



WEBINAR

Introduction to Travel Medicine

June 8, 2022

14:00-15:30 Bangkok time



VECTOR BORNE ILLNESSES

Malaria and Chemoprophylaxis

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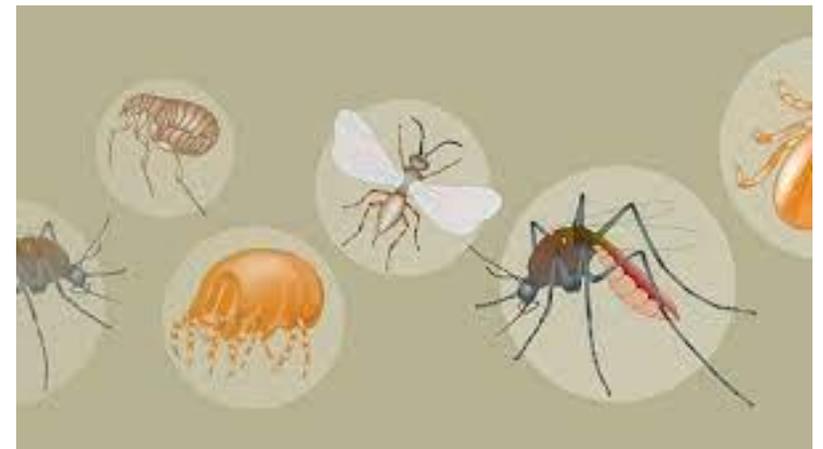
Overview

- Introduction
- Burden of disease
- List of diseases
- Malaria – Risk, prevention and chemoprophylaxis
- Dengue
- Rickettsial diseases, like Scrub typhus
- Conclusion

Introduction



- Vector-borne diseases account for more than 17% of all infectious diseases.
- Causes 700 000 deaths annually.
- Highest burden in tropical and sub tropical countries
- Huge impact on global travel and trade
- Dengue and malaria are the most important



WHO FACT SHEET



Table 1

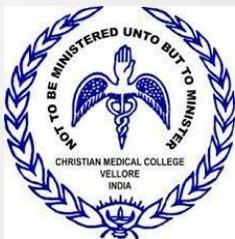
Major diagnoses for returning travelers visiting 18 GeoSentinel sites, 2000–2010*

- Acc. to 18 GeoSentinel sites, in 2000-2010
- 42,223 ill travelers were reported.
- Most common destinations were:
 - Sub-Saharan Africa (26%)
 - Southeast Asia (17%)**
 - South-central Asia (15%)**
 - South America (10%)

Diagnosis	No. cases
Malaria	1,762
Giardiasis	1,296
Dengue fever	888
Campylobacteriosis	596
Cutaneous larva migrans	577
Rabies postexposure prophylaxis	349
Enteric fever†	262
Spotted fever rickettsiosis	220
Chikungunya	120
Acute hepatitis A	94
Confirmed influenza A/B	84



List of vector borne diseases



<u>Vector</u>		<u>Disease caused</u>	<u>Type of pathogen</u>
Mosquito	<i>Aedes</i>	Chikungunya	Virus
		Dengue	Virus
		Lymphatic filariasis	Parasite
		Rift Valley fever	Virus
		Yellow Fever	Virus
		Zika	Virus
	<i>Anopheles</i>	Lymphatic filariasis	Parasite
		Malaria	Parasite
	<i>Culex</i>	Japanese encephalitis	Virus
		Lymphatic filariasis	Parasite
		West Nile fever	Virus
Aquatic snails		Schistosomiasis (bilharziasis)	Parasite
Blackflies		Onchocerciasis (river blindness)	Parasite

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Fleas	Plague (transmitted from rats to humans)	Bacteria
	Tungiasis	Ectoparasite
Lice	Typhus	Bacteria
	Louse-borne relapsing fever	Bacteria
Sandflies	Leishmaniasis	Parasite
	Sandfly fever (phlebotomus fever)	Virus
Ticks	Crimean-Congo haemorrhagic fever	Virus
	Lyme disease	Bacteria
	Relapsing fever (borreliosis)	Bacteria
	Rickettsial diseases (eg: spotted fever and Q fever)	Bacteria
	Tick-borne encephalitis	Virus
	Tularaemia	Bacteria
Triatome bugs	Chagas disease (American trypanosomiasis)	Parasite
Tsetse flies	Sleeping sickness (African trypanosomiasis)	Parasite



Malaria

- Estimated 219 million cases globally
- 400,000 deaths every year.
- Most deaths occur in children under the age of 5 years.

