Dengue
Diagnosis and clinical management

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Disclaimer

The findings and conclusions of this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention
Basic Concepts

- Four dengue viruses (DENV 1-4)
- Long-term homotypic immunity, short-term heterotypic immunity
- Mainly transmitted by mosquitoes, other routes of transmission possible
- Most dengue infections are asymptomatic
- Most symptomatic cases are mild
Why should we care about dengue?

- Outbreaks and incidence continue to increase globally
- Most common cause of fever among travelers returning from Asia and Latin America
- Around 5% of patients progress to severe disease
- Older and frequent travelers: additional risks for severe disease
- Unrecognized disease is a common cause of death
- Early suspicion, and timely and judicious IV fluids replacement can significantly decrease mortality
Dengue Clinical Classification – WHO (2009)

**Dengue**

**Probable Dengue**
Live in/travel to endemic area within the last 14 days

**Fever** and **two** of the following criteria:
- Nausea/vomiting
- Rash
- Aches and pains (headache, retro-orbital pain, myalgia, arthralgia)
- Tourniquet test positive/petechiae
- Leukopenia

**Dengue with warning signs**

**One or more** of the following warning signs:
- Abdominal pain or tenderness
- Persistent vomiting
  \( (\geq 3/h, \text{ or } \geq 4/6 \text{ h}) \)
- Clinical fluid accumulation
  (ascites, pleural effusion)
- Mucosal bleeding
- Lethargy, restlessness
- Postural hypotension
- Liver enlargement >2 cm
- Progressive increase in hematocrit

**Severe dengue**

**One or more** of the following manifestations:
- Severe plasma leakage leading to
  - Shock
  - Respiratory distress
- Severe bleeding
- Severe organ involvement
  - Liver (AST or ALT >1,000)
  - Brain
  - Heart

AST: Aspartate Aminotransferase
ALT: Alanine Aminotransferase
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Dengue Clinical Course

Mosquito bite

- 3 - 14 days

Incubation

- 0

Febrile

- 2 - 7 days

Viremic

- 0

Not viremic

- 0

Critical

- 1 - 2 days

Convalescent

- 3 - 5 days
Dengue Clinical Course

- Presentation can change quickly
  - Identify and monitor warning signs

- Plasma leakage and progression to severe dengue usually occur in the critical phase
  - Defervescence, warning signs, hemoconcentration, fluid accumulation

- **Hypovolemic shock** is the main manifestation of severe dengue
  - Early signs of shock: narrowing pulse pressure, **tachycardia**, delayed capillary refill
Risk factors for severe disease

- Obesity, asthma, hypertension/heart disease, diabetes, kidney disease, chronic liver disease, coagulopathies, hemolytic diseases

- Pregnancy, infancy, elderly patients

- Secondary infection
  - Higher risk in secondary infection, compared to 1st, 3rd, and 4th
  - Dengue can progress to severe disease with any infection
Acute management of dengue should be based on clinical evaluation and **NOT** on lab confirmation.
Diagnostic testing

- Dengue is a nationally notifiable disease
- Rapid diagnostic tests are NOT widely available
- Testing can be arranged through the arboviral surveillance team at the State/Local Health Department
- Some commercial laboratories offer DENV RT-PCR, NS1, and DENV IgM
Common laboratory findings

Leukocytes (neutrophils)

Lymphocytes

Hematocrit

Platelets

Febrile (2-7 days)
Critical (1-2 days)
Convalescent (3-5 days)
Clinical management

https://www.cdc.gov/dengue/healthcare-providers/treatment.html
Group A – Outpatient Follow-up

- Should be assessed daily
  - Daily CDB/Hct (until out of critical phase)

- Monitor for:
  - Signs of dehydration in febrile phase
  - Disease progression and defervescence
  - Warning signs

- Recommendations
  - Mosquito bites prevention, bed rest, oral fluids, paracetamol

Patients with:
- No warning signs, and
- Ability to drink sufficiently, and
- Normal urine output
Inpatient management

Group B - Patients with any:
- Warning signs
- Co-existing conditions (pregnancy, renal failure, coagulopathy)
- Other chronic conditions
- Infants, >65 years old
- Social circumstances

Group C - Patients with any:
- Shock – Compensated and decompensated
- Fluid accumulation with respiratory distress
- Severe bleeding
- Severe organ involvement
Guiding principles of fluid management

- Limit IV fluids in febrile phase
- IV fluids usually needed for only 24–48 hr
- Give only isotonic solutions
- Give minimum IV fluids required to restore intravascular volume, maintain good perfusion and urine output of at least 0.5 ml/kg/hr
- Monitor signs of fluid response – REASSESS
- Use ideal body weight to calculate maintenance fluids in overweight/obese patients
Dengue management don’ts

- Do not use NSAIDS
- Do not give intramuscular injections
- Do not use corticosteroids
- Do not give prophylactic platelet transfusions
Dengue vaccines

Dengvaxia

US ACIP recommends 3 doses (six months apart) for the prevention of dengue in:

- People 9–16 years old with
  - laboratory confirmation of previous dengue virus infection and
  - living in endemic areas
Dengue vaccines

Qdenga (TAK-003)

WHO-SAGE has recommended 2 doses (three months apart) in

- People 6–16 years old
  - Settings with high dengue disease burden and high transmission intensity
  - Introduced 1-2 years prior to age-specific peak incidence of hospitalizations

- Authorized by the European Medicine Agency, approved in several countries (UK, Argentina, Indonesia, Thailand, Brasil)

- FDA application was voluntarily withdrawn in the United States

There are currently no dengue vaccines recommended for 

travelers in the United States
Takeaways

- In the US, most dengue cases are travel-associated
  - Occurrence expected to increase
- Suspect dengue in all febrile travelers coming from endemic areas within 14 days
- No therapeutics are currently available to treat dengue
- No dengue vaccines are currently available for travelers in the United States
- Contact local/state Health Department for notification and confirmatory testing
Takeaways

- If dengue is suspected:
  - Determine phase of the disease (febrile, critical, convalescent)
  - Determine severity of the disease (without/with warning signs, severe)
  - Assess comorbidities and other risk factors
  - Determine clinical management requirements based on group classification (A,B1, B2,C)

- Main severe dengue presentation is shock, not bleeding
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References


