 - vaccine cost

Existing ACIP JE vaccine recommendations for travelers

- Recommended
 - Travelers who plan to spend ≥ 1 month in endemic areas during JE virus transmission season, including recurrent travelers or urban-based expatriates planning to visit rural areas
- Consider
 - Short-term travelers (< 1 month) during JE virus transmission season if plan to travel outside urban area and have itinerary or activities that increase risk of JE virus exposure
 - Travelers to area with ongoing JE outbreak
 - Travelers to endemic areas uncertain of specific destinations, activities, or duration of travel
- Not recommended
 - Short-term travelers whose visit restricted to urban areas or outside of transmission season

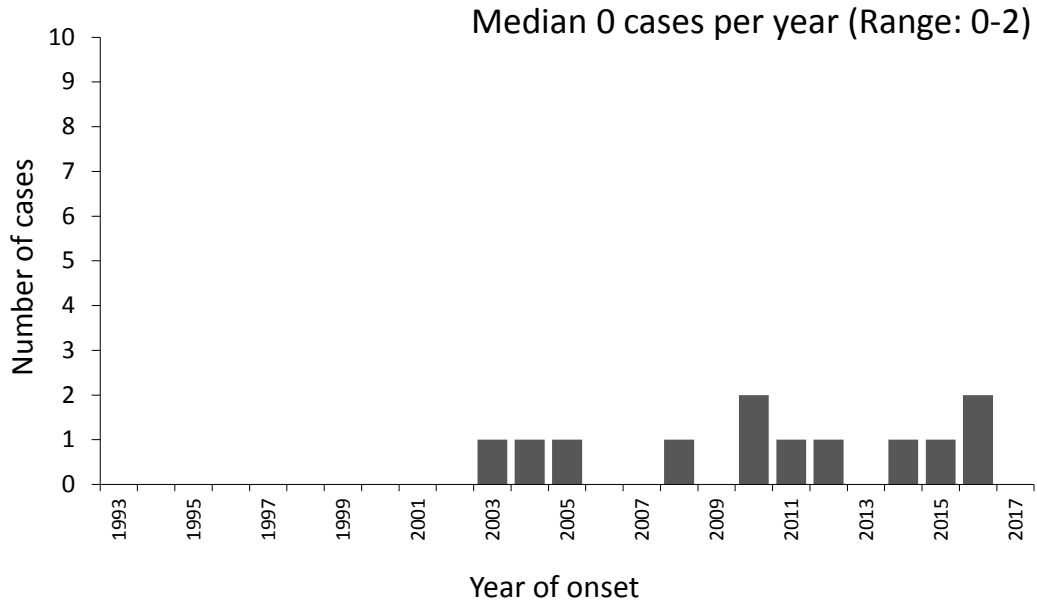
Epidemiology of JE among travelers

Travel-associated JE cases, 1993-2017 (N=56)*



*Year not specified for 2 cases

JE cases among U.S. travelers, 1993-2017 (N=12)



Sex and age of U.S. travel-associated JE cases, 1993-2017 (N=12)

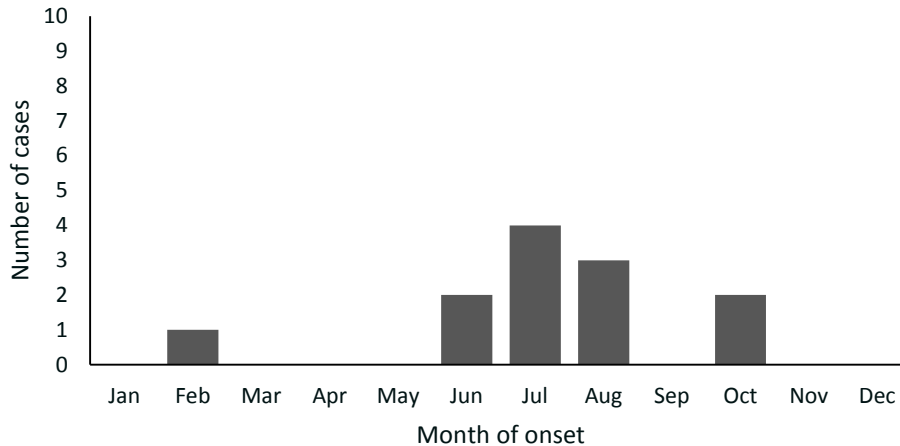
Sex

Male	8 (67%)
Female	4 (33%)

Age group (years)

0–19	4 (33%)
20–39	3 (25%)
40–59	3 (25%)
≥60	2 (17%)

Month of onset of U.S. travel-associated JE cases, 1993-2017 (N=12)



Outcomes of U.S. travel-associated JE cases, 1993-2017 (N=12)

Died	2 (17%)
Survived	
Sequelae	3 (25%)
No sequelae	6 (50%)
Unknown*	1 (8%)

*Spent 3 weeks in ICU

Probable country of acquisition of U.S. travel-associated JE cases, 1993-2017 (N=12)

Country	
Philippines	4 (33%)
Thailand	2 (17%)
Vietnam	2 (17%)
South Korea	2 (17%)
China	1 (8%)
Taiwan	1 (8%)

Type of traveler for U.S. travel-associated JE cases, 1993-2017 (N=12)

Tourist*	8 (67%)
Expatriate**	4 (33%)

*Includes 3 persons traveling to visit friends and relatives and 1 study abroad program student

**Includes one college professor who spent several months working in a JE endemic country

Trip duration for U.S. travel-associated JE cases, 1993-2017 (N=12)

Duration of travel

≥1 month		8 (67%)
2 - < 4 weeks	} “Shorter-term”	3 (25%)
1 - < 2 weeks		1 (8%)

Itineraries for U.S. travel-associated JE cases, 1993-2017 (N=12)

Travelled for ≥ 1 month	8 (67%)
Travelled for < 1 month	
Majority of time in rural areas	1 (8%)
≥ 1 overnight trip to rural areas	2 (17%)
No exposure-related information	1 (8%)

Estimate of risk for U.S. travelers to Asia

- Risk estimate based on reported U.S. cases
 - 12 U.S. travel-associated JE cases in the 25 years from 1993 to 2017 (<1 per year)
 - 4-5 million U.S. citizen trips to Asia per year since 2004 (NTTO)¹
 - **< 1 case per million trips to Asia**
- Risk varies based on season, destination, duration, and activities

1. <http://travel.trade.gov/view/m-2008-O-001/index.html>;

Estimate of risk: limitations

- Calculation based on number of trips as number of travelers not available
- Rate of underdiagnosis and underreporting unknown; assuming 10 times as many cases
 - 120 U.S. traveler cases (~5 case per year)
 - 100-125 million U.S. citizen trips to Asia
 - ~1 case per million trips to Asia

Estimate of risk: Vaccination rates

- Two studies with data on vaccination rates among US travelers
 - Airport survey: 11% of higher risk travelers reported receiving JE vaccine¹
 - Global TravEpiNet (GTEN) study: 28% of higher risk travelers vaccinated during clinic visit or had received JE vaccine within previous 2 years²
- Even with low vaccination rates, JE rare among U.S. travelers



Thank you