Incidence of malaria in travelers

Risk – **Aware** of the risk

Prevention of the Bite

Chemoprophylaxis

Recognition and **Diagnosis** in a returning traveller

Incidence of malaria in travelers



- Malaria is prevalent in approx. 91 countries and territories
- Visited by more than 125 million international travellers every year.
- Each year many international travellers fall ill with malaria while visiting countries/territories where malaria is endemic
- Over 10 000 are reported to become ill with malaria after returning home

Awareness – Risk of Malaria

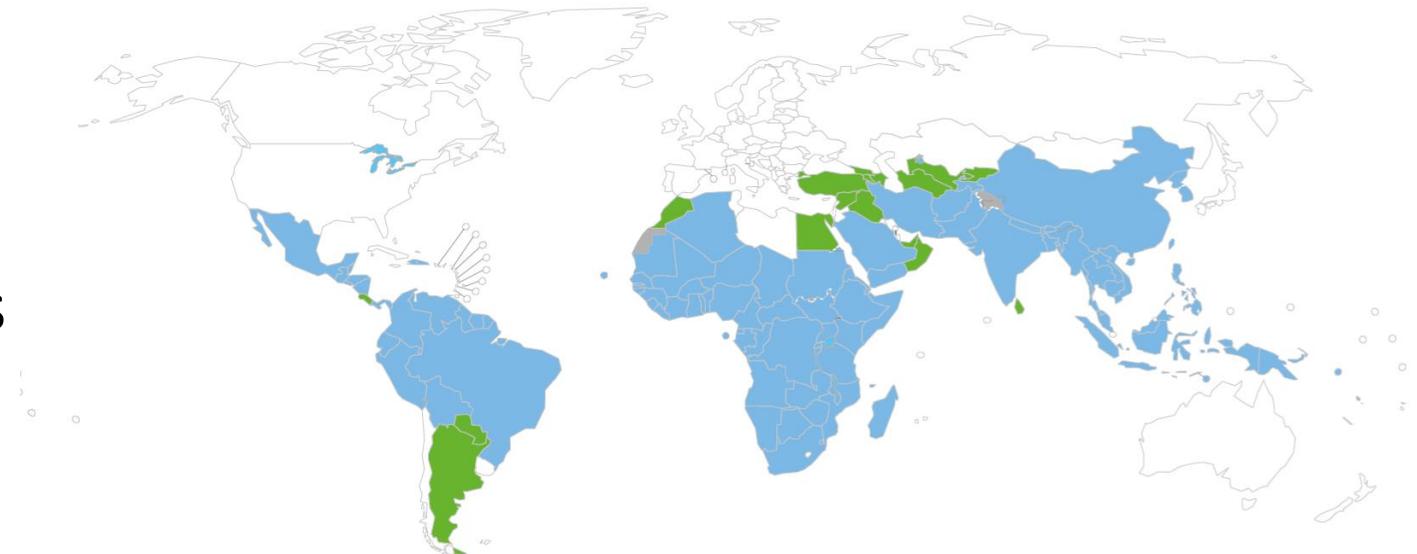


- All non – immune travelers are at risk
- Semi - immune travelers while visiting friends and relatives
- Most cases occur due to poor adherence
- Special population

