

Dengue Fever

Dengue Fever and Dengue Haemorrhagic Fever

- Dengue is the most common mosquito-borne viral disease of humans.
- It is caused by dengue virus 1-4.

- All four dengue virus (Den 1, 2, 3 and 4) infections may be
- Asymptomatic 95%.
- Dengue fever (DF), or dengue haemorrhagic fever (DHF) with plasma leakage
- May lead to hypovolemic shock, dengue shock syndrome (DSS).

Clinical Characteristics of Dengue Fever

- Fever
- Headache
- Muscle and joint pain
- Nausea/vomiting
- Rash
- Hemorrhagic manifestations

There are actually three dengue clinical syndromes:

- Classic dengue fever;
- Dengue hemorrhagic fever, or DHF; and
- Dengue shock syndrome, or DSS.

Dengue shock syndrome is actually a severe form of DHF.

Clinical Case Definition for Dengue Fever

- Classical Dengue fever or Break bone fever is an acute febrile viral disease frequently presenting with headaches, bone or joint pain, muscular pains, rash and leucopenia

Clinical Case Definition for Dengue Hemorrhagic Fever

4 Necessary Criteria:

- Fever, or recent history of acute fever
- Hemorrhagic manifestations
- Low platelet count (100,000/mm³ or less)
- Objective evidence of “leaky capillaries:”
 - elevated hematocrit (20% or more over baseline)
 - low albumin
 - pleural or other effusions

Clinical Features

- Fever <10days
- >2days
- The principal symptoms of dengue are:
- High fever and at least two of the following:
 - Severe headache
 - Severe eye pain (behind eyes)
 - Joint pain
 - Muscle and/or bone pain
 - Rash
 - Mild bleeding manifestation (e.g., nose or gum bleed, petechiae, or easy bruising)
 - Low white cell count

- Generally, younger children and those with their first dengue infection have a milder illness than older children and adults.

Danger Signs in Dengue Hemorrhagic Fever

- Abdominal pain - intense and sustained
- Persistent vomiting
- Abrupt change from fever to hypothermia, with sweating and prostration
- Restlessness or somnolence

*All of these are signs of impending shock and should alert clinicians that the patient needs close observation and fluids.

- During the afebrile phase of DHF vital signs may be unstable. The patient, in the early stage of shock, has
- Acute abdominal pain
- Restlessness
- cold and clammy skin,
- rapid and weak pulse.
- The patient should be administered intravenous fluid therapy immediately.
- In case of continued or profound shock when pulse and blood pressure are undetectable, the patient should be given colloidal fluid following the initial fluid bolus.

Watch for warning signs as temperature declines 3 to 7 days after symptoms began.
warning signs includes:

- Severe abdominal pain or persistent vomiting
- patches on the skin
- Bleeding from nose or gums
- Vomiting containing blood
- Black, tarry stools
- Drowsiness or irritability
- Pale, cold, or clammy skin
- Difficulty breathing

LABORATORY CRITERIA

- LEUCOPENIA, THROMBOCYTOPENIA
- Increased IGM antibodies titres
- Dengue antigen (NS 1) detection by immunohistochemistry, immunofluorescence, elisa
- PCR
- ISOLATION OF DENGUE VIRUS

Recognition of Dengue Fever/Dengue Haemorrhagic Fever (DF/DHF)

- Dengue Fever is an acute febrile illness of 2-7 days duration
- (sometimes with two peaks) with two or more of the following manifestations:
 - headache
 - retro -orbital pain
 - myalgia/arthralgia
 - rash
 - haemorrhagic manifestation (petechiae and positive tourniquet test) and,
 - leukopenia.

In children, DF is usually mild.

- Dengue Haemorrhagic Fever is a probable case of dengue and
- haemorrhagic tendency evidenced by one or more of the following:
- Positive tourniquet test
- Petechiae, ecchymosis or purpura
- Bleeding from mucosa (mostly epistaxis or bleeding from
- gums), injection sites or other sites
- Haematemesis or melena

- Thrombocytopaenia (platelets 100,000/cu.mm or less) and
- Evidence of plasma leakage due to increased capillary permeability manifested by one or more of the following:
 - – A >20% rise in haematocrit for age and sex
 - – A >20% drop in haematocrit following treatment with:

- fluids as compared to baseline
- – Signs of plasma leakage (pleural effusion, ascites or
- hypoproteinaemia).
- Dengue Shock Syndrome (DSS) All the above criteria of DHF
- plus signs of circulatory failure manifested by rapid and weak pulse,
- narrow pulse pressure (< or equal to 20 mm Hg); hypotension for
- age, cold and clammy skin and restlessness.

