Training Module for Medical Officers (District & PHC Level)

Clinical Management of Dengue Fever (DF) and Dengue Haemorrhagic Fever (DHF)

Government of India

Directorate of National Vector Borne Diseases Control Programme
22 Shamnath Marg, Delhi -110054
Directorate General of Health Services,
Ministry of Health & Family Welfare

Index

Chapter 1

DIAGNOSIS OF DF/ DHF

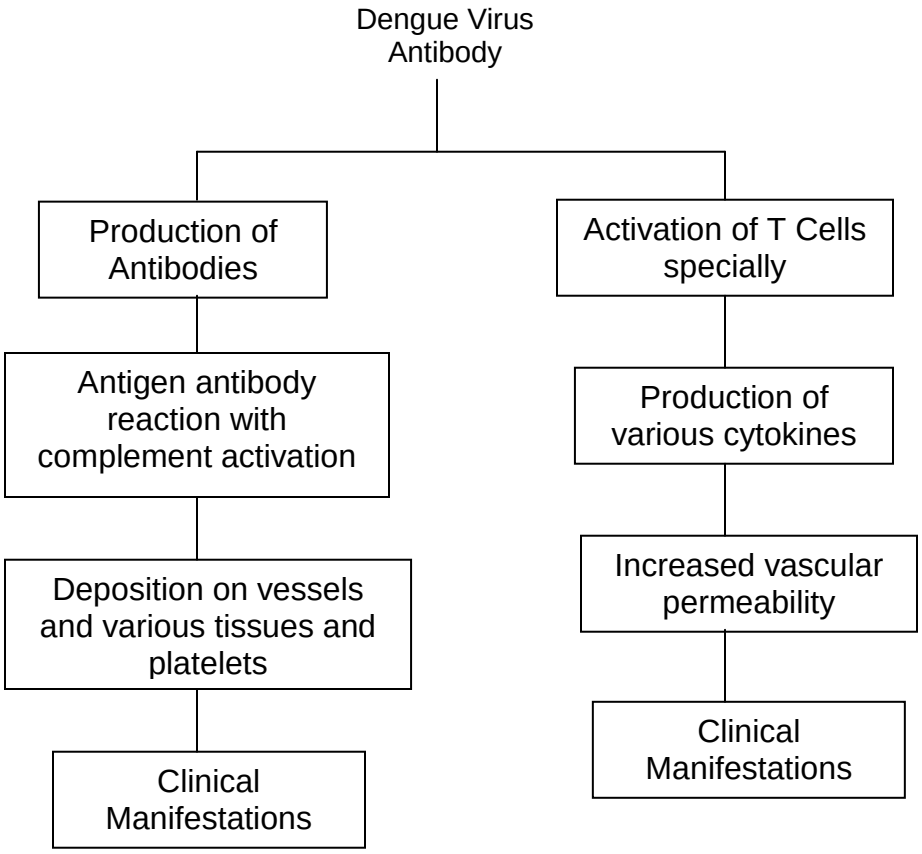
Objectives: At the end of chapter the participants will learn about

1. Clinical description of dengue
2. Criteria for DHF/ DSS and case classification
3. Laboratory confirmation of diagnosis

1. Immuno-pathogenesis of Dengue

The key manifestations of the disease are sudden onset of shock, leakage, hemorrhagic diathesis/ thrombocytopenia occurring at the time of recovery. Pathogenesis is not well defined but the short lived nature of plasma leakage with minimum sequelae suggests that it is mediated through soluble mediators, compliment activation and cytokines are reported to be responsible for various manifestations. Fig 1 illustrates the patho-physiology of DHF.

Fig 1 Patho-physiology Of DHF



2. Clinical manifestations of DF/ DHF

Clinical manifestations vary from undifferentiated fever to florid hemorrhage and shock. The clinical presentations depend on age, immune status of the host and the virus strain. Under the programme the following WHO recommended case definitions are followed:

Dengue Fever : Clinical description

An acute febrile illness of 2-7 days duration with two or more of the following manifestations:

Headache, retro-orbital pain, myalgia, arthralgia, rash, haemorrhagic manifestations.