Pregnant women

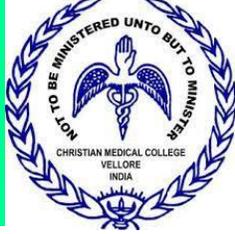
Children

Travelers with comorbidities



■ Countries endemic for malaria, 2016
□ Countries not endemic for malaria, 2000

■ Countries endemic in 2000, no longer endemic in 2016
■ Not applicable



Prevention of the bite

- Avoiding outdoor activities between dusk and dawn
- Wearing clothing to reduce the exposed skin
- Insect repellent
 - **DEET** - N,N-diethyl-3-methylbenzamide(30 to 50%) is protective for at least four hours
lower percentage preparations provide a shorter duration of protection
same concentration of DEET is safe for infants and children >2 months.
 - **Picaridin** - synthetic repellent.
(20% Versus 35% DEET have comparable efficacy up to eight hours after application

J Med Entomol. 2004;41(3):414.
 - **IR3535** - N-acetyl-N-butyl-aminopropionic acid ethyl ester(15% or higher) is protective for about eight hours.
 - OLE is an effective repellent and can be used in children >3 years.
- Repeated use

Other preventive measures

- Bed nets treated with insecticides.
- Permethrin treated clothing and bed netting can repel mosquitoes for more than one week.
- Standard nets dipped in permethrin are effective for three washes, whereas newer formulations can withstand 20 washes.
- Long-lasting insecticide impregnated nets (LLINs) can remain effective as long as three years.

Travel Med Infect Dis. 2013;11(6):374. Epub 2013 Oct 25.

- Staying in well screened or airconditioned rooms

Chemoprophylaxis



- No antimalarial prophylactic regimen gives complete protection
- Important to know the contraindications and adverse effects
- Drug interactions
- Special population

Chloroquine sensitive Pf

Drug	Tablet size	Dose	Frequency*	Initiation (time before first exposure to malaria)	Discontinuation (time after last exposure)	Use in pregnancy
Chloroquine phosphate (Aralen and generic agents)	500 mg salt (300 mg base)	1 tablet orally	Once weekly	1 to two weeks	4 weeks	Yes
Hydroxychloroquine sulfate (Plaquenil)	400 mg salt (310 mg base)	1 tablet orally	Once weekly	1 to 2 weeks	4 weeks	Yes
Atovaquone-proguanil (Malarone)	250 mg atovaquone and 100 mg proguanil	1 tablet orally	Once daily	1 to 2 days	7 days	No; insufficient data on use in pregnancy
Mefloquine hydrochloride (Lariam and generic agents)	250 mg salt (228 mg base)	1 tablet orally	Once weekly	3 weeks preferable; 2 weeks acceptable	4 weeks	Yes

Chloroquine sensitive Pf

Drug	Tablet size	Dose	Frequency*	Initiation (time before first exposure to malaria)	Discontinuation (time after last exposure)	Use in pregnancy
Doxycycline hyclate (Vibramycin, Vibra-Tabs, other brands, and generic agents); doxycycline monohydrate (Monodox, Adoxa, and generic agents)	100 mg	1 tablet orally	Once daily	1 to 2 days	4 weeks	No; teratogenic
Tafenoquine (Arakoda) [¶]	100 mg	2 tablets orally	Loading dose once daily for 3 days, then once a week starting 7 days after the last loading dose	Loading dose 3 days prior to trip	1 week after trip	No; unknown G6PD status of fetus

Chloroquine resistant Pf

Drug	Tablet size	Dose	Frequency*	Initiation (time before first exposure to malaria)	Discontinuation (time after last exposure)	Use in pregnancy
Atovaquone-proguanil (Malarone)	250 mg atovaquone and 100 mg proguanil	1 tablet orally	Once daily	1 to 2 days	7 days	No; insufficient data on use in pregnancy
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Plasmodium vivax

Drug	Tablet size	Dose	Frequency*	Initiation (time before first exposure to malaria)	Discontinuation (time after last exposure)	Use in pregnancy
Areas with <i>Plasmodium vivax</i>						
Primaquine phosphate (appropriate prophylaxis for short duration travel to areas with principally <i>P. vivax</i>) [¶]	26.3 mg salt (15 mg base)	2 tablets orally	Once daily	1 to 2 days	7 days	No; unknown G6PD status of fetus
Chloroquine phosphate (Aralen and generic agents)	500 mg salt (300 mg base)	1 tablet orally	Once weekly	1 to 2 weeks	4 weeks	Yes
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Recognition and diagnosis of malaria in a returning traveler