Disease Course

- DF/DHF has an unpredictable course. Most patients have a febrile phase lasting 2 -7 days. This is followed by a critical phase which is of
- about 2-3 days duration. During this phase, the patient is afebrile, and is at risk of developing DHF/DSS which may prove fatal if prompt and appropriate treatment is not provided. Since haemorrhage and or

- shock can occur rapidly, arrangements for rapid and appropriate treatment should be always available. By doing this, the case fatality
- rate can be substantially reduced
- DHF (Grades)
- DF I II III IV
- Febrile Phase (3-7 days)
- Afebrile Phase (critical stage)
- Convalescent Phase
- Recovery

Treatment of DF and DHF

- Febrile Phase
- In the early febrile phase, it is not possible to distinguish DF from DHF.
- Their treatments during the febrile phase are the same, i.e. symptomatic and supportive:
 - Rest.
 - Paracetamol (not more than 4 times in 24 hours) according to age for fever above 39°C.
 - Fluid management in case of DF, DHF

- Patients must be carefully observed for complications for at least 2 days after recovery from fever. This is because life threatening complications often occur during this phase.
- Severe abdominal pain,
- passage of black stools,
- bleeding into the skin or from the nose or gums,
- sweating, and cold skin.
- If any of these signs is noticed, the patient should be taken to the hospital.

1. Elimination of mosquito breeding places

- **Cover water containers**—Tight covers on water storage containers, will prevent the mosquitos laying their eggs there. If the cover is loose, mosquitos can go in and out.
- **Septic tanks and soak-away pits**—Cover and seal these, so that dengue mosquitos cannot breed there.
- **Removal of rubbish**—Garbage articles and other rubbish found around houses can collect rain water. They should be removed or smashed and buried in the ground or burned, where this is permissible.
- **Biological control**—Mosquito wigglers can be controlled by small larva-eating fish, such as guppies. These fish can be found in streams or ponds or obtained through pet shops. Bacterial pesticides will also kill mosquito wigglers.
- **Chemical control**—Safe and easily used larvicides such as temephos sand core granules can be placed in water containers to kill developing wigglers.

2. Prevent mosquito bites

People can protect themselves from mosquito bites by using any of the following means—

- **Mosquito coils and electric vapour mats**—Slow burning **mosquito coils** or electric vapour mats are effective in the rainy season, just after sunrise and/or in the afternoon hours before sunset, when dengue mosquitoes bite.
- **Mosquito nets**—Nets placed over sleeping places can protect small children and others who may rest during the day. The effectiveness of such nets can be improved by treating them with permethrin (a pyrethroid insecticide). Curtains (cloth or bamboo) can also be treated with insecticide and hung at windows or doorways, to repel or kill mosquitos.
- **Repellents**—Mosquito repellents can be applied to exposed parts of the body where mosquitos bite. Care should be taken in using repellents on small children and the elderly.
- **Screens**—Screens on windows and doorways are effective protection against the entry of mosquitos in homes.
- **Protection of people sick with dengue**—Mosquitos become infected when they bite people who are sick with dengue. Mosquito nets and mosquito coils will effectively prevent mosquitos from biting sick people and help stop the spread of dengue.



The most common epidemic vector of dengue in the world is the *Aedes aegypti* mosquito. It can be identified by the white bands or scale patterns on its legs and thorax.

Algorithm for Dengue Fever Management in Accident & Emergency Department

If fever > 2 days and < 10 days

Send Complete Blood Count, Platelets, Glucose

Presence of warning signs

List of Warning Signs: (one or more)

- No clinical improvement / worsening clinical parameters on Form I
- Persistent vomiting
- Severe abdominal pain
- Lethargy and or restlessness
- Bleeding: severe epistaxis, black stools, hematemesis, extensive menstrual bleeding, hematuria
- Giddiness
- Pale cold clammy extremities
- Less / no urine output for 4 – 6 hours

Absence of warning signs

Family education:

Mosquito repellent, no aspirin or NSAIDs, no steroids, no antibiotics, no empiric anti malarials, Paracetamol \leq 3g/day, tepid water sponging, oral fluids with solutes e.g. juice (avoid red colored fluids)

Prescription

Follow up with CBC and platelets on day 3, 4 & 5 of fever

If rapid platelet fall or warning signs develop

Form 2 new.jpg

If rapid platelet fall or warning signs develop

سرور سز هسپتال لاهور

* Admit Patient

See guidelines for admitted patients

* Co morbid conditions e.g. pregnancy, very obese patients, extremes of age, Cirrhosis, CRF may warrant early admission at clinicians' discretion.

