Revised Dengue Clinical Case Management Guidelines 2011

Department of Health

National Dengue Prevention and Control Program
National Center for Disease Prevention and Control (DOH-NCDPC)
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I. BACKGROUND and RATIONALE

According to WHO, dengue is the most rapidly spreading mosquito-borne viral disease in the world. In the last 50 years, incidence has increased 30-fold with increasing geographic expansion to new countries and, in the present decade, from urban to rural settings. Between 2001 and 2008, more than a million cases were reported in Cambodia, Malaysia, Philippines, and Vietnam – the four countries in the Western Pacific Region with the highest numbers of cases and deaths. Official reports from these countries revealed a combined death toll of 4,798.

Dengue is an all-year round disease in the Philippines. In 2008, the Philippines was reported as one of the countries with the highest number of dengue cases and deaths in the Western Pacific Region. In 2010, all regions reported cases of dengue and several outbreaks were reported in provinces and municipalities. The cases totaled to 135,355, which is 135% higher compared to 57,636 cases in 2009.

The elimination of dengue is the responsibility of everyone. The Department of Health continuously seeks the participation of communities in eliminating mosquitoes as well as their breeding sites. Responding to dengue cases, on the other hand, requires the delivery of competent clinical services and management decisions among all levels of health care. Dengue missions were conducted to selected regions where increases in the numbers of dengue cases and outbreaks were observed. Visits to hospital wards and rural health units found varying clinical skills and degrees of capacity to diagnose, classify, and manage dengue cases.

To address this, the DOW with support from WHO conducted on 29 October 2010 a National Dengue Workshop on Clinical Management to serve as a forum for the local adaptation of the recently updated WHO Dengue Guidelines for Diagnosis, Prevention and Control. The results of the discussions paved the way to the development of a standard source of information and guidelines for dengue case management.

II. OBJECTIVE

This document aims to establish a standard in the diagnosis and treatment of dengue for all public and private health facilities and other stakeholders.

III. COVERAGE

This administrative order shall apply to all public and private health workers, LGUs, NGOs, academe and other stakeholders involved in the diagnosis and treatment of dengue cases.

The following sections and annexes contain updated information on the course of dengue illness, revised dengue case classification, and treatment guidelines specifically for health practitioners, laboratory personnel, those involved in vector control, and other public health officials and staff.

Specifically, these are as follows:
• Annex A – Revised Case Classification
• Annex B – General Guidelines
• Annex C – Treatment Guidelines
• Annex D – Annotations
• Annex E – Dengue Reclassification Diagram
• Annex F – Revised Clinical Case management Diagram

IV. SEPARABILITY CLAUSE

In the event that any rule, section, paragraph, sentence, clause or word of this administrative order is declared null and void for valid reason(s), the validity of the other provisions shall not be affected.

V. REPEALING CLAUSE

All orders and other issuances inconsistent with this administrative order are hereby revised, modified or rescinded accordingly. All other provisions of existing issuances which are not affected by this order shall remain valid and in effect.

VI. EFFECTIVITY

This Order takes effect immediately upon posting and publication in the DOH intranet, or fifteen days upon filing with the University of the Philippines Law Center.

ENRIQUE T. ONA, MD, FPCS, FACS
Secretary of Health
Dengue Fever

ANNEX A

REVISED DENGUE CASE CLASSIFICATION

In the new case classification, patients with dengue are classified according to the levels of severity as having dengue without Warning Signs, Dengue with Warning Signs, and Severe Dengue based on clinical manifestations with or without laboratory parameters.

Changes in dengue epidemiology in recent years led to difficulties and inconsistencies in the use of the previous dengue case definition and classification. The adoption of this new classification is deemed a solution in determining more standard, practical and appropriate management of dengue cases in the country. Likewise, this improvement is seen to improve consistency in reporting across various levels of health care facilities.