Criteria for Dengue Hemorrhagic Fever and Dengue Shock Syndrome

Dengue Hemorrhagic Fever : A probable or confirmed case of dengue and hemorrhagic tendencies evidenced by **one or more of the following**

- Positive tourniquet test
- Petechiae, ecchymoses or purpura
- Bleeding from mucosa, gastrointestinal tract, injection sites or other sites
- Haematemesis or malena

And thrombocytopenia (<100 000 cells per cumm)
And evidence of plasma leakage due to increased vascular permeability, manifested by **one or more of the following :**

- A rise in average haematocrit for age and sex >/ 20%
- A more than 20% drop in haematocrit following volume replacement treatment compared to baseline
- Signs of plasma leakage (pleural effusion, ascitis, hypoproteinaemia)

Dengue Shock Syndrome :

All the above criteria for DHF plus evidence of circulatory failure manifested by rapid and weak pulse and narrow pulse pressure (<=20 mm Hg) or hypotension for age and cold and clammy skin and restlessness

Case classification

Suspected: A case compatible with the clinical description

Probable: A case compatible with the clinical description with **one or more** of the following:

- Supportive serology (reciprocal haemagglutination - inhibition titre, comparable IgG ELISA titre or positive IgM antibody test in late acute or convalescent-phase serum specimens)
- Occurrence at same location and time as other confirmed cases of dengue fever

Confirmed: A case compatible with the clinical description that is laboratory confirmed

Laboratory criteria for diagnosis

One or more of the following:

- Isolation of the dengue virus from serum, plasma, leucocytes or autopsy samples
- Demonstration of a fourfold or greater change in reciprocal IgG or IgM antibody titres to one or more dengue virus antigen in paired serum samples.
- Demonstration of dengue virus antigen in autopsy tissue by immunohistochemistry or immunoflorescence or in serum samples by ELISA.
- Detection of viral genomic sequences in autopsy tissue, serum or CSF samples by polymerase chain reaction (PCR).

Chapter 2

CLINICAL MANAGEMENT OF DF/ DHF

Objectives: At the end of chapter the participants will learn about

1. Various grades of severity
2. Clinical management of severe and complicated cases of DF/DHF/DSS
3. Volume replacement process
4. When to discharge a patient

1. Grading the severity of Dengue infection

To decide where to treat the patient, it is important to classify the severity of dengue infection as given in the Table 1 below. The presence of thrombocytopenia with concurrent haemoconcentration differentiates Grade I and Grade II DHF from DF.

Table 1 Grading the severity of Dengue infection:

DF/ DHF	Grade	Symptoms/ signs	Laboratory findings
DF		Fever with two or more of following - Headache - Retro-orbital pain - Myalgia - Arthragia	Leucopenia, thrombocytopenia and evidence of loss of plasma
DHF	I	Above signs, symptoms plus positive tourniquet test, evidence of plasma leakage	Thrombocytopenia: Platelet count less than 100000/cu.mm. Haematocrit rise 20% or more
DHF	II	Above signs and symptoms plus some evidence of spontaneous bleeding in skin or other organs (black tarry stools, epistaxis, bleeding from gums, etc) and abdominal pain	Thrombocytopenia platelet count less than 100,000/cumm Haemtocrit rise 20% or more
DHF	III	Above signs and symptoms plus circulating failure (weak rapid pulse, pulse pressure =/<20 mm Hg or high diastolic pressure, hypotension with the presence of cold clammy skin and restlessness)	Thrombocytopenia: Platelet count less than 100,000/cumm Haematocrit rise more than 20%
DHF	IV	Profound shock with undetectable blood pressure or pulse	Thrombocytopenia: Platelet count less than 100,000/cumm Haematocrit rise more than 20%

Tourniquet test

The tourniquet test is performed by inflating a blood pressure cuff to a mid point between the systolic and diastolic pressure for five minutes. The test is considered positive when 10 or more petechiae per 2.5 cm^2 are observed. In DHF, the test usually gives a definite positive test with 20 petechiae or more. The test may be negative or only mildly positive during the phase of profound shock (DSS).

