Motto

Vision

- To impart evidence based research oriented medical education
- To provide best possible patient care
- To inculcate the values of mutual respect and ethical practice of medicine

RULES

DENGUE FEVER

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SLO

- Better understanding of clinical management of Dengue patients
- Provision of standardized and uniform care.

Objectives

- What is Dengue infection
- Pathogenesis with focus on primary and secondary infection
- Diagnosing Dengue infection, DHF, and DSS
- Recognizing critical period
- Monitoring and Treatment of Dengue infected patients

History

- **Old disease,** Chinese medical encyclopedia from the **Jin Dynasty** (265–420 AD), **> 2000 years**
- Virus isolation
  - 1943 Hotta & Kimura, 1944 Sabin & Schhlessinger
- 1st epidemic – 1953/54 Philippines
- 2nd epidemic- 1956 Philippines
- 3rd epidemic – **1958 BKK** Thailand

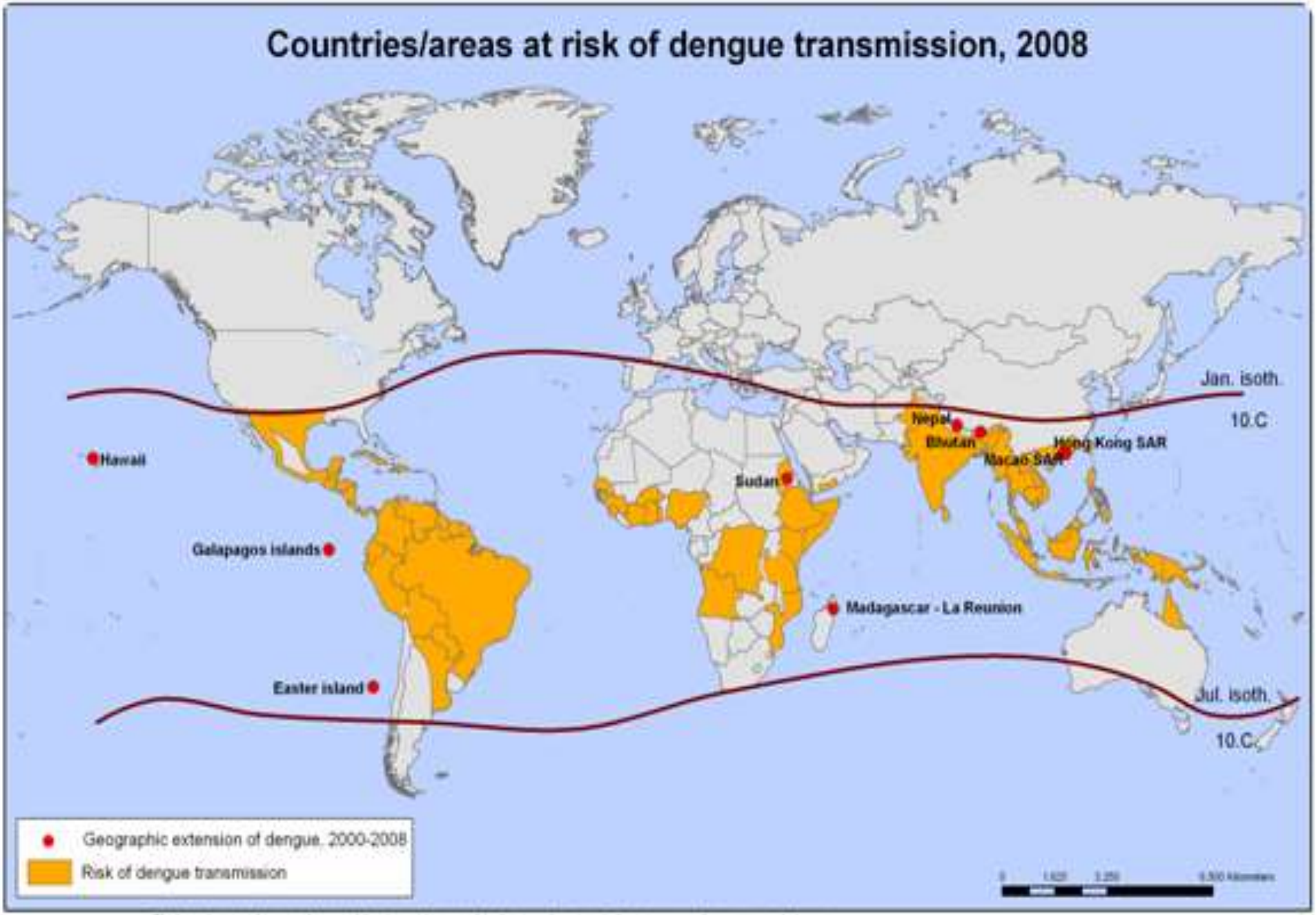
- **NOW in OVER 100 COUNTRIES!!!**

Global Situation