The Old Case Definition and Classification vis-a-vis the New Case Definition and Classification for Dengue

<table>
<thead>
<tr>
<th>OLD Case Definition and Levels of Severity</th>
<th>NEW Case Classification and Levels of Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Case Definition for Dengue Fever</strong></td>
<td><strong>Case Definition for Dengue without Warning Signs</strong></td>
</tr>
<tr>
<td>Probable dengue:</td>
<td>Probable dengue:</td>
</tr>
<tr>
<td>An acute febrile illness with 2 or more of the following:</td>
<td>Lives in or travels to dengue-endemic area, with fever, plus any two of the following:</td>
</tr>
<tr>
<td>• Headache</td>
<td>• Headache</td>
</tr>
<tr>
<td>• Retro-orbital pain</td>
<td>• Body malaise</td>
</tr>
<tr>
<td>• Arthralgia</td>
<td>• Myalgia</td>
</tr>
<tr>
<td>• Rash</td>
<td>• Arthralgia</td>
</tr>
<tr>
<td>• Hemorrhagic manifestations</td>
<td>• Retro-orbital pain</td>
</tr>
<tr>
<td>• Leukopenia;</td>
<td>• Anorexia</td>
</tr>
<tr>
<td>• Supportive serology (a reciprocal HI antibody titer ≥1280, a comparable IgG assay ELISA titer or (+) IgM antibody test on a late or acute convalescent phase serum specimen)</td>
<td>• Nausea</td>
</tr>
<tr>
<td>Confirmed:</td>
<td>• Vomiting</td>
</tr>
<tr>
<td>A case confirmed by laboratory criteria</td>
<td>• Diarrhea</td>
</tr>
<tr>
<td></td>
<td>• Flushed skin</td>
</tr>
<tr>
<td></td>
<td>• Rash (petechial, Hermann’s sign)</td>
</tr>
<tr>
<td></td>
<td>AND</td>
</tr>
<tr>
<td></td>
<td>Laboratory test, at least CBC (leucopenia with or without thrombocytopenia) and/or dengue NS1 antigen test or dengue IgM antibody test (optional)</td>
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</table>

<table>
<thead>
<tr>
<th>Case Definition for Dengue Hemorrhagic Fever (DHF)</th>
<th>Case Definition for Dengue with Warning Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>The following must all be present:</td>
<td>Lives in or travels to dengue-endemic area, with fever lasting for 2-7 days, plus any of the following:</td>
</tr>
<tr>
<td>1. Fever, or history of fever, lasting for 2-7 days, occasionally biphasic</td>
<td>• Abdominal pain or tenderness</td>
</tr>
<tr>
<td>2. Hemorrhagic tendencies evidenced by at least one of the following:</td>
<td>• Persistent vomiting</td>
</tr>
<tr>
<td>a. (+) tourniquet test</td>
<td>• Clinical signs of fluid accumulation</td>
</tr>
<tr>
<td>b. Petechia, ecchymosis, purpura</td>
<td>• Mucosal bleeding</td>
</tr>
<tr>
<td>c. Bleeding from the mucosa, GIT, injection sites or other locations</td>
<td>• Lethargy, restlessness</td>
</tr>
<tr>
<td>d. Hematomenis or melena</td>
<td>• Liver enlargement</td>
</tr>
<tr>
<td>3. Thrombocytopenia (100,000 cells/mm³ or less)</td>
<td>• Laboratory: increase in Hct and/or decreasing platelet count</td>
</tr>
<tr>
<td>4. Evidence of plasma leakage due to increased vascular permeability, manifested by at least one of the following:</td>
<td>Confirmed dengue:</td>
</tr>
<tr>
<td>a. A rise in the hematocrit equal to or greater than 20% above average for age, sex, and population</td>
<td>• Viral culture isolation</td>
</tr>
<tr>
<td>b. A drop in the hematocrit following volume replacement treatment equal to or greater than 20% of baseline</td>
<td>• PCR</td>
</tr>
<tr>
<td>c. Signs of plasma leakage such as pleural effusion, ascites and hypoproteinemia</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Case Definition for Dengue Shock Syndrome (DSS)</th>
<th>Case Definition for Severe Dengue</th>
</tr>
</thead>
<tbody>
<tr>
<td>All of the four criteria for DHF must be present plus evidence of circulatory failure manifested by:</td>
<td>Lives in or travels to a dengue-endemic area with fever of 2-7 days and any of the above clinical manifestations for dengue with or without warning signs, plus any of the following:</td>
</tr>
<tr>
<td>• Rapid and weak pulse, AND</td>
<td>• Severe plasma leakage, leading to:</td>
</tr>
<tr>
<td>• Narrow pulse pressure (&lt;20 mmHg [2.7kPa]) OR</td>
<td>- Shock</td>
</tr>
<tr>
<td>OR</td>
<td>- Fluid accumulation with respiratory distress</td>
</tr>
</tbody>
</table>
**Mild hemorrhagic manifestations like petechiae and mucosal membrane bleeding (e.g., nose and gums) may be seen. The earliest abnormality in the full blood count is a progressive decrease in total white cell count, which should alert the physician to a high probability of dengue.**

