

Dengue epidemics

French Experience from the Overseas Territories outbreak response from the field

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WORKSHOP ISTAMBUL EMERGING INFECTIOUS DISEASES 25-26 MARS 2026



Conflict of interest disclosure

I have no relevant financial or non-financial relationships to disclose regarding the content of this presentation.

Martinique in the French west indies

- One of the French oversea's territory
- About 7000 km from France = 9h by plane
- Tropical weather with 2 seasons (dry and wet)
- Over 350 000 inhabitants
- The most ageing department in France (33% > 60 years old)
- Endemo epidemia of dengue
- Other repeated and successive arbovirus outbreaks
- Yellow fever has disapeared



Healthcare system

General Overview

- ✓ French public health insurance system
-  300 general practitioners over the island

University Hospital Infrastructure

-  720 hospital beds total
-  40,000 annual visits to the emergency unit
-  30 beds for intensive and critical care
-  20 beds specialized in infectious diseases

Challenges during epidemics

-  Bed capacity saturation
-  Human resources strain and need for reinforcements (Health Reserve)
-  Outpatient follow-up is crucial for limiting hospital influx



Geographic distribution (incidence/100k person-years; 2023)



EU overseas countries/territories and outermost regions reporting cases and not visible in the main map extent

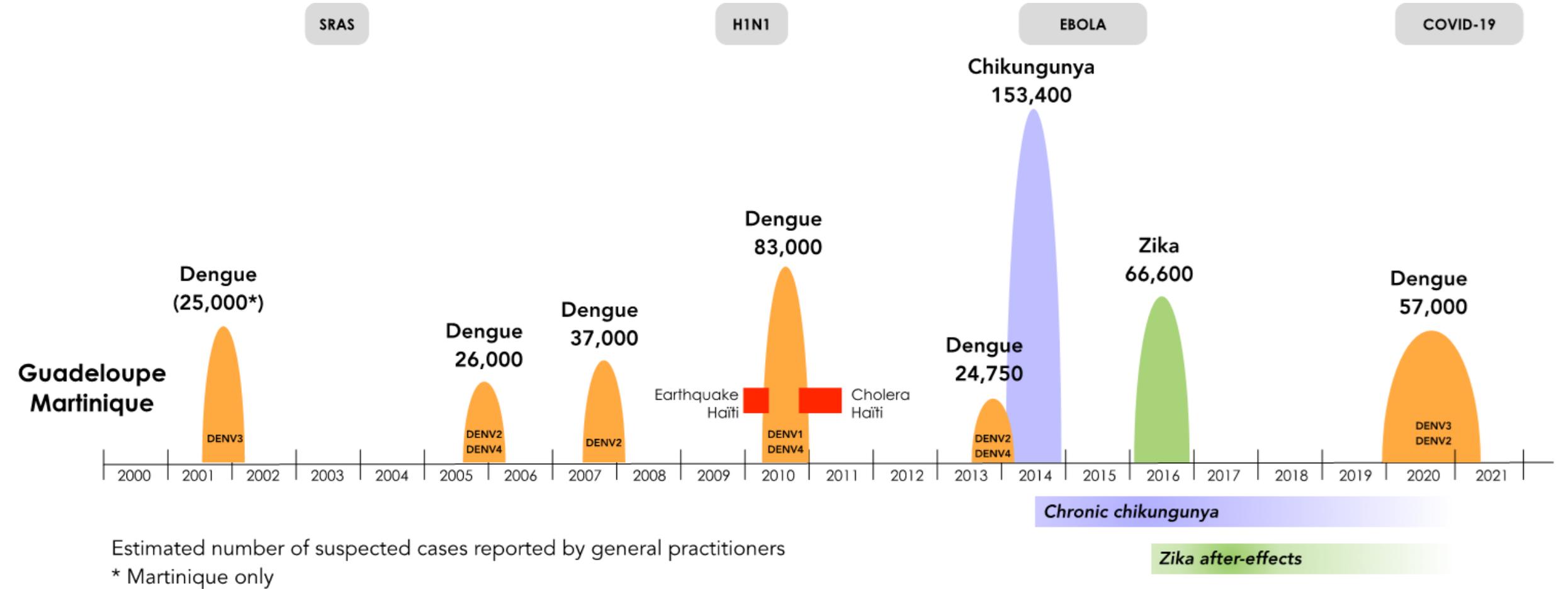
- Guadeloupe
- Martinique
- New Caledonia
- La Réunion
- Wallis and Futuna

Notification rate per 100 000 persons



Note: Data refer to Dengue virus cases reported in the last 12 months (November 2022-October 2023) [Data collection: November 2023]. Administrative boundaries: © EuroGeographics
The boundaries and names shown on this map do not imply official endorsement or acceptance by the European Union. ECDC. Map produced on 09 November 2023

Emerging infections in Martinique



Seroprevalence of dengue fever in the West Indies

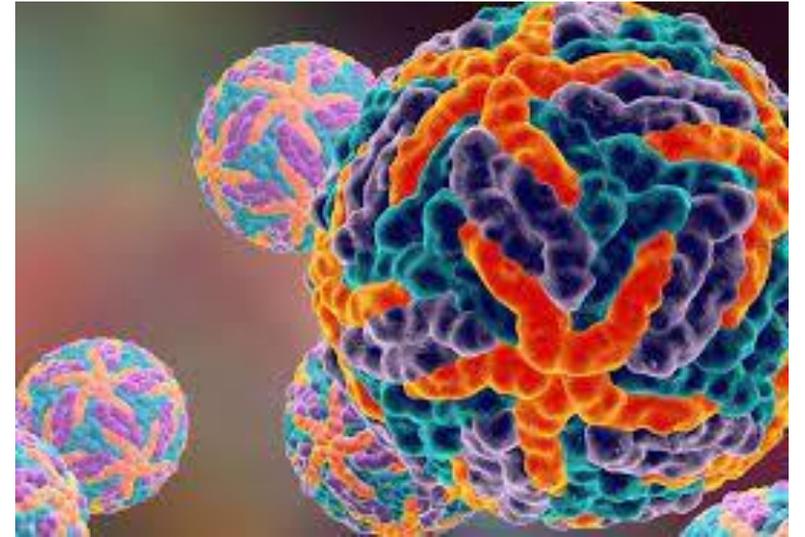
Seroprevalence of anti-dengue IgG in adult blood donors in Martinique and Guadeloupe according to age and birthplace in 2011 ($N = 783$)

	Seroprevalence % (n/N)	Confidence intervals (95%) (exact method)
18–70 years	93.5% (732/783)	[91.5; 95.1]
18–19 years	86.7% (26/30)	[69.3; 96.2]
20–29 years	91.7% (176/192)	[86.8; 95.2]
30–39 years	90.0% (171/190)	[84.8; 93.9]
40–49 years	96.9% (188/194)	[93.4; 98.9]
50–59 years	96.6% (142/147)	[92.2; 98.9]
60–70 years	96.7% (29/30)	[82.8; 99.9]
Born in the French West Indies	97.4% (551/566)	[95.7; 98.5]
Born in Continental France	82.2% (152/185)	[75.9; 87.4]

IgG = immunoglobulin G.