- An estimated 2.5 billion people (**40% of world's population**) live in over 100 endemic countries and areas where dengue viruses can be transmitted.
- Up to 50 million infections occur annually
  - DHF 500 000
  - **Deaths 22,000**

Source: WHO http://www.who.int/csr/disease/dengue/impact/en/

Countries/areas at risk of dengue transmission, 2008



Data Source: DengueNet, World Health Organization
Map Production: Public Health Information and Geographic Information Systems (GIS)

Distribution of DF/ DHF

Before 1960

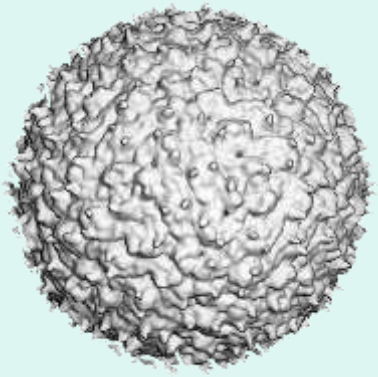
After 1960

Source: WHO http://www.who.int/csr/disease/dengue/impact/en/

Local Epidemiology

- Pakistan first reported an epidemic of dengue fever in 1994.
- Dengue virus is now endemic in Pakistan, circulating throughout the year with a peak incidence in the post monsoon period. Floods make the situation worse.
- **LAHORE EPIDEMIC:**
- **31861 confirmed cases.**
- **About 400 persons died.**

Dengue Virus



- **Classification**

  Family: Flaviviridae

  Genus: Flavivirus

- **Virus**

  Enveloped virus with a surface protein (haemagglutinin)