**CLINICAL SIGNS AND SYMPTOMS**

- Fever
- Headache
- Body malaise
- Myalgia
- Arthralgia
- Retro-orbital pain
- Anorexia
- Nausea
- Vomiting
- Diarrhea
- Flushed skin
- Rash (petechial, Hermann’s sign)

**Note:**

Above manifestations and/or laboratory parameters require strict observation, monitoring, and appropriate medical intervention.

**ANNEX B**

**GENERAL GUIDELINES**

Dengue infection is a systemic and dynamic disease. It has a wide clinical spectrum that includes severe and non-severe forms of clinical manifestations. After the incubation period, the illness begins abruptly and will be followed by 3 phases: febrile, critical and recovery phase.

**OLD**

**Case Definition and Levels of Severity**

- manifested by:
  - Hypotension for age, AND
  - Cold clammy skin and restlessness

**Grading of Severity of DHF/DSS**

**DHF Grade 1**

Fever accompanied by non-specific constitutional signs and symptoms such as anorexia, vomiting, abdominal pain; the only hemorrhagic manifestation is a (+) tourniquet test and/or easy bruising

**DHF Grade 2**

Spontaneous bleeding in addition to manifestations of grade 1 patients usually in the form of skin or other hemorrhages (mucocutaneous, gastrointestinal)

**DHF Grade 3 (DSS)**

Circulatory failure manifested by rapid, weak pulse and narrowing of pulse pressure or hypotension, with the presence of cold clammy skin and restlessness

**DHF Grade 4 (DSS)**

Profound shock with undetectable blood pressure or pulse

**NEW**

**Case Classification and Levels of Severity**

- **Severe bleeding**
- **Severe organ impairment**
  - Liver: AST or ALT >1000
  - CNS: e.g., seizures, impaired consciousness
  - Heart: e.g., myocarditis
  - Kidneys e.g., renal failure

Mild hemorrhagic manifestations like petechiae and mucosal membrane bleeding (e.g., nose and gums) may be seen. The earliest abnormality in the full blood count is a progressive decrease in total white cell count, which should alert the physician to a high probability of dengue.

**CLINICAL SIGNS AND SYMPTOMS**

- Fever
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- Vomiting
- Diarrhea
- Flushed skin
- Rash (petechial, Hermann’s sign)

**Critical Phase**

Defervescence occurs on day 3-7 of illness, when the temperature drops to 37.5-38°C or less and remains below this level. Around the time of defervescence, patients can either improve or deteriorate. Those who improve after defervescence have Dengue without Warning Signs. Those who deteriorate will manifest warning signs have Dengue with Warning Signs.

Warning signs are the result of a significant increase in capillary fragility. This marks the beginning of the critical
WARNING SIGNS
- Abdominal pain or tenderness
- Persistent vomiting
- Clinical signs of fluid accumulation
- Mucosal bleeding
- Lethargy; restlessness
- Liver enlargement
- Laboratory: Increase in hematocrit and/or decreasing platelet count

Some patients may deteriorate to Severe Dengue, defined by one or more of the following: (i) plasma leakage that may lead to shock (dengue shock) and/or fluid accumulation, with or without respiratory distress, and/or (ii) severe bleeding, and/or (iii) severe organ impairment.