If tourniquet test is found negative it should be repeated. Early diagnosis of disease and admission of DHF patient's in hospitals are important in order to reduce case fatality rates. Treatment can be initiated on clinical suspicion and on the basis of interpretation of platelet count and haematocrit, confirmation by laboratory diagnosis is not required.

2. MANAGEMENT

A. Management of Dengue Fever (DF)

Management of Dengue fever is symptomatic and supportive

i. Bed rest is advisable during the acute phase.

ii. Use cold sponging to keep temperature below 39^oC.

iii. Antipyretics may be used to lower the body temperature. Aspirin should be avoided since it may cause gastritis, vomiting and acidosis. Paracetamol is preferable in the doses given at below:

- 1-2 years: 60 –120 mg/doses
- 3-6 years: 120 mg/dose
- 7-12 years: 240mg/dose
- Adult : 500mg/dose

Limit the use of paracetamol

iv. Analgesics or mild sedatives may be required for patients with severe pain.

v. Oral fluid and electrolyte therapy are recommended for patients with excessive sweating or vomiting.

vi. Patients should be monitored in DHF endemic area until they become afebrile for one day without the use of antipyretics and after platelet and haematocrit determinations are stable, platelet count is >50000/ cumm.

B. Management of DHF Average Grade (Febrile Phase)

The management of febrile phase is similar to that of DF. Paracetamol is recommended to keep the temperature below 39^{o} C. Copious amount of fluid should be given orally, to the extent the patient tolerates, oral hydration solution, such as those used for the treatment of diarrhoeal diseases and / or fruit juices are preferable to plain water. IV fluid may be administered if the patient is vomiting persistently or refusing to feed.

Patients should be closely monitored for the initial signs of shock. The critical period is during the transition from the febrile to the afebrile stage and usually occurs after the third day of illness. Serial haematocrit determinations are essential guide for treatment, since they reflect the degree of plasma leakage and need for intravenous administration of fluids. Haematocrit should be determined daily from the third day until the temperature has remained normal for one or two days. If haematocrit determination is not possible, haemoglobin determination may be carried out as an alternative. The details of IV treatment when required for patients are given in Chart 1.

C. Management of DHF Grade I and II

Any person who has dengue fever with thrombocytopenia and haemoconcentration and presents with abdominal pain, black tarry stools, epistaxis, bleeding from the gums and infection etc needs to be hospitalized. All these patients should be observed for signs of shock. The critical period for development of shock is transition from febrile to abferile phase of illness, which usually occurs after third day of illness. A

rise of hameoconcentration indicates need for IV fluid therapy. If despite of the treatment, the patients develop fall in BP, urine output or other features of shock, the management for Grade III/IV DHF/DSS should be instituted.

Oral rehydration should be given along with antipyretics like Paracetamol sponging, etc. as described above. The detailed treatment for patients with DHF Grade I and II is given in Chart 1.

D. Management of DHF Grade III/IV

Common signs of complications are observed during the afebrile phase of DHF. Immediately after hospitalization, the haematocrit, platelet count and vital signs should be examined to assess the patient's condition and intravenous fluid therapy should be started. The patient requires regular and sustained monitoring. If the patient has already received about 1000 ml of intravenous fluid, it should be changed to colloidal solution preferably Dextran or if haematocrit is decreasing, fresh whole blood transfusion 10ml/kg/dose should be given.

However, in case of persistent shock when, after initial fluid replacement and resuscitation with plasma or plasma expanders, the haematocrit continues to decline, internal bleeding should be suspected. It may be difficult to recognize and estimate the degree of internal blood loss in the presence of haemoconcentration. It is thus recommended to give fresh whole blood in small volumes of 10ml/kg for all patients in shock as a routine precaution. Oxygen should be given to all patients in shock. The detailed graphical presentation of the treatment for patients with DHF Grades III and IV is given in Chart 2.