  Single stranded positive sense RNA genome

- **Serotypes**

  Four serotypes DEN 1 to DEN 4 with multiple genotypes

Life cycle

Blood meal by **a female mosquito**

extrinsic incubation period

8 – 10 days

replication in the mosquito

infected for life

introduce the virus to human during a blood meal

intrinsic incubation period

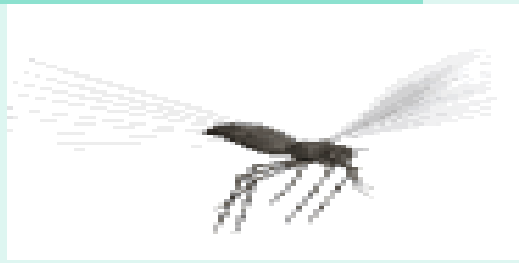
4 – 6 days

replication in the human

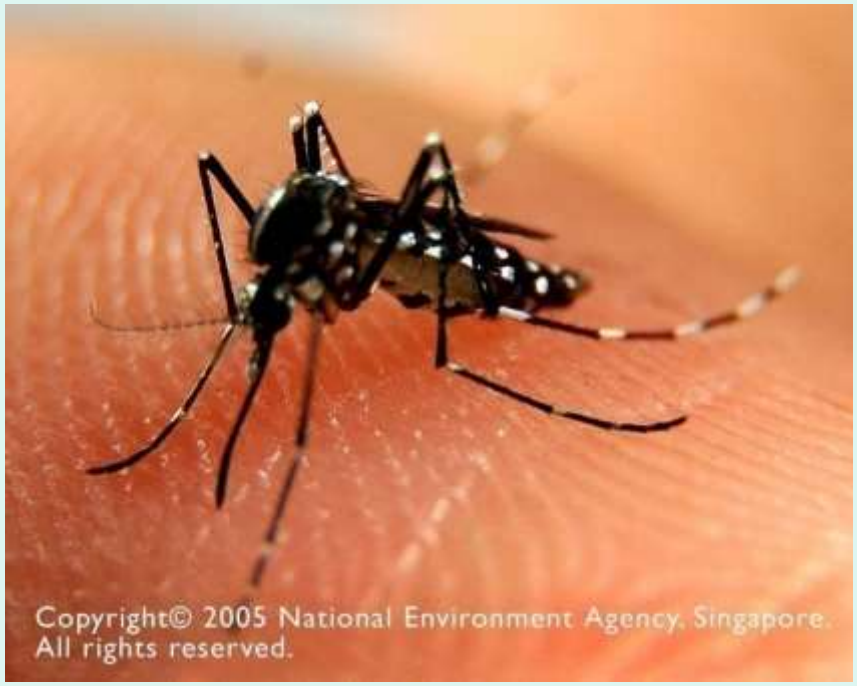
Mode of Transmission

- Mosquito bite
- Vertical, late pregnancy
- Transfusion related
- Transplantation related

Aedes Mosquito



- One distinct physical feature – black and white stripes on its body and legs. **Swift, minimal sound.**
- Bites during the day.
- Lays its eggs in **fresh**, stagnant water.
- Only the female *Aedes* mosquito feeds on blood. This is because they need the protein found in blood to produce eggs.
- Once infected remains throughout life.
- On average, a female *Aedes* mosquito can lay about 300 eggs during her life span of 14 to 21 days.



Dengue Pathogenesis

- Primary and secondary dengue infections
- Direct and indirect effects
- Endothelial dysfunction
- Bleeding and thrombocytopenia