Shock occurs when a critical volume of plasma is lost through leakage. It is often preceded by warning signs. The body temperature may be subnormal when shock occurs. With prolonged shock, the consequent organ hypoperfusion results in progressive organ impairment, metabolic acidosis and disseminated intravascular coagulation. This in turn leads to severe hemorrhage causing the hematocrit to decrease in severe shock. Instead of the leucopenia usually seen during this phase of dengue, the total white cell count may increase in patients with severe bleeding. In addition, severe organ impairment such as severe hepatitis, encephalitis or myocarditis and/or severe bleeding may also develop without obvious plasma leakage or shock.

Recovery Phase
A gradual re-absorption of extravasated fluid from the intravascular to the extravascular space (e.g., pleural effusion, ascites) by way of the lymphatics will take place in the next 48-72 hours. Patients’ general well-being improves, hemodynamic status stabilizes and diuresis ensues. Some patients may have a classical rash of “isles of white in the sea of red.” The hematocrit stabilizes or may be lower due to the dilution effect of reabsorbed fluid. White Blood Count usually starts to rise soon after defervesence but the normalization of the platelet count is typically later than that of WBC count.

Clinical problems encountered during the different phases of dengue are:
- Febrile phase – dehydration; high fever may cause febrile seizures in young children; neurological disturbances
- Critical phase – shock from the plasma leakage; severe hemorrhage; organ impairment
- Recovery phase – hypervolemia (only if intravenous fluid therapy has been excessive and/or extended into this period)

Some patients may further deteriorate to Severe Dengue with severe plasma leakage leading to shock (dengue shock) ± respiratory distress, severe bleeding and/or severe organ impairment. The period of clinically significant plasma leakage usually lasts 24 to 48 hours.

ANNEX C
SPECIFIC TREATMENT GUIDELINES
TREATMENT GUIDELINES: A STEPWISE APPROACH TO MANAGEMENT OF DENGUE
A. ASSESSMENT
Step 1 – Overall Assessment
1.1 History
- Date of onset of fever/illness
- Quantity of oral intake
- Assess for warning signs
- Diarrhea
- Seizures, impaired consciousness, behavioral changes
- Urine output (frequency, volume and time of last voiding)
- Other important relevant histories:
  - Family members or neighbors with dengue, or travel to dengue-endemic areas
  - Co-existing conditions such as infancy, pregnancy, obesity, diabetes mellitus, hypertension, etc.
  - Jungle trekking and swimming in waterfall (consider leptospirosis, typhus malaria)
  - Recent unprotected sexual or drug use behavior (consider acute HIV seroconversion illness)

1.2 Physical Examination
- Assess mental state and Glasglow Coma scale (GCS) score
- Assess hydration status
- Assess hemodynamic status (refer to Table 1)
- Look out for tachypnea/acidotic breathing/pleural effusion
- Check for abdominal tenderness/hepatomegaly/ascites
- Examine for rash and bleeding manifestations
- Tourniquet test (repeat if previously negative or if there is no bleeding manifestation)

1.3 Investigation
- Full blood count (FBC)
- Dengue diagnostic tests
- Laboratory tests should be performed to confirm the diagnosis – viral culture isolation or PCR. However, it is not necessary for the acute management of patients except in cases with unusual manifestations

Step 2 – Diagnosis, Assessment of Disease Phase and Severity
Determine:
- Is it dengue?
- Which phase of dengue? (febrile/critical/recovery)
- Are there warning signs?
- What is the hydration and hemodynamic status?
- Does the patient require admission?

Step 3 – Management
a. Disease notification
b. Management decisions – depending on the clinical manifestations and other circumstances, patients
may:
- Be sent home (GROUP A); or may
- Be referred for in-hospital management (GROUP B); or may
- Require emergency treatment and urgent referral (GROUP C)

B. TREATMENT (by type of patient)

GROUP A – Patients who may be sent home

These are patients who are able to tolerate adequate volumes of oral fluids and pass urine at least once every 6 hours, and do not have any warning signs, particularly when fever subsides.