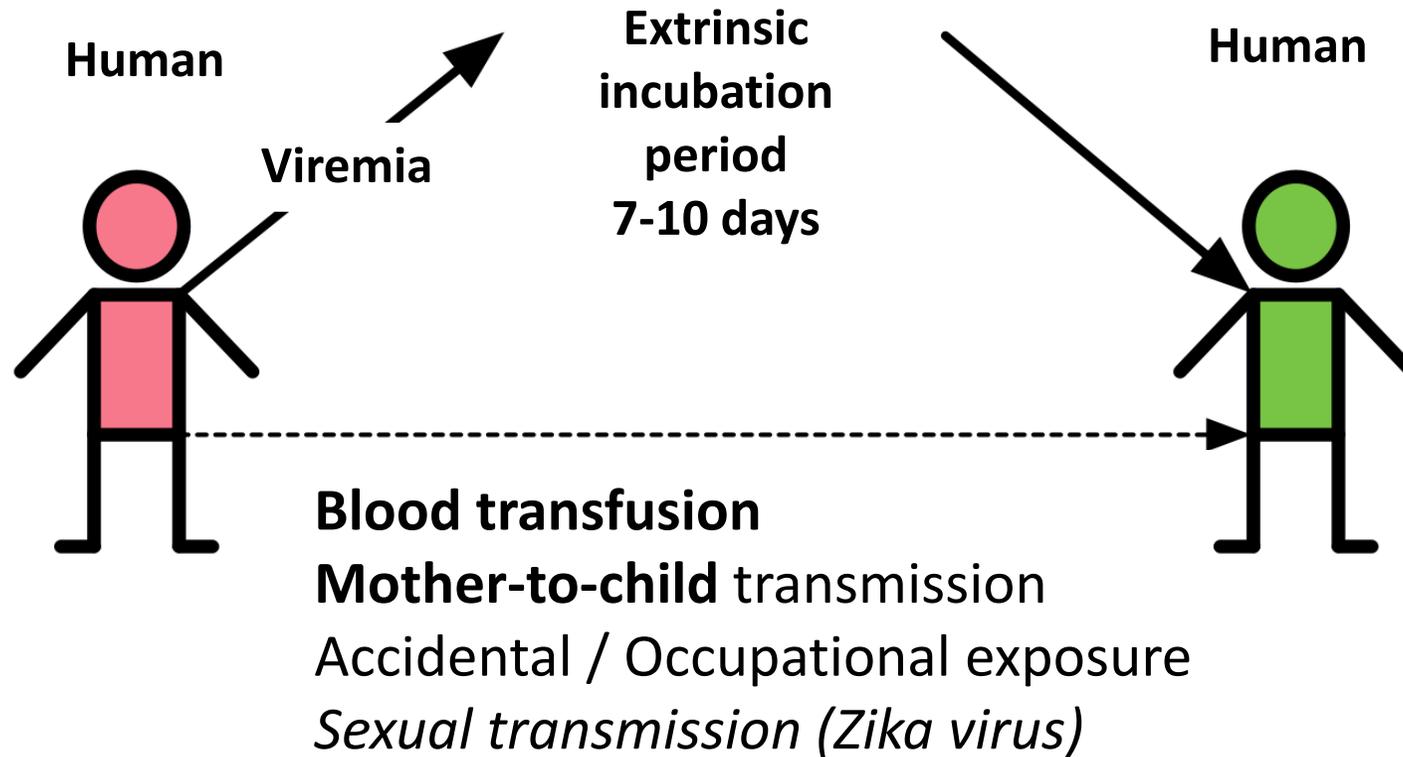
General information on Dengue

- RNA virus of the genus Flaviviridae
- Same family as yellow fever virus, Zika virus...
- Arbovirus = Arthropod Borne Viruses
- Transmitted by female Aedes mosquitoes (aegypti, albopictus...)
- Four serotypes: DENV-1, DENV-2, DENV-3, DENV-4, with no cross-protective immunity but modulation in the response to infection
- Reinfection possible (primary, secondary, and post-secondary infections)



Dengue transmission cycle

Aedes mosquito



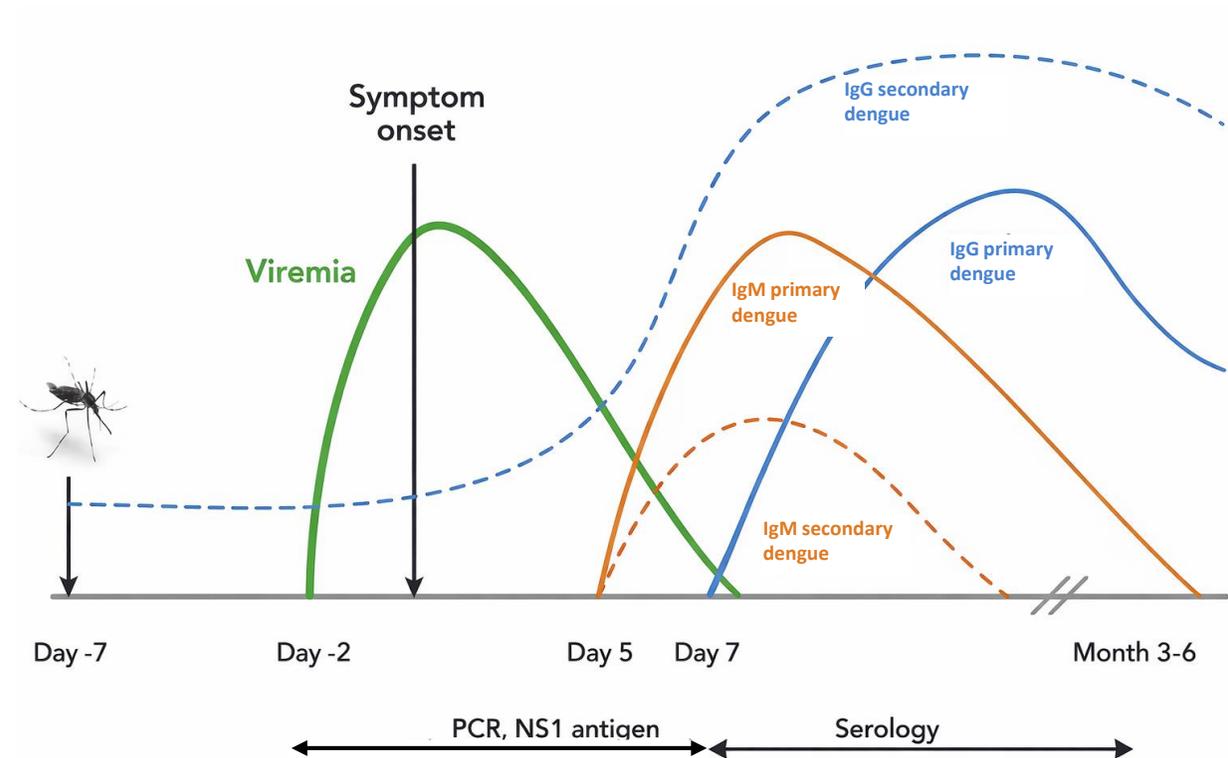
Clinical spectrum

- Wide clinical spectrum
- **Asymptomatic** forms in most cases (50 to 90%¹)
- **Symptomatic** forms ranging from
 - ✓ **Non-severe** forms (acute viral infection) with or without warning signs
 - ✓ **Severe** forms (1 to 5%²): plasma leakage syndrome (vasculopathy)
- Avoid using the term "hemorrhagic dengue" not systematically linked to severity, instead distinguish between non-severe and severe forms