Increased risk of severe dengue

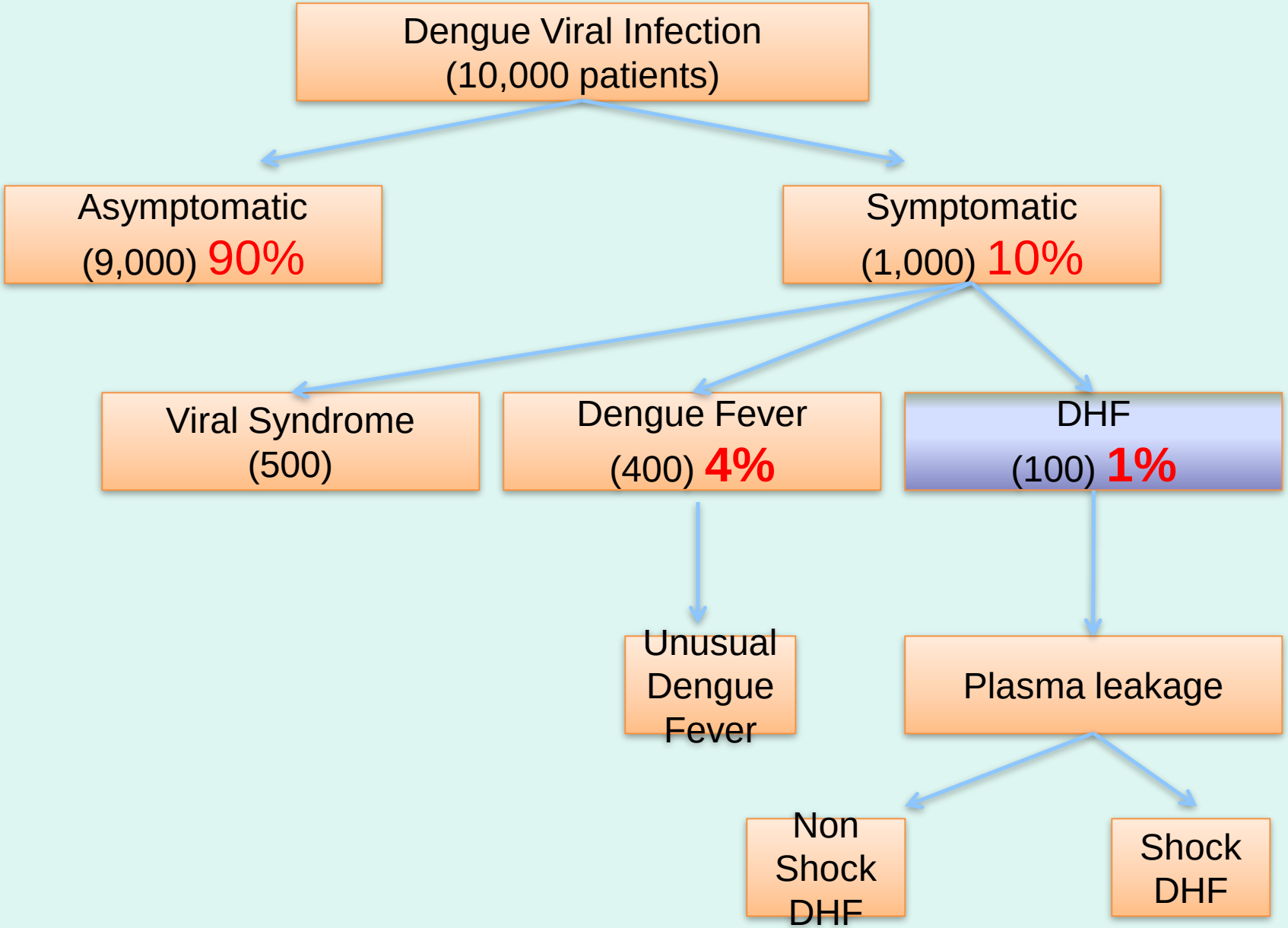
- Asthma, diabetes and other chronic diseases.
- Female sex
- AB blood group
- Several HLA class I alleles

Decreased risk of severe dengue

- Race
  - Caucasian & Asian vs African 5:1
- Malnutrition

Clinical Features

- Dengue fever
- DHF/DSS


Dengue Viral Infection
(10,000 patients)
Asymptomatic
(9,000) 90%
Symptomatic
(1,000) 10%
Viral Syndrome
(500)
Dengue Fever
(400) 4%
DHF
(100) 1%
Unusual Dengue Fever
Plasma leakage
Non Shock DHF
Shock DHF

Suspected Case

- **Fever >2 and < 10 days**
- Headache
- Retro orbital pain
- Myalgias
- Arthralgias/severe backache/bone pains
- Rash
- Severe abdominal pain
- Bleeding manifestations (epistaxis, hematemesis, bloody stools, menorrhagia, hemoptysis)
- Decreased urinary output despite adequate fluid intake.
- **3 or more criteria should be present**
- **Clinical alertness**

Probable Case

- Suspected case with Supportive lab evidence
  - Thrombocytopenia (<100000/mm^3)
  - Leucopenia (<4000/mm^3)

Confirmed Case

- Probable case with any one of 3 confirmatory evidence
  - Positive NS1 antigen
  - Positive IgM, ≥4 time rise in IgG
  - Viral detection by PCR

DHF or DLF

A case of dengue

–>20% rise in haemotocrit for age and sex

–>20% drop in haemotocrit following treatment with fluids as compared to baseline

–Signs of plasma leakage (pleural effusion, ascites or hypoproteinaemia).