Ambulatory patients should be reviewed daily for disease progression: decreasing WBC, defervescence and warning signs until they are out of the critical period. Those with stable hematocrit can be sent home with the advice to return immediately to the hospital if they develop any of the warning signs.

Action Plan
- Oral rehydration solution (ORS) should be given based on weight, using currently recommended ORS:

<table>
<thead>
<tr>
<th>Body weight (kg)</th>
<th>ORS to be given</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;3-10</td>
<td>100 mL/kg/day</td>
</tr>
<tr>
<td>&gt;10-20</td>
<td>75 mL/kg/day</td>
</tr>
<tr>
<td>&gt;20-30</td>
<td>50-60 mL/kg/day</td>
</tr>
<tr>
<td>&gt;30-60</td>
<td>40-50 mL/kg/day</td>
</tr>
</tbody>
</table>


- Reduce osmolarity of ORS containing sodium 45 to 60 mmol/liter.
- Sports drinks should NOT be given due to its high osmolarity which may cause more danger to the patient.

GROUP B – Patients who should be referred for in-hospital management

These include patients with any of the following features:
- Warning signs
- Co-existing conditions that may make dengue or its management more complicated, such as pregnancy, infancy and old age, obesity, diabetes mellitus, renal failure, chronic hemolytic diseases, etc.
- Social circumstances such as living alone or living far from health facility or without a reliable means of transport.

Action Plan
a. Dengue without Warning Signs

Encourage oral fluids. If not tolerated, start intravenous fluid therapy of 0.9% NaCl (saline) or Ringer’s Lactate with or without dextrose at maintenance rate (refer to Table 2). Patients may be able to take oral fluids after a few hours of intravenous fluid therapy.

Fluid management for patients who are admitted, without shock (Dengue without Warning Signs):
- Isotonic solutions (D5 LRS, D5 Acetated Ringers D5 NSS/D5 0.9 NaCl) are appropriate for Dengue patients without warning signs who are admitted without shock.
- Maintenance IVF is computed using the caloric-expenditure method (Holliday-Segar Method) or calculation Based on Weight (Ludan Method).

<table>
<thead>
<tr>
<th>Body Total Fluid Requirement (mL/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (kg)</td>
</tr>
<tr>
<td>0-10</td>
</tr>
<tr>
<td>10-20</td>
</tr>
<tr>
<td>&gt;20</td>
</tr>
</tbody>
</table>


GROUP C – Patients who require emergency treatment

If any of the following is observed, take the patient immediately to the nearest hospital

These are warning signals for danger:
- Bleeding
  - Red spots or patches on the skin
  - Bleeding from nose or gums
  - Vomiting blood
  - Black-colored stools
  - Heavy menstruation/vaginal bleeding
- Frequent vomiting
- Severe abdominal pain
- Drowsiness, mental confusion or seizures
- Pale, cold or clammy hands and feet
- Difficulty in breathing

What should be avoided?
- Do not take NSAIDS, e.g. acetylsalicylic acid (aspirin)/mefenamic acid or steroids. If you are already taking these medications, please consult your doctor.
- Antibiotics are not necessary

HOME CARE CARD FOR DENGUE

What should be done?
- Adequate bed rest
- Adequate fluid intake (>5 glasses for average-sized adult or accordingly in children)
  - Milk, fruit juice (caution with diabetes patient) and isotonic electrolyte solution (ORS) and barley/rice water
  - Plain water alone may cause electrolyte imbalance
- Take paracetamol (not more than 4 grams per day for adults and accordingly in children)
- Tepid sponging
- Look for mosquito breeding in places in and around the home and eliminate them

What should be avoided?
- Do not take NSAIDS, e.g. acetylsalicylic acid (aspirin)/mefenamic acid or steroids. If you are already taking these medications, please consult your doctor.
- Antibiotics are not necessary
Dengue Fever

Monitoring by health care providers:

• Hematocrit, white blood cell and platelet counts
• Warning signs
• Urine output – volume and frequency
• Temperature pattern
• Body weight


Calculation of Oral Rehydration Fluids Using Weight (Ludan Method)

<table>
<thead>
<tr>
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<th>ORS to be given</th>
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<tr>
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<td>50-60 mL/kg/day</td>
</tr>
<tr>
<td>&gt;30-60</td>
<td>40-50 mL/kg/day</td>
</tr>
</tbody>
</table>

*where the volume of fluids for mild dehydration is computed as follows:

- Infant
  - 50 mL/kg
- Other Child or Adult
  - 30 mL/kg

• One-half of the computed TFR is given in 8 hours and the remaining one-half is given in the next 16 hours

Step 1: Compute for Total Fluid Requirement:

\[ \text{TFR} = \text{Maintenance IVF} + \text{Fluids for Mild dehydration} \]

Step 2: Compute one-half of TFR:

\[ \text{TFR}/2 = 1500 \text{ mL}/2 = 750 \text{ mL} \]

Step 3: Volume to be given in the first 8 hours:

\[ = 750 \text{ mL in 8 hours} \]

\[ = 93 \text{ mL/hour for 8 hours} \]

Step 4: Volume to be given in the next 16 hours:

\[ = 750 \text{ mL in 16 hours} \]

\[ = 46 \text{ mL per hour for 16 hours} \]

Monitoring by health care providers:

1. Obtain a reference hematocrit before fluid therapy
2. Give only isotonic solutions such as 0.9% NaCl (saline), Ringer’s Lactate, Hartmann’s solution.

Start with 5-7 mL/kg/hour for 1-2 hours, then reduce to 3-5 mL/kg/hr for 2-4 hours, and then reduce to 2-3 mL/kg/hr or less according to clinical response (see Table 3)

3. Reassess the clinical status and repeat the hematocrit

4. If the hematocrit remains the same or rises only minimally, continue with the same rate (2-3 mL/kg/hr) for another 2-4 hours.

5. If there are worsening of vital signs and rapidly rising hematocrit, increase the rate to 5-10 mL/kg/hour for 1-2 hours

6. Reassess the clinical status, repeat hematocrit and review fluid infusion rates accordingly

7. Give the minimum intravenous fluid volume required to maintain good perfusion and urine output of about 0.5 mL/kg/hr. Intravenous fluids are usually needed for only 24 to 48 hours.

8. Reduce intravenous fluids gradually when the rate of plasma leakage decreases towards the end of the critical phase. This is indicated by:

- Urine output and/or oral fluid intake is adequate, or
- Hematocrit decreases below the baseline value in a stable patient

GROUP C – Patients with Severe Dengue Requiring Emergency Treatment and Urgent Referral

a. Management for patients admitted to the hospital with Compensated Shock

1. Start intravenous fluid resuscitation with isotonic crystalloid solutions at 5-10 mL/kg/hr over 1 hour, then reassess the patient condition (vital signs, capillary refill time, hematocrit, urine output) and decide depending on the situation:

2. If the patients condition improves, intravenous fluids should be gradually reduced to

- 5-7 mL/kg/hr for 1-2 hours, then
- To 3-5 mL/kg/hr for 2-4 hours, then
- To 2-3 mL/kg/hr and then
- To reduce further depending on hemodynamic status, which can be maintained for up to 24 to 48 hours

(Note: Please refer to Tables 2 and 3 for a more appropriate estimation of normal maintenance requirement based on ideal body weight.)

3. If vital signs are still unstable (shock persists), check the hematocrit after the first bolus:

- If hematocrit increases or is still high (>50%),
Algorithm for the Treatment of Compensated Shock

Compensated shock (systolic BP maintained but has signs of plasma leakage (hemoconcentration or reduced perfusion)

BOX A. Obtain baseline CBC (a). Fluid resuscitation with plain isotonic crystalloid 10 mL/kg/hour over 1 hour. Give oxygen support.