Biological diagnosis

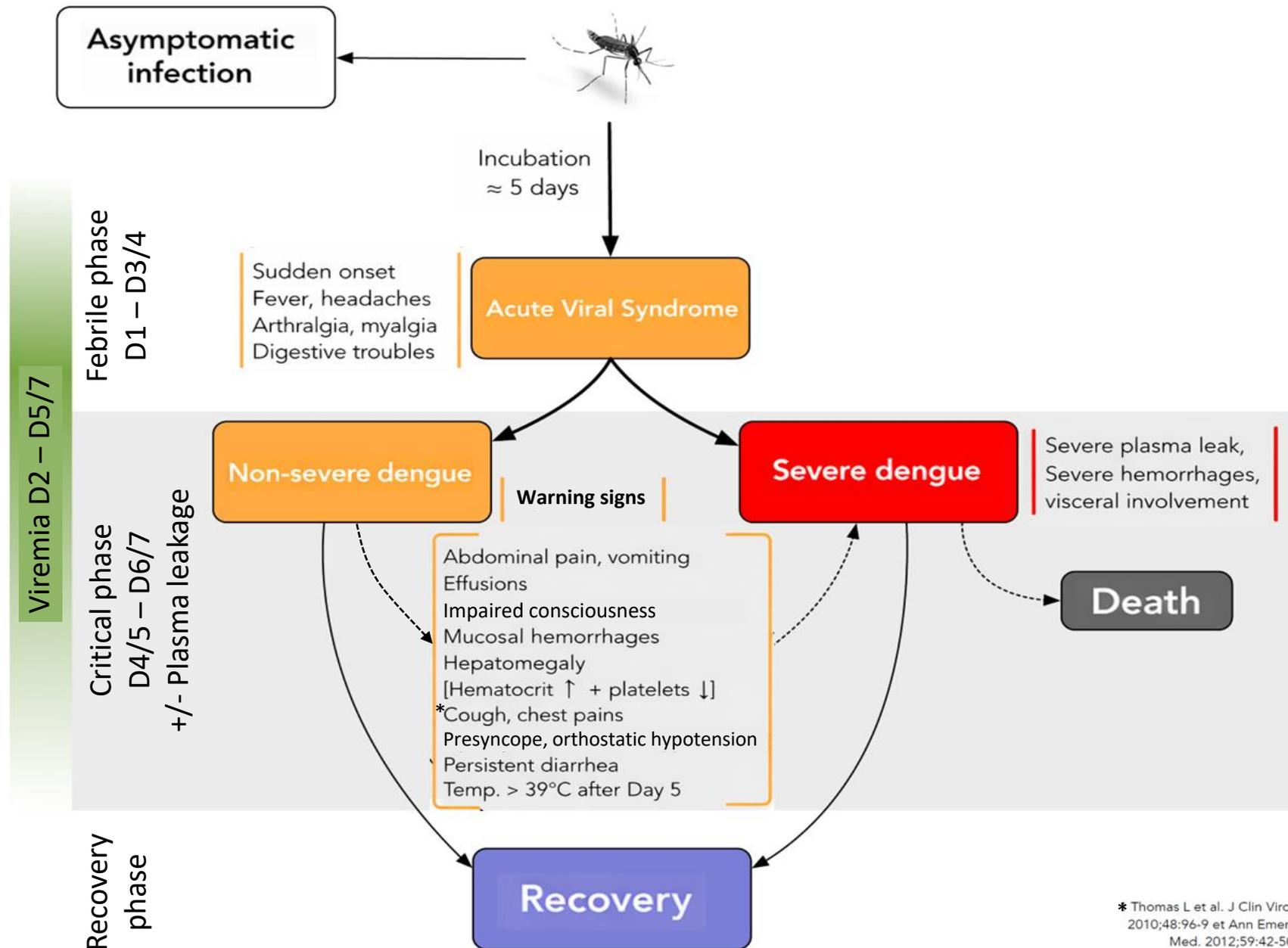
- First week of illness:
 - direct detection by RT-PCR
 - +/- detection of the NS1 antigen (negative or inconclusive NS1 cannot rule out the diagnosis → routine RT-PCR is preferred)
- Beyond day 7: serology but limitations +++ in endemic countries
- Diagnostic **prioritization** during an outbreak
 - ✓ risk factors of severe dengue / warning signs
 - ✓ suspicion of severe dengue
 - ✓ clinical diagnostic uncertainty



Consider differential diagnoses

- Delays in managing alternative diagnoses are frequent during dengue outbreaks
- Indicative list of conditions to consider (depending on location):
 - Leptospirosis
 - Other bacterial infections that worsen in the absence of antibiotic treatment
 - Primary HIV infection
 - Other arbovirus diseases: chikungunya, Zika ...
 - Influenza
 - COVID-19
 - Malaria
 - Rash diseases including measles, rubella... And non-specific viral syndrome
 - Hemorrhagic fevers...