(Made in collaboration with SriLankan Dengue Experts Dr. L Fernando, Dr. K Sallehewa, Dr.H Tissera, Dr. J Weeraman and WHO Guidelines 2011)

THANK

YOU

Identification of Dengue Hemorrhagic Fever

Admission (For DSS See Form IV)

Critical phase/Impending critical phase

Absence of signs of Dengue Hemorrhagic Fever /Dengue Shock Syndrome

Critical phase (day 3 – 7; lasts for 24 – 48 hours)

If any one of these signs is present then go to Form IV for further management

Highly Suggestive of DHE

- Disproportionate tachycardia
- Narrowing of pulse pressure < 20 mm
- Tender hepatomegaly (DHF likely)
- Haemoconcentration
 - HCT 20% rise from baseline or rise approaching 20% if patient already on IV fluids
- Biochemistry
 - Serum albumin < 3.5 g/dl or 0.5 gm/dl fall during illness
- Non fasting serum cholesterol < 100 mg/dl or 20mg/dl fall during illness
- Oedematous gall bladder wall on U/S

Confirmed DHE**

- Ascites on U/S
- Pleural effusions (CXR Right lateral decubitus or chest U/S to detect minimal effusion)

** Definitive evidence of plasma leakage

Management:

Some fluid restriction is essential during the critical phase(24-48hrs)

see:

- Algorithm for fluid management in critical patients
- Flow charts for hourly monitoring

Continue 4 – 6 hourly monitoring

Manage according to flow charts

* Reversal of neutrophil / lymphocyte ratio or reactive lymphocytosis within next 24 hrs is indicative of increased chances of entering the critical phase

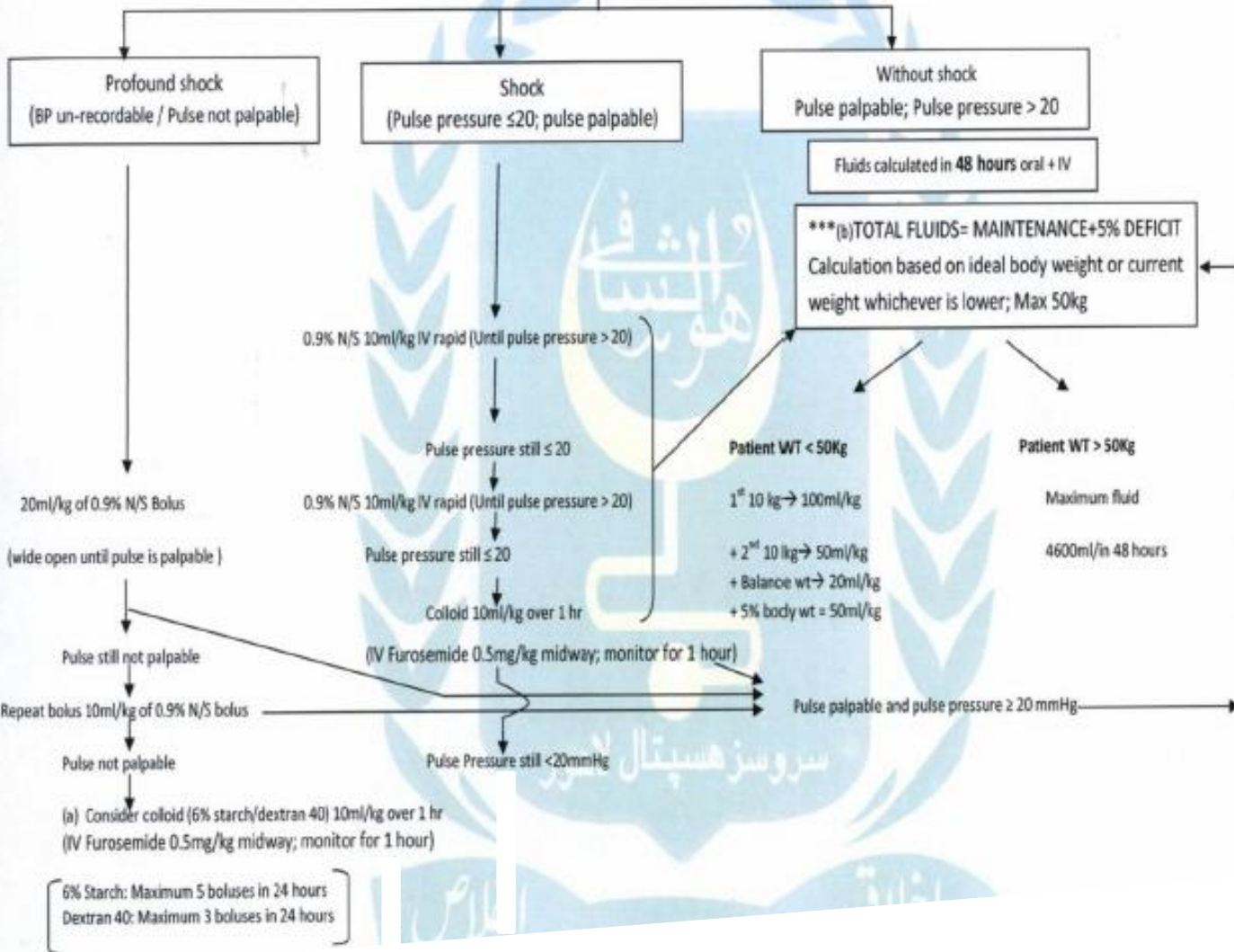
Convalescent phase: After the critical phase; lasts 5 – 7 days.