Is there improvement? (b) (See Table 1)

- Yes

BOX B.
IV crystalloid 5-7 mL/kg/hr for 1-2 hours, then reduce to 3-5 mL/kg/hr for 2-4 hours; reduce to 2-3 mL/kg/hr for 2-4 hours.

- Fluids should not exceed 3 liters per day to avoid fluid overload (g) and (h).
- If feasible, monitor HCT every 6 hours or as necessary (a).
- Reassess hemodynamic status frequently (see Table 1) including urine output (f).
- Monitor for signs of bleeding

- No

HCT ↓ or High

BOX C.
Administer 2nd bolus of fluid, colloid/crystalloid (c) 10 mL/kg in 1 hour

- Patient is stable

HCT decreases

Go to BOX B

- Patient is unstable

HCT increases

Administer 3rd bolus of fluid (colloid/crystalloid) 10-20 mL/kg for 1 hour

- If patient improves, go to BOX B.

- If patient does not improve, go to BOX E.

Patient is stable

Patient is unstable

BOX D.
If there are signs of occult/overt bleeding initiate transfusion with fresh whole blood 20 mL/kg or PRBC 10 mL/kg

Reassess hemodynamic status and bleeding parameters

1. If improved go to BOX B.
2. If patient does not improve, go to BOX E.

BOX E
If patient does not improve, consider inotropes (d) and refer to tertiary care center

1. If patients is stable and HCT increases by 10% from baseline, correlate clinically and assess need to increase fluid rate
2. If patient is unstable and HCT increases, go to BOX B.
3. If patient is unstable and there is a sudden drop in HCT, look for signs of bleeding. Consider transfusion with fresh whole blood 20 mL/kg or PRBC 10 mL/kg
4. If patient is stable for 48 hours stop IVF or give maintenance fluids or ORS (refer to Table 3 or Table 4)

Note: Small bold letters in parentheses indicate annotation/s
Algorithm for the Treatment of Hypotensive Shock

Hypotensive shock (e)

**BOX A.** Obtain baseline CBC (a). Fluid resuscitation with 10 mL/kg plain isotonic crystalloid or colloid over 15 minutes (c). Give oxygen support.

Is there improvement? (b)
(See Table 1)

**Yes**

**BOX B.**
- IV crystalloid 5-7 mL/kg/hr for 1-2 hours; reduce to 3-5 mL/kg/hr for 2-4 hours; reduce to 2-3 mL/kg/hr for 2-4 hours.
- Fluids should not exceed 3 liters per day to avoid fluid overload (g) and (h).
- If feasible, monitor HCT every 6 hours or as necessary (a).
- Reassess hemodynamic status frequently (see Table 1) including urine output (f).
- Monitor for signs of bleeding

**Patient is stable**

**HCT** decreases

Reduce IVF rate to 7-10 mL/kg/hr for 1-2 hrs

If patient remains stable, go to **BOX B**

**Patient is unstable**

**HCT** increases

Administer 3rd bolus fluid (colloid/crystalloid) 10-20 mL/kg for 1 hour (c)

If patient improves, go to **BOX B**

**BOX E**
If patient does not improve, consider inotropes (d) and refer to tertiary care center

**No**

**BOX C.**
Administer 2nd bolus fluid (colloid) 10-20 mL/kg over 15 min. Check hemodynamic parameters (see Table 1)

**BOX D.**
If there are signs of occult/overt bleeding initiate transfusion with fresh whole blood 20 mL/kg or PRBC 10 mL/kg

Reassess hemodynamic status and bleeding parameters

1. If improved go to **BOX B**.
2. If patient does not improve, go to **BOX E**.

**Note:** Small bold letters in parentheses indicate annotation/s
repeat a second bolus of crystalloid solution at 10-20 mL/kg/hr for 1 hour. After this second bolus, if there is improvement, then reduce the rate to 7-10 mL/kg/hr for 1-2 hours, and then continue to reduce as above

- If hematocrit decreases compared to the initial reference hematocrit (<40% in children and adult females, <45% in adult males), this indicates bleeding and the need to cross-match and transfuse blood as soon as possible (see Treatment for Hemorrhagic Complications)

4. Further boluses of crystalloid or colloidal solutions may need to be given during the next 24 to 48 hours

b. Management for patients admitted to the hospital with Hypotensive Shock

Patients with hypotensive shock should be managed more vigorously

1. Initiate intravenous fluid resuscitation with crystalloid or colloid solution (if available) at 20 mL/kg as a bolus given over 15 minutes to bring the patient out of shock as quickly as possible.