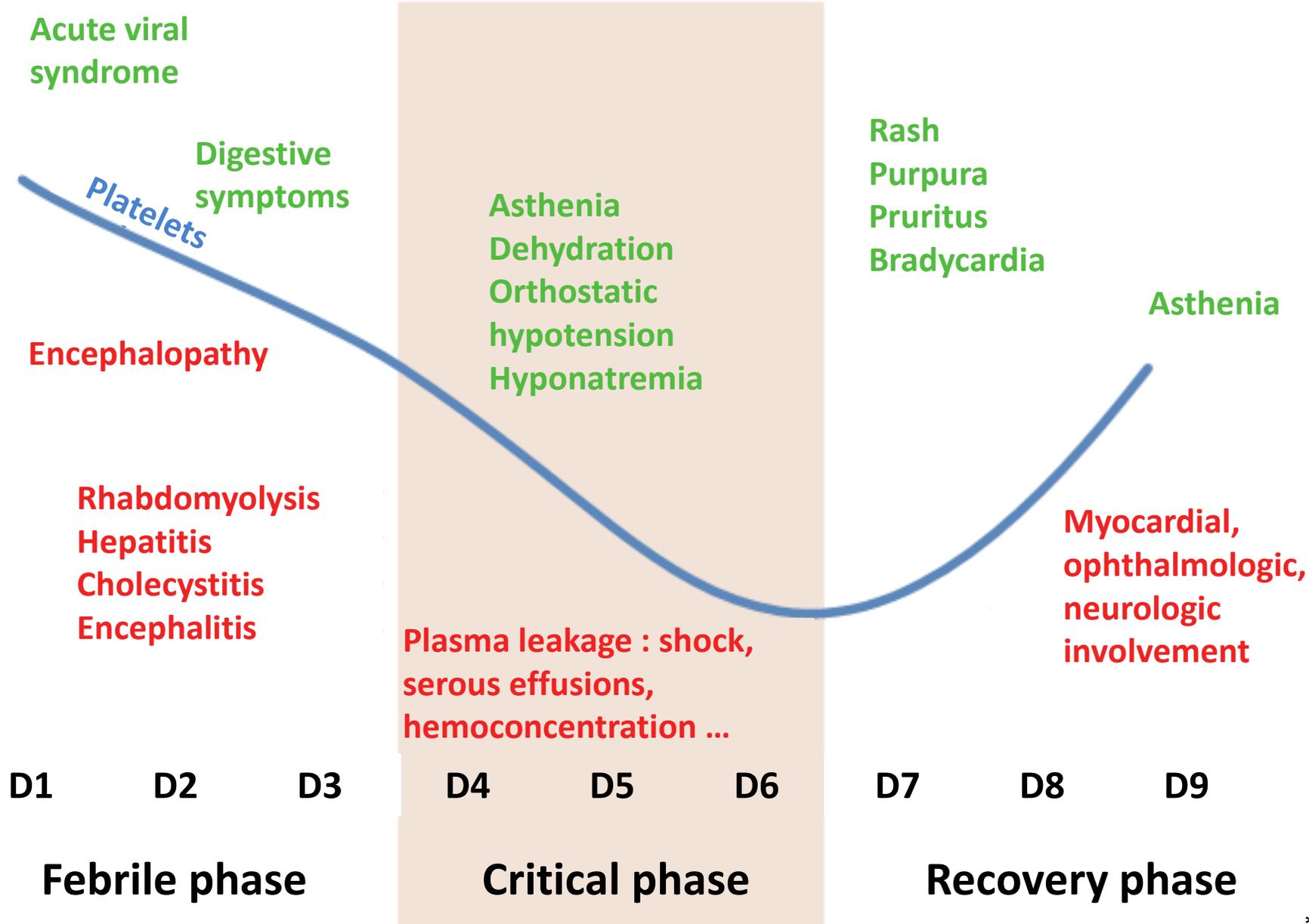
Clinical history of infection (adaptated from WHO 2009)



* Thomas L et al. J Clin Virol. 2010;48:96-9 et Ann Emerg Med. 2012;59:42-50.