E. Criteria for discharge of patients

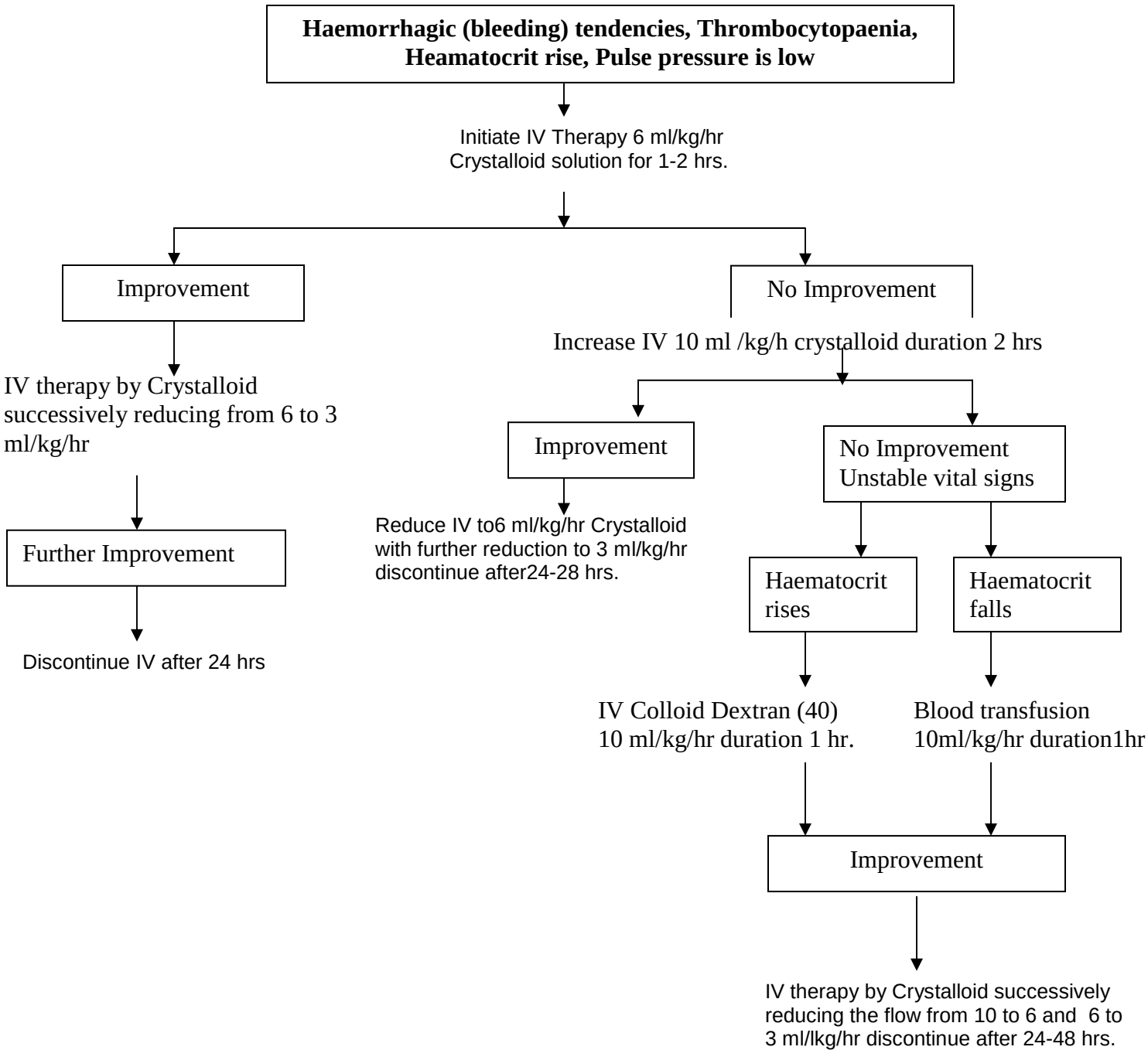
- Absence of fever for at least 24 hours without the use of anti-fever therapy
- Return of appetite