- Early diagnosis is life saving and prevents severe complicated malaria
- Correct method of diagnosis
- Rapid Diagnostic Test
- Malarial parasite on the blood film
- Quantitative buffy coat

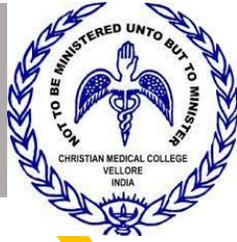


Treatment of malaria in a traveler

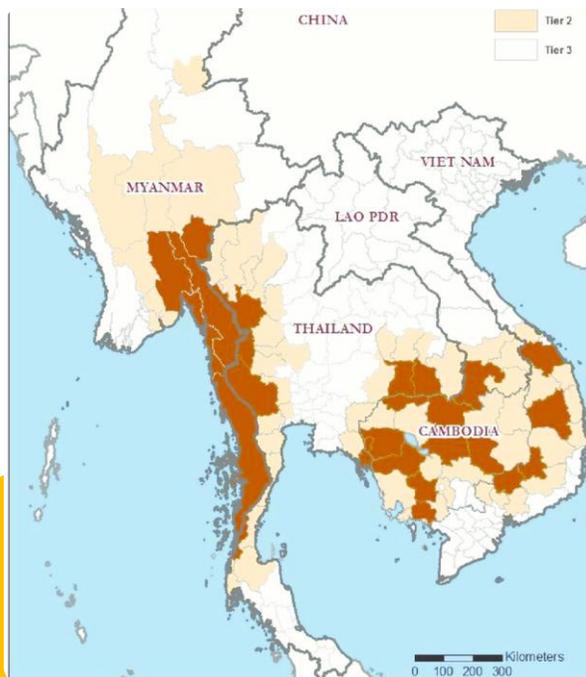
- An artemisinin-based combination therapy (ACT)
 - In *P. vivax* /*P. ovale* – followed by Primaquine
 - Check G6DP levels
 - In mixed infection
 - Standby emergency treatment (SBET)
- In uncomplicated Pf -
 - Artemether–lumefantrine
 - Dihydroartemisinin–piperaquine
 - Atovaquone-proguanil.



Areas with resistant malaria



- Chloroquine resistance in Pf
- Resistant *P. vivax* was rare but is increasingly reported now.
- Chloroquine resistant *P. malariae* – reported from Indonesia.
- *P. knowlesi* infection should always be considered if there is a history of travel to forested areas of south-east Asia.
- Multidrug resistant malaria –
 - Mefloquine resistance reported in Cambodia, south-eastern Myanmar, and Thailand. Choice of chemoprophylaxis is limited to doxycycline and atovaquone–proguanil.
 - Artemisinin resistance is reported in Cambodia, Myanmar, Thailand and Viet Nam, Democratic Republic.