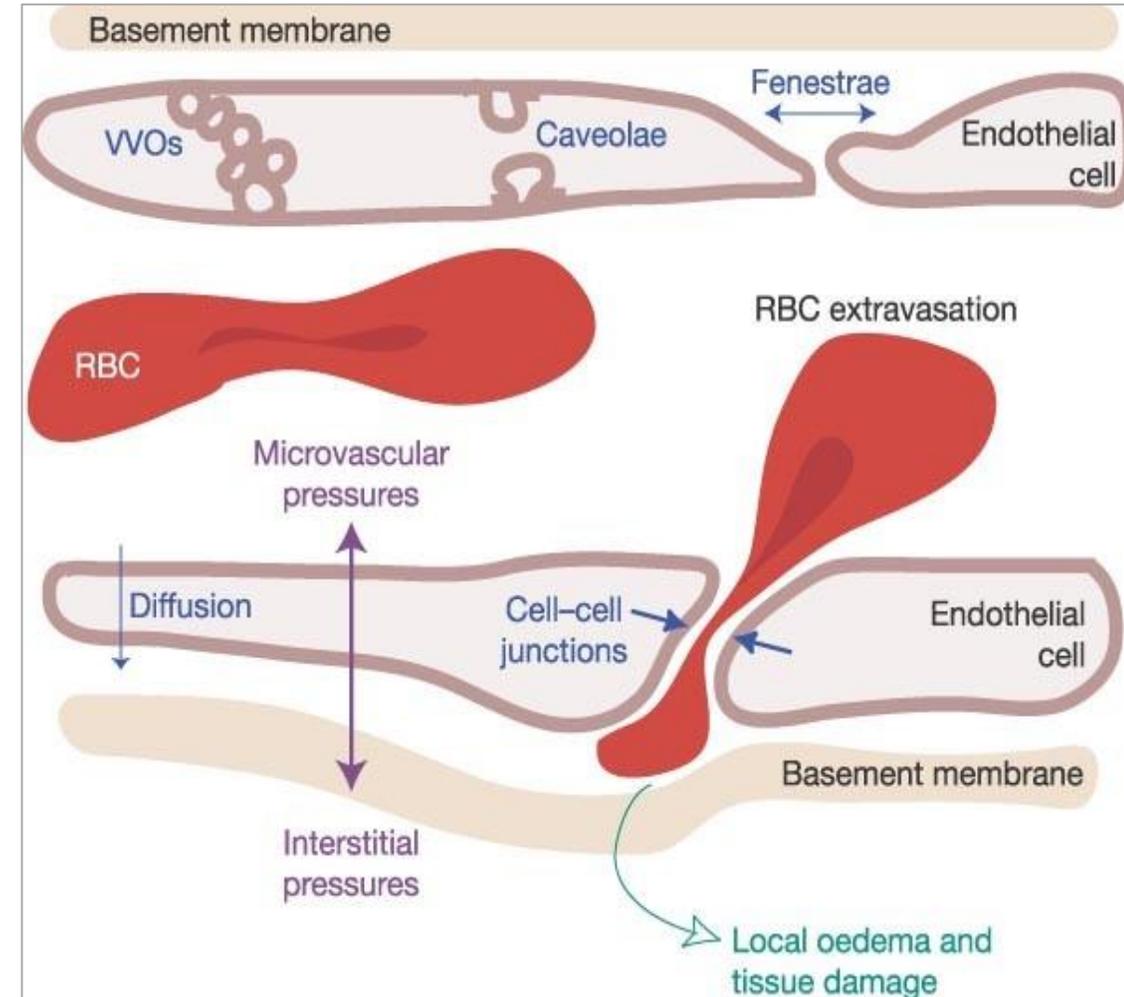
DENGUE

SEVERE DENGUE



Clinical and biological progression: Plasma leakage syndrome

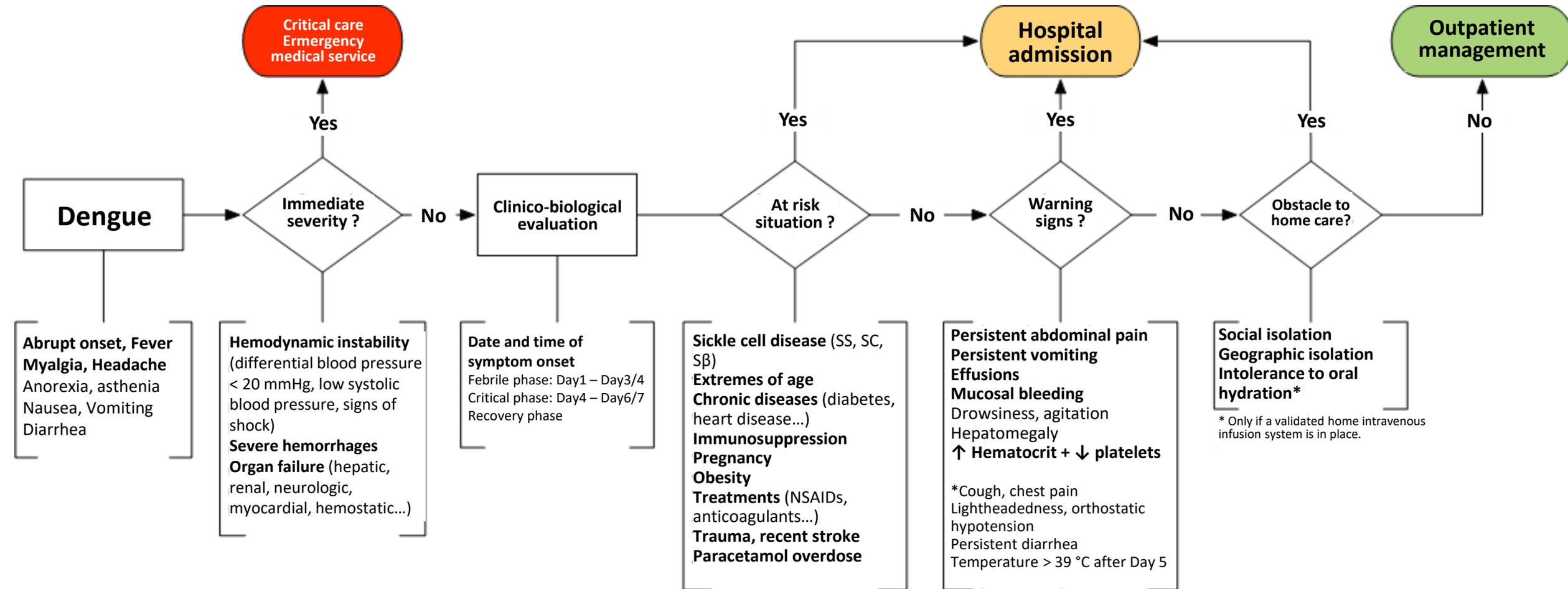
- Severity of the disease
Rapid deterioration within a few hours
- Clinical
 - onset of a **3rd space fluid accumulation** with interstitial edema (pleura, peritoneum, etc.),
 - hemodynamic failure/shock,
 - hemorrhagic syndrome
- Biological:
 - **hemoconcentration**,
 - hypoalbuminemia,
 - thrombocytopenia,
 - metabolic acidosis,
 - **DIC** and multiple organ failure



Recovery phase rash (\neq Febrile phase rash)



Patient orientation and triage strategy



* Thomas L et al. J Clin Virol.
2010;48:96-9 et Ann Emerg Med.
2012;59:42-50.

Outpatient management

- Many limitations but **essential** during epidemics
- Monitoring and management until the end of the critical phase (6/7 days)
 - Daily clinical assessment by the GP (or at least every 48 hours with telephone contact in between)
 - Blood tests at least every 48 hours
 - Hospitalization in case of worsening, new signs, or lack of improvement despite oral hydration
 - **Oral hydration solution (over 3 l/day), salted soups, fruit juices**
± IV hydration via a home-care provider during ED overcrowding
- **Drug contraindications**
 - **Aspirin and anti-inflammatory** drugs
 - Intramuscular injections
- Paracetamol for pain (**beware of overdose**)
- Personal protection against mosquito bites during viremic phase

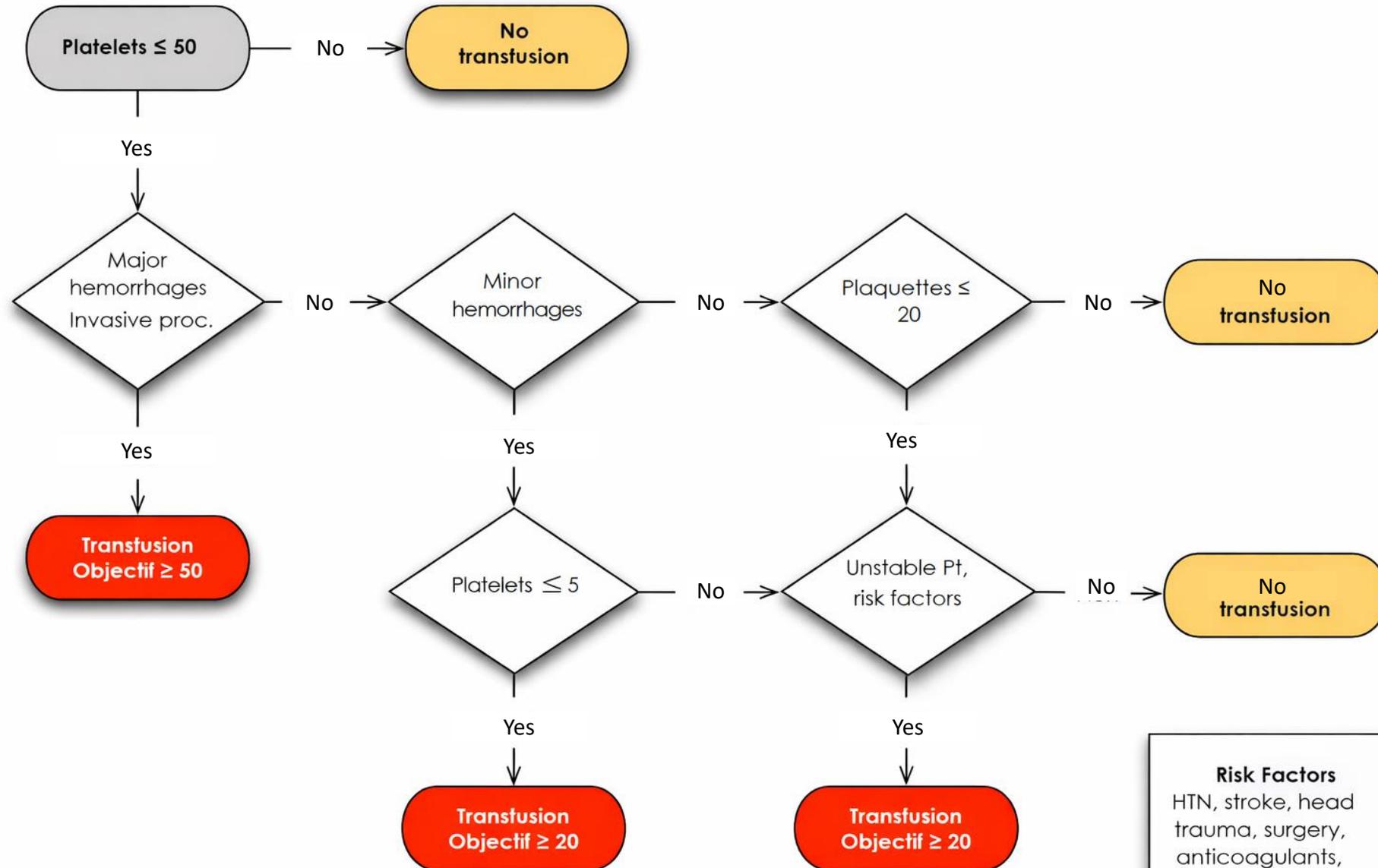
Management of dengue with warning signs or plasma leakage without severity criteria 1/2