Dengue Shock Syndrome

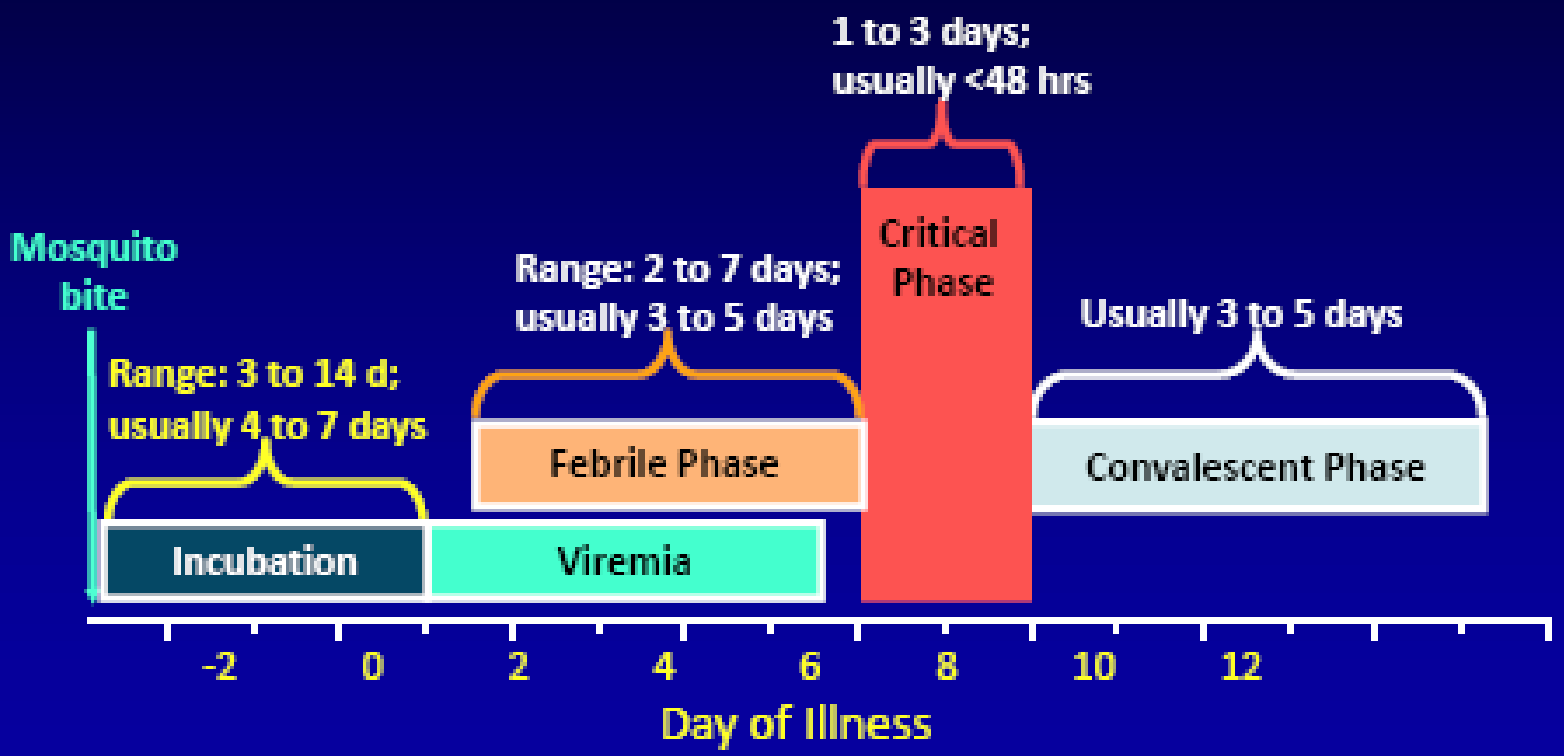
A case of DHF when develop signs of

- **Narrow pulse pressure (< or equal to 20 mm Hg).**
- **Circulatory failure manifested by rapid and weak pulse.**
- Hypotension for age.
- Cold and clammy skin.