- Visible clinical improvement
- Good urine output
- Minimum of 3 days after recovery from shock
- No respiratory distress from pleural effusion or ascitis
- Platelet count > 50 000/ cumm

The checklist of equipment necessary for management of dengue is given in **Annexure1**. The Dengue Fever Case Investigation form and Laboratory requisition form are given in **Annexure 2** and **Annexure 3**.

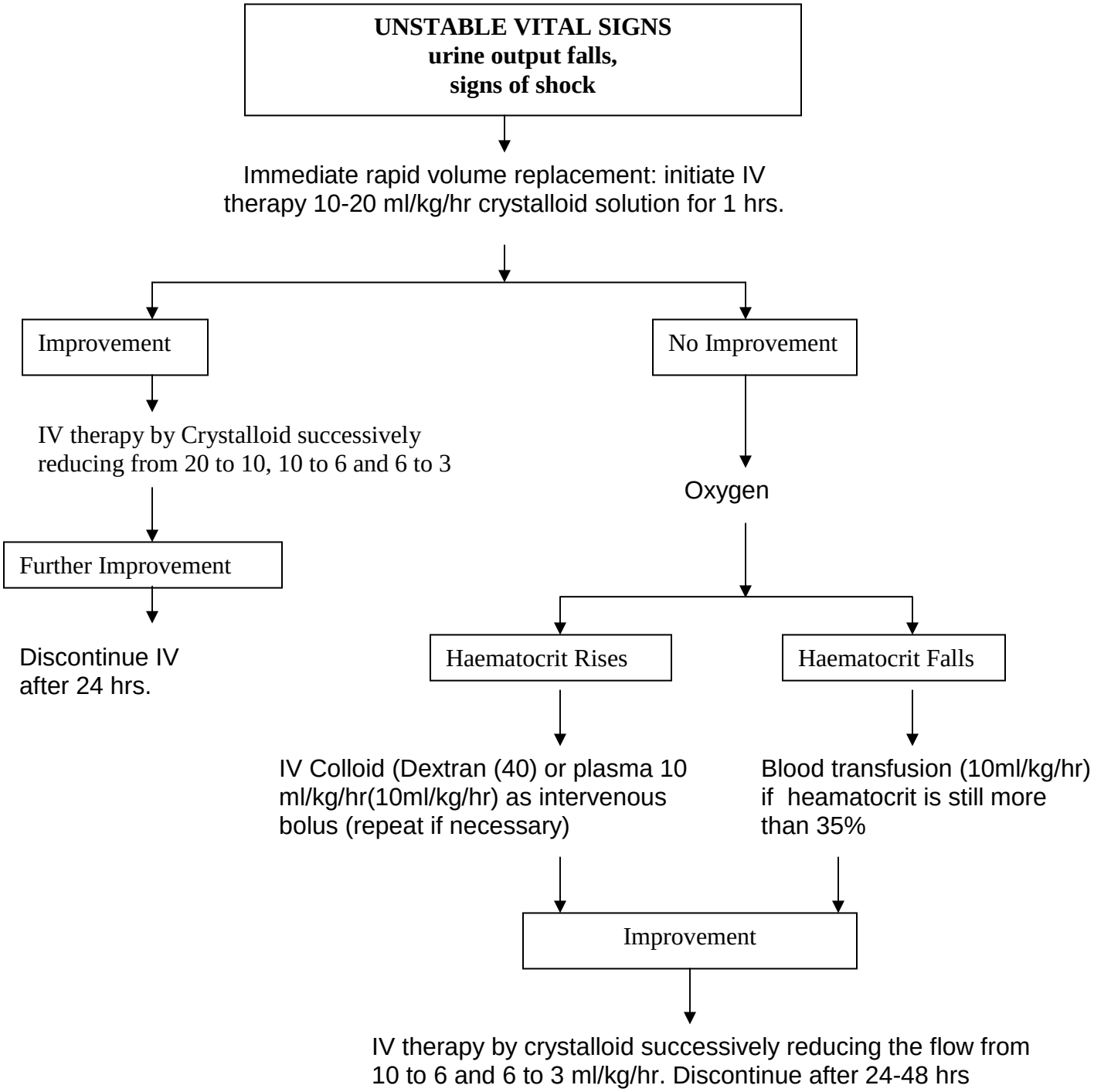
- Serial platelet and haematocrit determinations: drop in platelets and rise in haematocrit are essential for early diagnosis of DHF.
- Cases of DHF should be observed every hour for vital signs and urinary output.