- Hospital admission
- **Intravenous hydration** with crystalloid solution (0.9% sodium chloride)
 - with a loading dose 10 mL/kg over 1 hour
 - maintenance dose if improvement and adequate urine output (monitor carefully – risk of fluid overload)
- **Close clinical and biological monitoring**
 - Vital signs, clinical status, and urine output every 4 hours
 - Hematocrit after the loading dose and then every 8 to 12 hours
 - Blood glucose, AST/ALT, electrolytes, serum creatinine, urea, ferritin, coagulation tests every 24 hours

Management of dengue with warning signs or plasma leakage without severity criteria 2/2

- Drug contraindications
 - Aspirin and anti-inflammatory drugs
 - Intramuscular injections
 - Paracetamol (temporary discontinuation)
- Personal protection against mosquito bites during viremic phase
- Criteria for hospital discharge
 - Clinical criteria : Afebrile for at least 48 hours, general condition improving, return of appetite, normal hemodynamic status, normal or increased urine output, absence of respiratory distress and bleeding
 - Biological criteria : Increasing platelet count, stable hematocrit without intravenous fluid therapy

Thrombocytopenia management



Dengue fever and prevention

Vector control

- Collective measures (PSAGE)
- Individual measures

Individual protection

- Physical barriers
- Chemical barriers

Vaccination

- Qdenga (2 doses)
- *Butantan (1 dose)*

Vector control and public health measures

Shared responsibility between local authorities : State, Regional Council, Regional Public Health Agency
Activation of the PSAGE (Epidemic Surveillance, Alert, and Management Program)

PHASE	DESIGNATION	EPIDEMIOLOGICAL INTERPRETATION	2023 TIMELINE
Phase 1	Sporadic transmission phase	Presence of sporadic cases	February 2023
Phase 2 – Level 1	Isolated clusters phase	Isolated clusters or clusters without epidemiological link(s)	March 2, 2023
Phase 2 – Level 2	Active viral circulation phase	Cluster(s) with potential progression or multiple clusters with epidemiological link(s) between them	June 21, 2023
Phase 3	Epidemic risk phase	Exceedance by clinically suggestive cases of the expected maximum level	July 27, 2023
Phase 4 – – Level 1	Epidemic phase	Confirmed epidemic (cf. epidemic alert criterion)	August 22, 2023
Phase 4 – – Level 2	Epidemic phase with severe forms	Epidemic with a high frequency of severe forms	–
Phase 5	Return-to-normal phase	From the point at which clinically suggestive cases fall below the expected maximum level, until the end of the epidemic (cf. end-of-epidemic criterion), and transition to sporadic transmission, isolated clusters, or active viral circulation	
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Destruction of larval habitats

J'ÉLIMINE LES EAUX STAGNANTES



JE CHANGE L'EAU 2 FOIS PAR SEMAINE



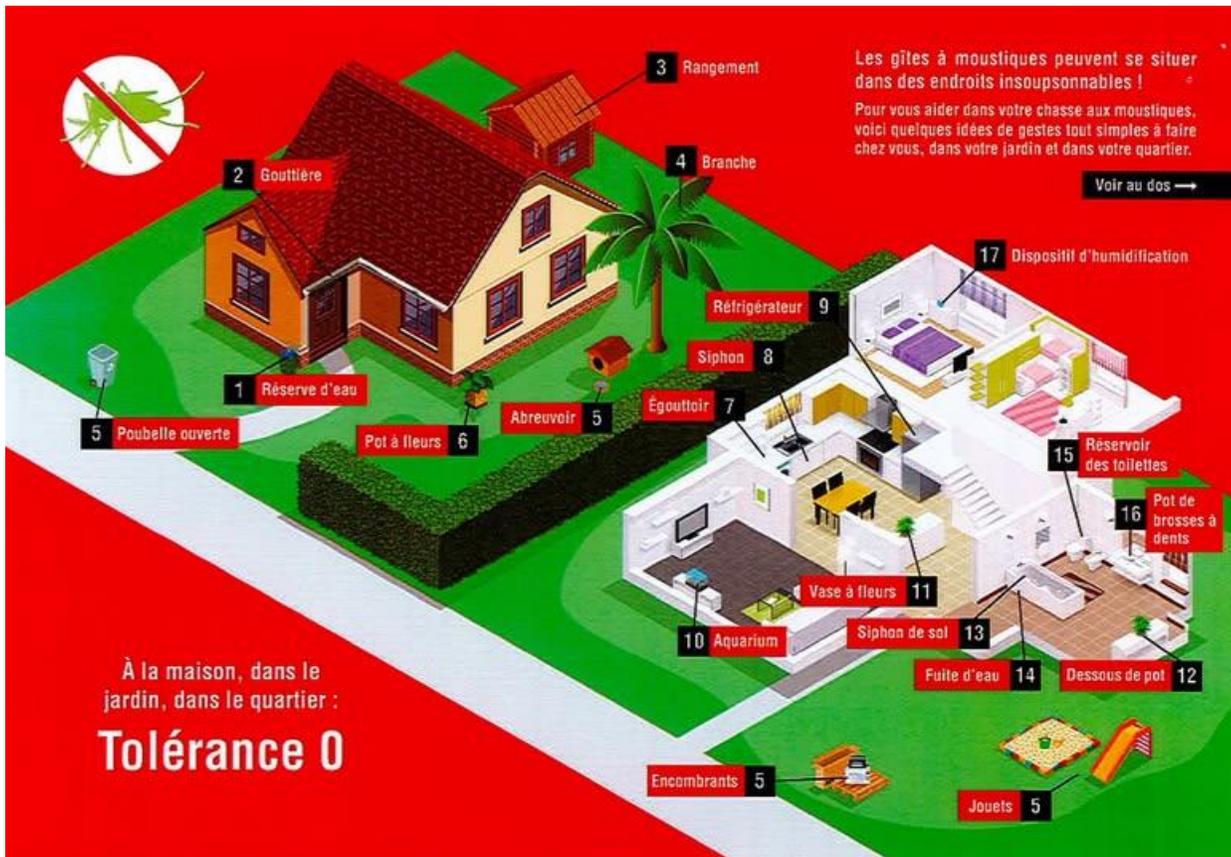
JE COUVRE LES FÛTS ET CITERNES D'EAU



JE NETTOIE LES GOUTTIÈRES



JE ME PROTÈGE DES PIQÛRES



Insecticide spraying



Collectivité Territoriale de Martinique
RÉPUBLIQUE FRANÇAISE
ars
16 juillet au 20 août 2025

Caravane STOP AUX MOUSTIQUES !

Faisons la guerre aux MOUSTIQUES !

TOUS RESPONSABLES STOP AUX MOUSTIQUES !

collectivitedemartinique.mq

The poster features a white van with a mosquito icon and the slogan 'TOUS RESPONSABLES STOP AUX MOUSTIQUES !' on its rear. A person is shown spraying the van. In the background, a red and white tent with staff members is set up on a green field with a winding road and red location pins. A red vertical banner on the right indicates the dates '16 juillet au 20 août 2025'. Logos for the Collectivité Territoriale de Martinique, République Française, and ars are at the top.