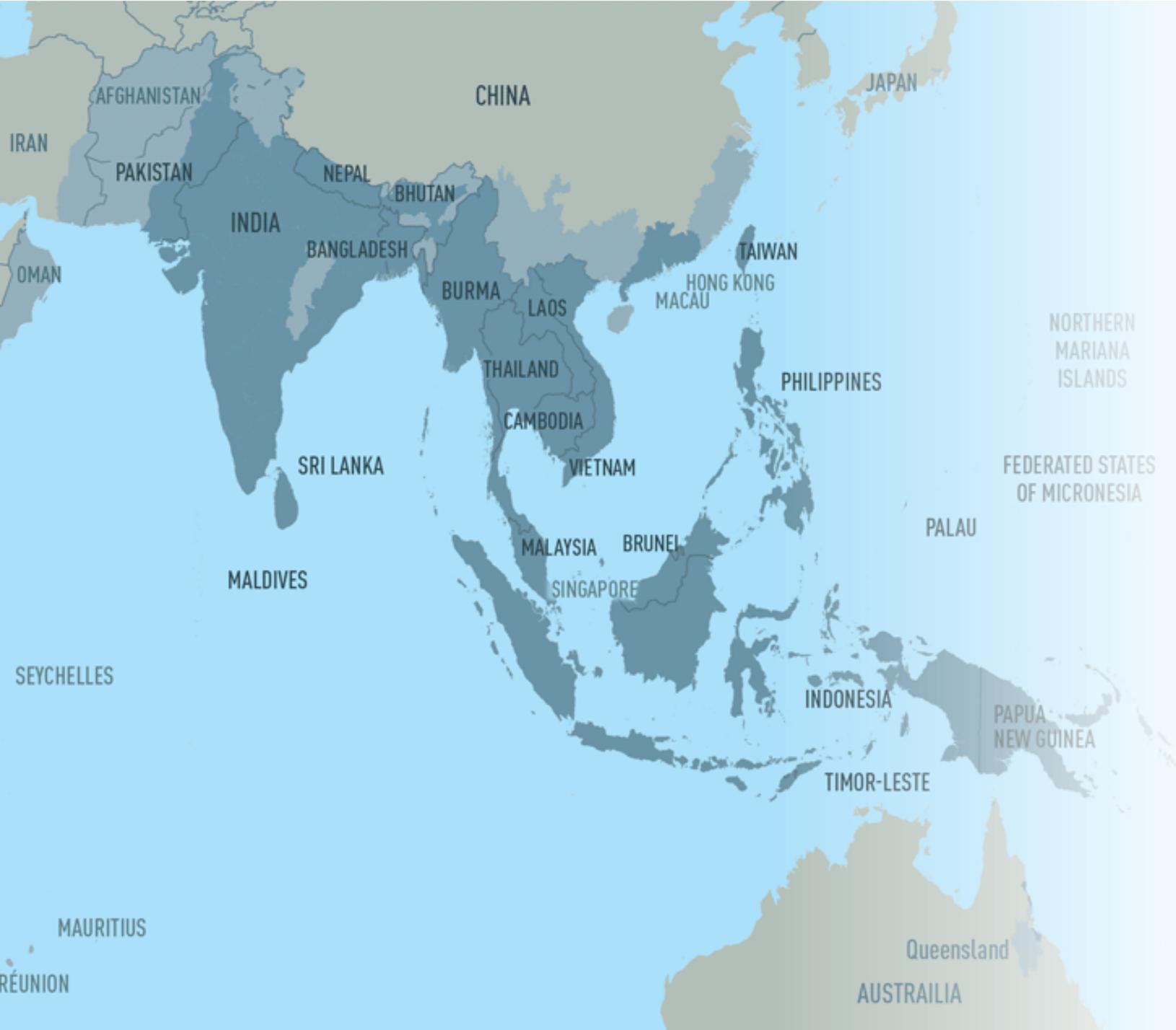




DENGUE FEVER

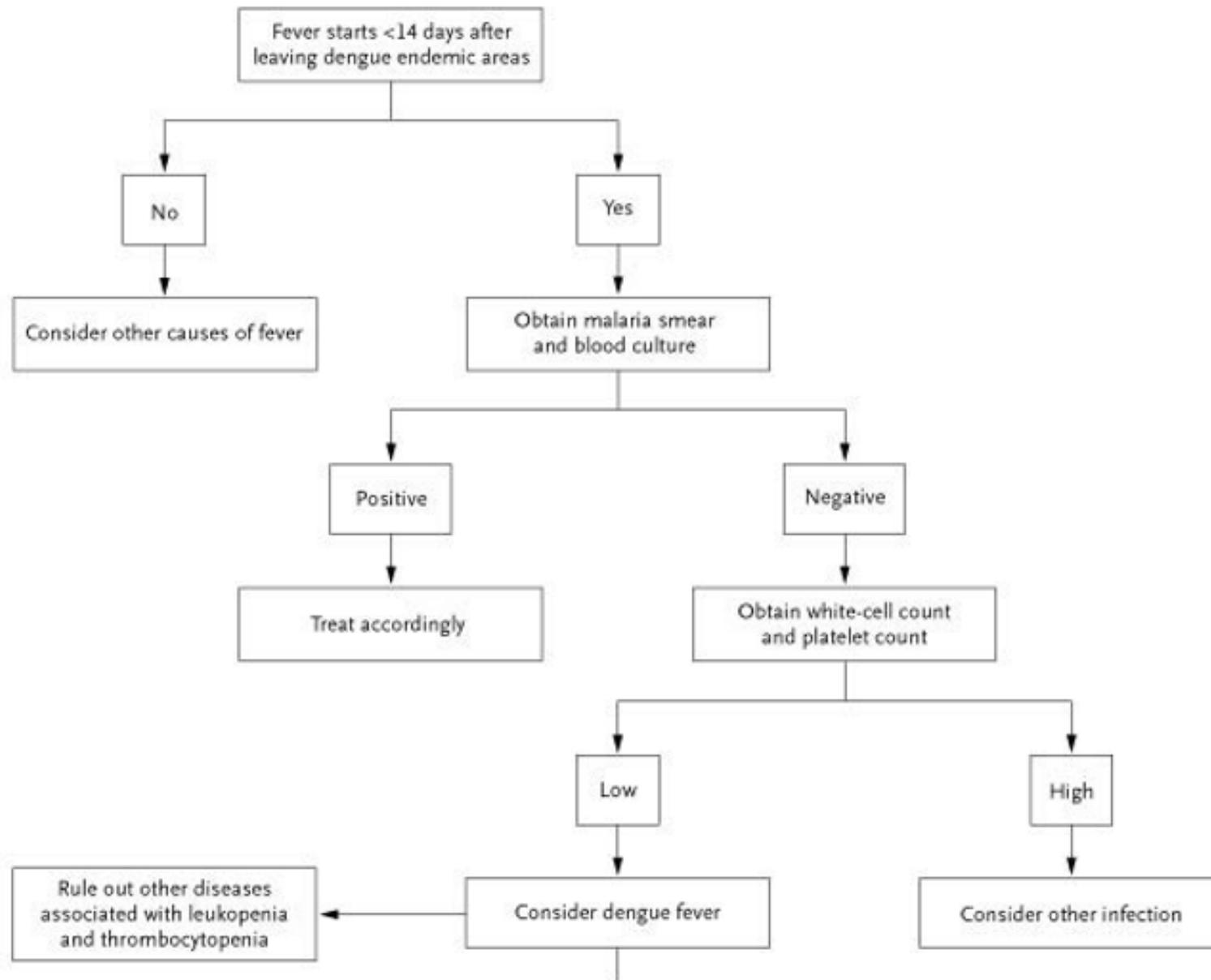
- Occurs in more than 3.9 billion people
- 129 countries are at risk
- 96 million symptomatic cases
- 40,000 deaths every year.