Chart 1. Volume Replacement Flow Chart for Patients with DHF Grades I & II



Improvement: Haematocrit falls, pulse rate and blood pressure stable, urine output rises
No Improvement: Haematocrit or pulse rate rises, pulse pressure falls below 20 mmHg, Urine output falls
Unstable Vital signs: Urine output falls, signs of shock

Chart 2. Volume Replacement Flow Chart For Patients With DHF Grades III & IV



In cases of acidosis, hyperosmolar or Ringer's lactate solution should not be used

3. READY RECKONER

In an outbreak situation where it is not possible to admit every patient it is important to prioritize to decide who needs in hospital care most. Following points are a guide to distinguish various situations and the action to be taken:

1. Consider having a dengue corner in the hospital during transmission season which is functional round the clock with adequate trained manpower with facility for
   - tourniquet test
   - BP cuff of correct sizes
   - Blood Counter for Complete blood count and haematocrit

2. Indications for domiciliary management:
   - No tachycardia
   - No hypotension
   - No narrowing of pulse pressure
   - No bleeding
   - Platelet count > 100000/cumm

Do baseline haematocrit for follow up

Patient should come for follow up after 24 hours for evaluation. In case of the following complaints patient should report to nearest hospital immediately

- Bleeding from any site (fresh red spots on skin, black stools, red urine, nose bleed, menorrhagia)
- Severe Abdominal pain, refusal to take orally/ poor intake, persistent vomiting
- Not passing urine for 12 hrs / decreased urinary output
- restlessness, seizures, excessive crying (young infant), altered sensorium and behavioral changes and severe persistent headache

- cold clammy skin
- sudden drop in temperature

3. Consider admission of patient showing the following symptoms and signs
    - Bleeding from any site

    Warning signs :

    - Persistent high grade fever(40º C and above)
    - Severe Abdominal pain, refusal to take orally/ poor intake, persistent vomiting, any signs of dehydration
    - Impending circulatory failure – tachycardia, postural hypotension, narrow pulse pressure(<20 mmHg, with rising diastolic pressure eg 100/90 mmHg), increased capillary refilling time - > 3secs (paediatric age group)
    - Neurological abnormalities - restlessness, seizures, excessive crying (young infant), altered sensorium and behavioral changes, severe and persistent headache
    - Drop in temperature and/or rapid deterioration in GC
    - Shock- cold clammy skin, hypotension/ narrow pulse pressure, tachypnoea

    However a patient may remain fully conscious until late stage

4. Lab investigations for patient assessment
    - CBC: Hb, Hct, TLC, DLC, Platelet count, Peripheral blood smear
    - Platelets < 100000/cumm (Thrombocytopenia)
    - Hct : ≥20% rise from baseline

5. Lab investigations for confirming diagnosis
    - Serology : to be done on or after day 5 by Mac ELISA (in an outbreak all suspected patients of dengue need not undergo serology to arrive at a diagnosis.)