Emergence of insecticide resistance in Martinique

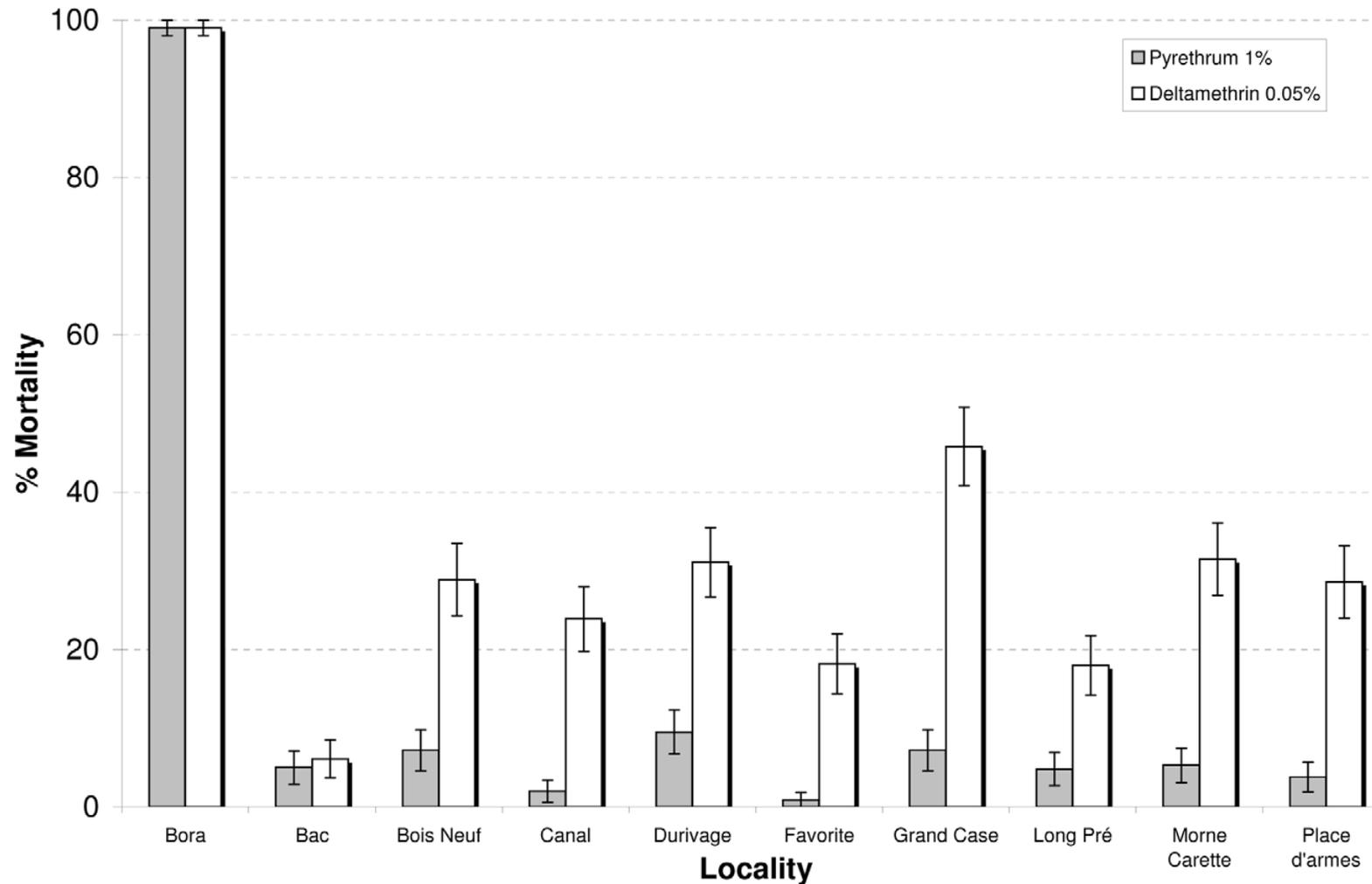


Figure 2. Mortality rates in WHO tube tests. This figure shows the mortality rates (6 SE) of *Aedes aegypti* collected in the 9 localities selected for the space treatments and that of the laboratory susceptible strain (Bora) when exposed to pyrethrum (1%) or deltamethrin (0.05 %) in WHO tube tests. Data were analyzed using the AOD package of R. doi:10.1371/journal.pntd.0001202.g002