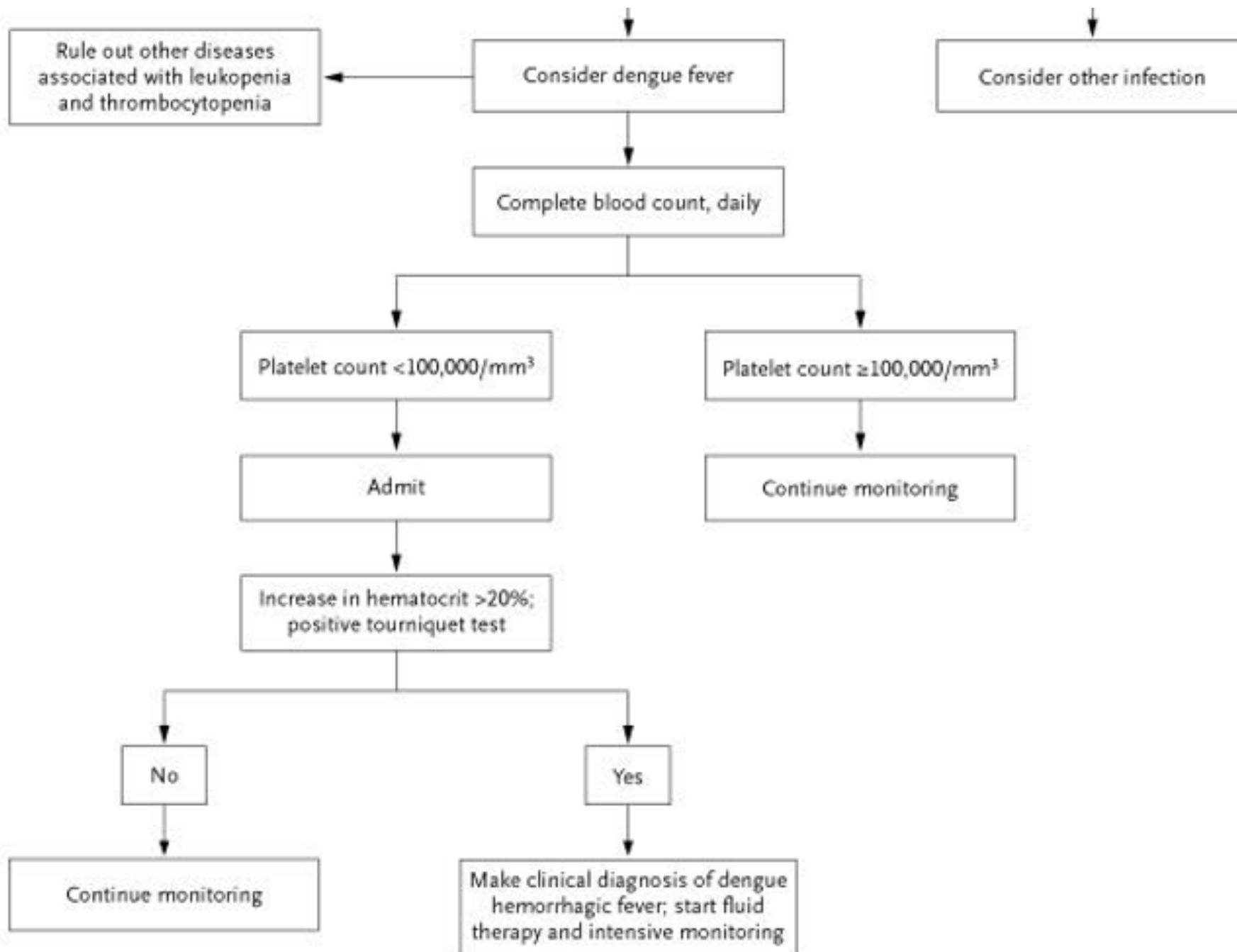




- Increased risk in the urban population and residential areas
- Nonspecific symptoms
- 20% may become severe
- Look for early signs of severe disease

Algorithm for evaluation of fever in a traveler from Asian countries







Scrub Typhus

- Vector/Transmission: Larval form (Chigger) of the Trombiculid mite is the vector that transmits the causative agent *Orientia tsutsugamushi*
- Humans are accidental hosts
- Painless bite.
- Ecology: Mites live in areas of dense vegetation at a humid and warm temperature.
- Incubation period: 7 to 10 days after the bite of an infected chigger (range 6 to 19 days).
- The distribution of scrub typhus is determined by the distribution of the arthropod host/vector.



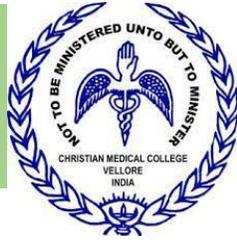
When to suspect scrub typhus in a traveler

- The presence of an eschar is a key clinical feature of scrub typhus.
- It is present in about 50% of travel-related cases.
- It is painless, measures usually 3 to 6 mm in diameter, and can occur on any part of the body, often on the scrotum or in the axillary regions.
- The chigger bite is usually not remembered by the patient, and the eschar must be actively looked for by the physician.