- Good appetite, Convalescent rash, Pruritus, Hemodynamic stability, Bradycardia, Diuresis, Stabilization of HCT, rise in WBC, Rise in platelet count. Management: maintain oral intake, antihistamine, rest, discharge

For DSS (Dengue Shock Syndrome) See the pertinent algorithm

(Made in collaboration with SriLankan Dengue Experts Dr. I Fernando, Dr. K Sallehewa, Dr.H Tissera, Dr. J Weeraman and WHO Guidelines 2011)

ALGORITHM FOR FLUID MANAGEMENT IN CRITICAL PHASE





Consider whole blood transfusion (10ml/kg) or packed cell volume (5ml/kg)
(IV Furosemide 0.5mg/kg midway; monitor for 1 hour)

Important:

- Boluses / blood / oral all included in total fluid calculation.
- Shock defined as pulse pressure ≤ 20 mmHg

Note:

*** Infusion rate should vary from 1.5 – 7 ml/kg/hr (IV+oral) keeping an eye on degree of plasma leakage.

Keep urine output 0.5 – 1.0 ml/Kg/hr and give fluid accordingly.

if heading towards fluid overload: switching to colloids can be needed as higher rate of crystalloids cannot be continued for longer hours

if patient is not improving consider complications: (c)

(Made in collaboration with SriLankan Dengue Experts Dr. I Fernando, Dr. K Sallehewa, Dr.H Tissera, Dr. J Weeraman and WHO Guidelines 2011)

(a)

(b)

(b)

Choice of fluids:

Crystalloids:

0.9% N/S

5% DW+0.9 %N/S

< 6 months of age: 5%DW+0.45% N/S

Colloids:

6% Starch

Dextran 40 (When available)

Rate of infusion of colloids 10ml/Kg/Hr

½ bolus in 30 mins or full bolus in 60 mins

Calculation of Ideal Body Weight

- **Best Method:** Weight for height using a growth chart
- Weigh for age using a growth chart
- In an emergency situation use these formulae

<1 year	$\frac{\text{Age (in Months)+ 9}}{2}$
< 7 years	$(\text{Age} \times 2) + 8$
> 7 years	$\text{Age} \times 3$
APLS	$(\text{Age} + 4) \times 2$

Ideal Body Weight (IBW)

When fluid requirement is calculated (both oral and IV), calculate only for IBW or actual body weight if it is lower than the IBW. The **maximum wt** for which fluid is calculated in any patient should not exceed **50 kg**. Accordingly **M+5%** should not exceed **4600 ml** in any patient.

(c)

Complications: (consider when no improvement)

- A: Acidosis Correct acidosis if pH is <7.35 and if HCO_3^- level <15 mmol/l, NaHCO_3 1ml/kg slow bolus Max. 10ml (can be repeated upto 50ml)
- B: Bleeding Consider Whole blood (10 ml/kg) or packed cell (5 ml/kg)
- C: Hypocalcaemia Check serum calcium and QT intervals
Give 10% calcium gluconate. Dose 1ml/kg/min, max 10ml at one time, repeat 6 hourly if needed.
- S: Sugar Levels Monitor Blood Sugar levels and manage accordingly.

Calculation of total fluids for critical period

M (Maintenance) 100ml/kg for 1st 10 kg
+50 ml/kg for next 10 kg
+20 ml/kg for balance wt

5% of body weight = +50ml x body wt (kg)

Eg: Body weight 22 kg (This is ideal or actual body weight, whichever is smaller)

$$M = 100 \times 10 + 50 \times 10 + 20 \times 2 = 1540 \text{ ml}$$

$$5\% = 50 \times 22 = 1100 \text{ ml}$$

$$M + 5\% = 1540 + 1100 = 2640 \text{ ml}$$

This is the total fluid volume this patient will need over the entire critical period irrespective of its length.

(d)

Indications of Furosemide:

- Midway in the infusion of colloids in patients who are already in fluid overload or who are likely to be overloaded depending on the fluids already given.
- Midway between blood transfusions.
- In patients passing less than 0.5ml/kg/hr of urine despite receiving adequate fluids and having stable BP, pulse, Hct to improve the UOP.
- During recovery phase when there is pulmonary oedema or fluid overload.