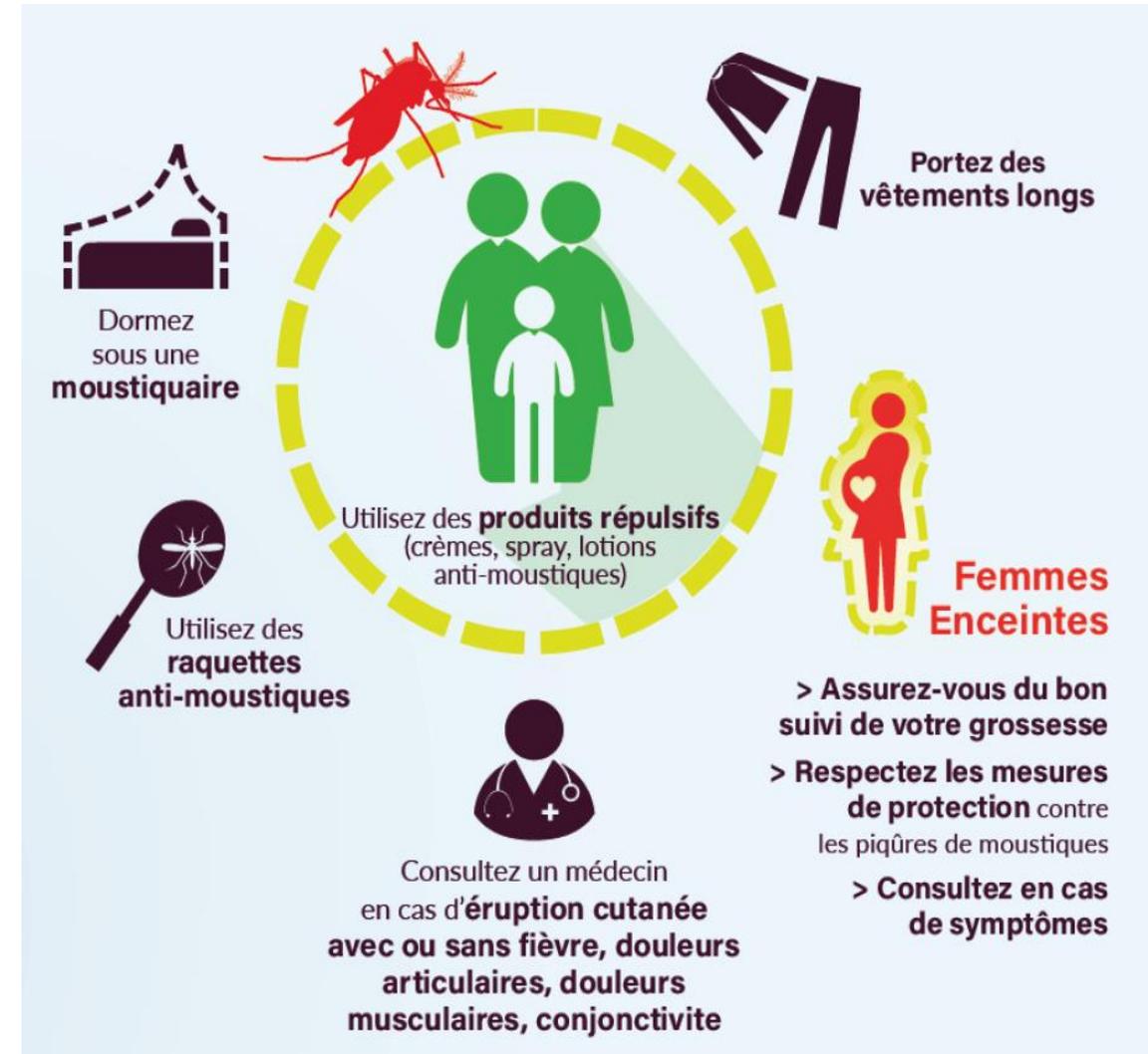
Individual measures

Recommended measures:

- Insecticide-treated **mosquito net for beds**, cribs, or strollers, depending on age
- Non-insecticide-treated mosquito net in the absence of malaria risk
- **Window and door screens**
- **Topical skin repellents** applied to exposed body areas, in addition to wearing loose-fitting, covering and lightweight clothing

Additional measures:

- Electric insecticide diffuser (indoors)
- **Electric mosquito swatters**
- Indoor spraying of insecticide “foggers” or “bombs” (commercially available)
- Air conditioning
- Ventilation
- Mosquito coils (outdoor use)



Dengue Vaccines



CYD-TDV^[1]

- Live attenuated
- Tetravalent
- 3 doses
- Yellow fever 17D backbone chimerized with prM and E proteins from DENV-1 to 4 replacing the YF prM and E

**Licensed, but
production discontinued**



TAK-003^[2]

- Live attenuated
- Tetravalent
- 2 doses
- Live dengue virus vaccine backbone chimerized with DENV-2 PDK-53

Licensed



TV-003/Butantan-DV^[3-5]

- Live attenuated
- Tetravalent
- 1 dose
- DENV backbone modified by deletion or antigenic chimerization to represent DENV-1 to 4

Licensed

prM and E, pre-membrane and envelope

1. CYD-TDV dengue tetravalent vaccine (live, attenuated) [PI]. EMA. Published December 18, 2018; Updated October 21, 2025; 2. TAK-003 dengue tetravalent vaccine (live, attenuated) [PI]. EMA. Published December 14, 2022; Updated December 1, 2025; 3. Kallás EG, et al. N Eng J Med. 2024;390:397-408; 4. Pierce KK, et al. J Clin Invest. 2024;134:e173328; 5. Blaney JE Jr, et al. Viral Immunol. 2006;19:10-32.

Vaccination

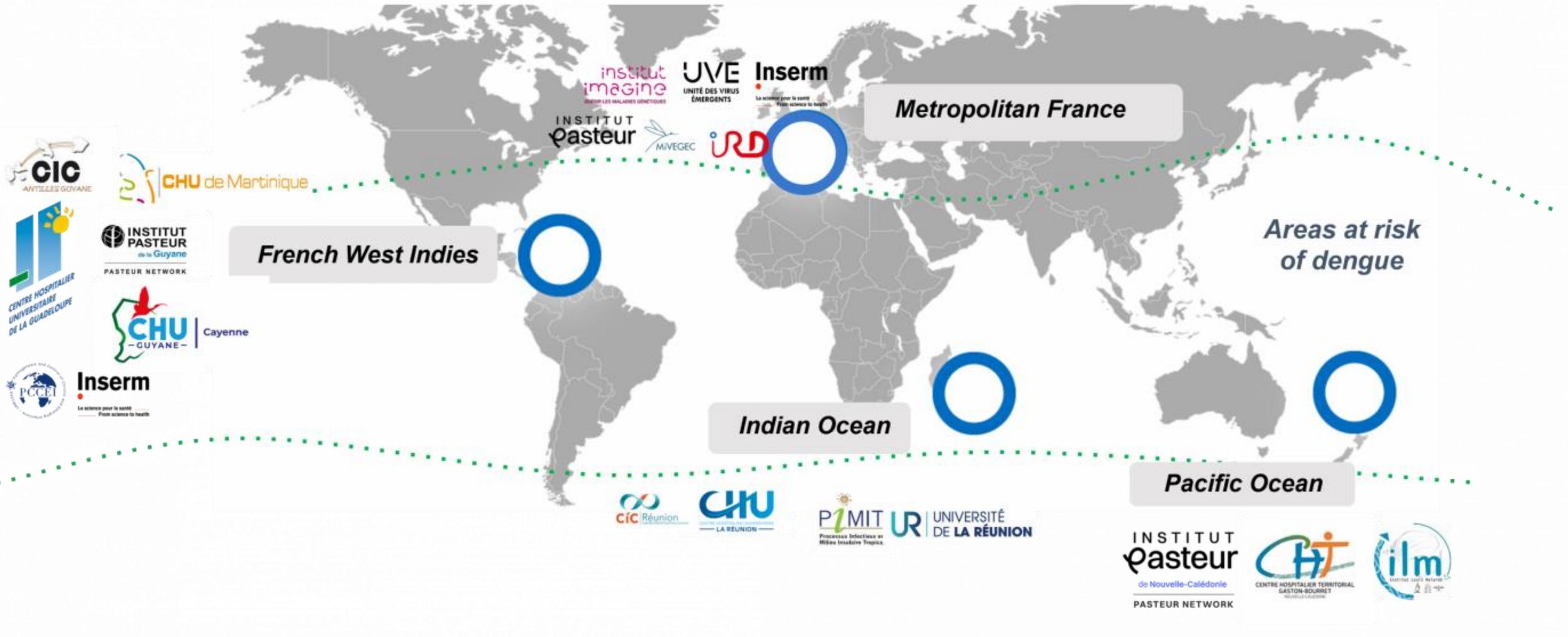
- Dengvaxia[®] : controversy related to severe dengue following vaccination and a potential link with ADE, no longer available
- Qdenga[®] : Dec 2024 - Recommended in French overseas territories in the Americas, Mayotte, and Réunion for:
 - Children aged 6–16 years with prior dengue infection
 - Adults aged 17–60 years with comorbidities, regardless of previous dengue infection

Not reimbursed in France with approximate cost: €110–120 per dose (2 doses schedule)

- Additional data awaited for the Butantan[®] dengue vaccine (1 dose)



Research



Take home messages from « the field »

- Prioritization of laboratory testing and outpatient follow-up
- No specific treatment = close monitoring and supportive care
- Consider differential diagnoses
- One Health approach involving authorities and community engagement in vector control
- Progress toward vaccination strategies



Thank you for your attention.