CDC website



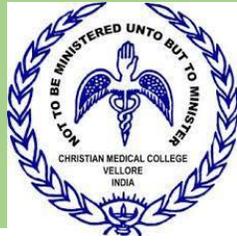
Diagnosis of Scrub typhus



- Serological tests and molecular assays
- The gold standard is the indirect immunofluorescence assay (IFA), but expensive and complicated.
- Indirect immunoperoxidase assay (IIP), ELISAs, and commercially available immuno- chromatographic tests (ICT).
- IIP has a sensitivity of (79.6% vs. 68.5% at titer > 1:400)
- ELISA-based tests are close to the gold standard IFA.
- ICT can be used for early rapid diagnosis and has a high sensitivity (~70%).
- PCR assays

Hendershot, E.F., Sexton, D.J. Scrub typhus and rickettsial diseases in international travelers: A review. *Curr Infect Dis Rep* **11**, 66–72 (2009).

Treatment of Scrub typhus



- DOXYCYCLINE
- World Health Organization (WHO) recommends that pregnant women or children can use azithromycin or chloramphenicol.

Hendershot, E.F., Sexton, D.J. Scrub typhus and rickettsial diseases in international travelers: A review. *Curr Infect Dis Rep* **11**, 66–72 (2009).

Prevention of Scrub typhus



- No vaccine is available to prevent scrub typhus.
- Reduce your risk by avoiding contact with infected chiggers.
- Avoid areas with lots of vegetation and brush where chiggers are found.
- Use of DEET containing repellents against chiggers, on exposed skin and clothing.
- If you are also using sunscreen, apply sunscreen before applying insect repellent.
- Permethrin kills chiggers and can be used to treat boots, clothing, and camping gear.

Chemoprophylaxis



- Chemoprophylaxis is controversial.
- A weekly dose of 200 mg of doxycycline can be used is for travelers at high occupational risk, such as soldiers on field operations.
- Travelers in endemic regions should be warned to avoid cleared jungle areas known to contain infected “mite islands” and to use repellants to the top of boots and socks as well as the hem of trousers.

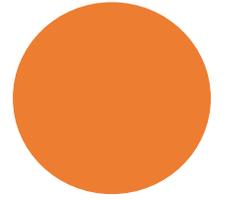
Olson JG, Bourgeois AL, Fang RC, et al. Prevention of scrub typhus. Prophylactic administration of doxy- cycline in a randomized double blind trial. *Am J Trop Med Hyg* 1980; 29:989–997.



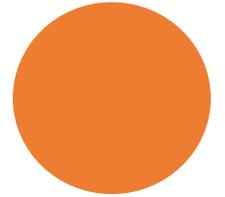
Chikungunya is a viral disease transmitted to humans by infected mosquitoes.

- Asia and the Americas were the regions most affected by chikungunya.
- Pakistan faced a persistent outbreak that started the previous year and reported 8 387 cases, while India suffered with 62 000 cases.

- Japanese encephalitis virus (JEV) is a flavivirus spread by mosquitoes.
- JEV is the main cause of viral encephalitis in many countries of Asia with an estimated 68 000 clinical cases every year.
- 24 countries in the WHO South-East Asia and Western Pacific regions have endemic JEV transmission, exposing more than 3 billion people to risks of infection.



- Lymphatic filariasis caused by *Wuchereria bancrofti*, which is responsible for 90% of the cases
- Leishmaniasis is caused by protozoan parasites which are transmitted by the bite of infected female phlebotomine sandflies.
- In 2020, more than 90% of new cases reported to WHO occurred in 10 countries: Brazil, China, Ethiopia, Eritrea, India, Kenya, Somalia, South Sudan, Sudan and Yemen.



Summary

- International travelers are at risk of vector borne diseases
- Behavioral change is the crucial element in reducing VBD
- Pre travel advice and carefully planned travel itinerary is important
- Risk assessment of the destination prior to travel.
- Personal protection and use of insect repellent.
- Adherent chemoprophylaxis may reduce the risk of diseases.