DD

- Enteric
- Malaria
- Influenza
- Hepatitis
- Measles/Rubella
- Sepsis
- Other Viral infections
- Ricketessial infections

Clinical Course of Dengue



Slide from Dr. Hal Margolis, CDC Puerto Rico

Natural course of DF

Febrile phase
High grade fever for 2-7 days

No critical phase

Convalescent phase
2-5 days, longer in adults

Natural course of DHF

Febrile phase
High grade fever for 2-7 days

Critical phase
Plasma leakage 24- 48 h, usually on D5/D6, but earliest on D3

Recovery phase
2-5 days, longer in adults

Is it Critical Phase ?

- Day 3-7 of illness, lasts for 24-48 hours
- Clinical
  - **Fever settled**
  - Tachycardia
  - CRFT >2seconds
  - Pulse pressure ≤ 20 mm Hg
  - Urinary output <0.5-1 ml/hour
  - Tender hepatomegaly

- Investigations
  - HCT ↑20%
  - Albumin <3.5g%
  - CXR
    - PE
  - USG
    - Ascites, pleural effusion
    - GB
  - Leukopenia starts improving
  - Neutrophils start increasing
  - Platelets

Dengue Management

- **Patient care**
  - **Clinical management**
  - **Diagnostics**
- **Prevention and control**
  - Vector control
  - Dengue vaccine

Mortality/morbidity

- Recovery from dengue infection is usually complete. Even patients whether DF or DHF usually recover without squeal.
- The fatality rate associated with dengue shock syndrome varies by country, from 12-44%

Cause of morbidity/mortality

- Prolonged shock
- Fluid overload
- 10 hours untreated - Death!!!
- > 4 hours untreated
  - Liver failure- prognosis 50%
  - Liver + Renal failure – prognosis 10%
  - 3 organs failure (+respiratory failure) – Poor prognosis

Fluid regimen

- **Mainstay of treatment**
  - Mantainance of HD status
  - Prevention of SHOCK
  - Help prevent FLUID OVERLOAD
  - No Role of viricidal drugs

Fluid quota for critical phase...

Maintenance + 5% of Body Weight

Maintenance

- **1st 10 kg→ 100ml/kg**
- **2nd 10 kg→ 50ml/kg**
- **Balance wt→ 20ml/kg**

5% body wt = 50ml/kg

Child 22 kg

- Maintenance
  – 1000 + 500 + 40 = 1540 mls
- 5% Deficit – 50 x 22 = 1100 mls
- Total 2640 mls

Types of Fluid

- Crystalloids
  - 0.9% Saline
  - 5%Dextrose 0.9% Saline
  - 5% Dextrose ½ saline

Fluid Quota

- Fluid quota includes oral and IV
- Over 48 hours if patient presents in the beginning of critical phase (without shock)
- Over 24 hours for patients coming in shock

COLLOIDS

- *Dextran 40 in saline*
- *6% Starch*
- 10 ml/kg over 1 hour
- All boluses part of fluid quota

Refractory Shock

- Blood
  - packed cells
  - whole blood
- Bicarbonate
- Glucose
- Calcium

What not to do

- **Say no to platelets transfusion unless specifically indicated.**
- Avoid giving steroids.

Prescription/Health Education

- Paracetamol in divided doses, maximum 3g/day
- No aspirin/NSAID
- Tap water sponging for fever.
- No antibiotic, antimalarial, or steroids.
- Adequate hydration
- Avoid red/brown color fluids.
- Personal protective measures.
- Warning signs

Signs of Recovery

- Stable pulse, blood pressure and breathing rate
- Normal temperature
- No evidence of external or internal bleeding
- Return of appetite
- No vomiting
- Good urinary output
- Stable hematocrit
- Convalescent confluent petechiae rash

Diet and Activity

- No specific diet.
- ORS, fruit juice, water
- Return of appetite is a sign of recovery.
- Bed rest followed by gradual resumption of activities

Outbreak prevention

- Increased health surveillance
- **CAPACITY BUILDING**
- Prompt reporting of new cases
- Heightened professional awareness
- Public education

TAKE HOME MESSAGE

- **Dengue is not only preventable but treatable illness as well.**
- **Heightened clinical suspicion, early recognition of critical period are key to success in dengue treatment.**

Thank you!