6. Investigations for indoor patients

- Chest X Ray : Rt lateral decubitus and one day after temperature drops
- USG abdomen and Chest
- Blood Biochemistry: Serum electrolytes
- Stool examination for occult blood, pleural fluid tapping and for excluding other causes may be done.

7. Indoor management of Patients

A) Indications of red cell transfusion

- Loss of blood(overt blood) -10% or more of total blood volume – Preferably whole blood/ component to be used
- Refractory shock despite adequate fluid administration and declining haematocrit
- Replacement volume should be 10 cc/kg body wt at a time and coagulogram should be done
- If fluid overload is present PCV is to be given

B) Indications of platelet transfusion

In general there is no need to give platelets even at < 20000/cumm

- Prophylactic platelet transfusion may be given at level of <10000/cumm in absence of bleeding manifestations
- Prolonged shock; with coagulopathy and abnormal coagulogram
- In case of Systemic massive bleeding, platelet transfusion may be needed in addition to red cell transfusion.

C) Use of fresh frozen plasma/ cryoprecipitate in coagulopathy with bleeding as per advise of Physician and patients condition.

These are only broad guidelines. The treating physician should consider the condition of the patient in totality and decide

Annexure 1

Checklist of diagnostic and therapeutic material for dengue case management

1. **Minimum of diagnostic materials should be :**

- Blood pressure cuffs (adult and paediatric)
- Thermometers
- Haematocrit centrifuge
- Haematocrit supplies (lancets, capillary tubes, reader)
- Compound microscope and materials for white blood cell and platelet counts
- Vacutainers or syringes/needles for obtaining dengue and diagnostic test samples

2. **Minimum of diagnostic therapeutics:**

- Paracetamol
- WHO oral rehydration solution
- Lactate Ringer's solution; 0.9% saline; 5% glucose
- Tubing and needles for intravenous therapy

3. **Additional facilities for in-patients:**

- Laboratory test equipment and supplies for blood typing and cross-matching for measuring arterial blood gases and pH and for measuring serum electrolytes
- Portable X-ray and ultrasound equipment
- Central venous pressure monitoring kits
- Intake-output monitoring charts

4. Therapeutic materials will be same as that of outpatient department plus:

- Intravascular volume expanders (Dextran 40, plasmanate, platelet concentrates,
  fresh frozen plasma, whole blood)
- 7.5% sodium bicarbonate for injection
- Chloral hydrate
- Oxygen

Annexure 2

Dengue Fever Case Investigation form

Reporting Information

Date of Reporting :…../……./…….

Date of Investigation :……./……../…….

Patient Information

Name : …… Sex : M/F Age ……..yrs

Father's Name : …… Religion : ……

Address : ……

……

Village / Mohalla : ……. Block / Urban Area : …….

District : …….. State : …….

Travel History

Date From :……..

Date To: ……...

Address : ……

……

Village / Mohalla : ……. Block / Urban Area : …….

District : …….. State : …….

Signs and Symptoms

Fever	Yes	No	Duration
Headache	Yes	No	
Retro orbital pain	Yes	No	
Myalgia	Yes	No	
Arthralgia	Yes	No	
Rash	Yes	No	
Haemmorhagic Manifest	Yes	No	

Tourniquet Test Pos……../ Neg……..

Laboratory Investigations

WBC count

Platelet count

Haematocrit

Serological Test Pos…… / Neg…….

Case Classification : Suspect/ Probable / Confirmed

Management :

Vitals Charting

Fluid Chart

Investigating Officer
Name & Signature

Annexure 9

Lab Requisition form

State / District…….

PHC……..

Name……..

Age/Sex……..

Addresss

Local……..

Permanent…….

Telephone No…….

Date of collection……..

Nature of Sample

Tick the box

Serum ☐

Whole Blood ☐

Name and Signature of MO……..

……

Results

Patient ID……..

Patient of Name……..

Date of collection……..Date of reporting……..

Tick the box

Test type	Pos	Neg
IgM Mac ELISA		
RDT		
IgG Paired Sera		

Name and signature of the Investigator