2. If the patient’s condition improves, give a crystalloid/colloid infusion of 10 mL/kg/hr for 1 hour, then continue with crystalloid infusion and gradually reduce
   - To 5-7 mL/kg/hr for 1-2 hours, then
   - To 3-5 mL/kg/hr for 2-4 hours and then
   - To 2-3 mL/kg/hr or less, which can be maintained for up to 24 to 48 hours (refer to Table 2)

3. If vital signs are still unstable (shock persists), check hematocrit after the first bolus:
   - If hematocrit increases compared to the previous value or remains very high (>50%), change intravenous fluids to colloid solutions at 10-20 mL/kg as a second bolus over ½ to 1 hour. After this dose, reduce the rate to 7-10 mL/kg/hr for 1-2 hours, then change back to crystalloid solution and reduce rate of infusion as mentioned above when the patient’s condition improves
   - If hematocrit decreases compared to the previous value (<40% in children and adult females, <45% in adult males), this indicates bleeding and the need to cross-match and transfuse blood as soon as possible (see treatment for hemorrhagic complications)

4. Further boluses of fluid may need to be given during the next 24 hours. The rate and volume of each bolus infusion should be titrated to the clinical response. Patients with severe dengue should be admitted to the high dependency or intensive care areas.

c. Monitoring

Patients with dengue shock should be frequently monitored, until the danger period is over. A detailed fluid balance of all input and output should be maintained.

Notes:
Interpretation of hematocrit: Changes in the hematocrit are a useful guide to treatment. However, it must be interpreted in parallel to the hemodynamic status, the clinical response to fluid therapy and the acid-base balance.

- For example: A rising or persistently high hematocrit:
  - Together with unstable vital signs (particularly narrowing of the pulse pressure) indicates active plasma leakage and the need for a further bolus of fluid replacement.
  - With stable hemodynamic status and adequate urine output, do not require extra intravenous fluid. Continue to monitor closely and it is likely that the hematocrit will start to fall within the next 24 hours as the plasma leakage stops

C. TREATMENT OF HEMORRHAGIC COMPLICATIONS

Mucosal bleeding may occur in any patient with dengue but if the patient remains stable with fluid resuscitation/replacement, it should be considered as minor. This usually improves rapidly during the recovery phase.

In patients with profound thrombocytopenia, ensure strict bed rest and protection from trauma to reduce the risk of bleeding.

Do not give intramuscular injections to avoid hematoma.

Note: Prophylactic platelet transfusions for severe thrombocytopenia in otherwise hemodynamically stable patients are not necessary.

If major bleeding occurs, it is usually from the gastrointestinal tract and/or per vagina in adult females. Internal bleeding may not become apparent for many hours until the first black stool is passed

Who are at risk of major bleeding?
- Patients with prolonged/refractory shock
- Patients with hypotensive shock and renal or liver failure and/or severe and persistent metabolic acidosis
- Patients given non-steroidal anti-inflammatory agents (NSAIDs)
- Patients with pre-existing peptic ulcer disease
- Patients on anticoagulant therapy
- Patients with any form of trauma, including intra-muscular injection

Note: Patients with hemolytic conditions will be at-risk for acute hemolysis with hemoglobinuria and will require blood transfusion

How to recognize severe bleeding
- Persistent and/or severe overt bleeding in the presence of unstable hemodynamic status, regardless of the hematocrit level
- A decrease in hematocrit after fluid resuscitation together with unstable hemodynamic status
- Refractory shock that fail to respond to consecutive fluid resuscitation of 40-60 mL/kg.
- Hypotensive shock with low/normal hematocrit before fluid resuscitation
- Persistent or worsening metabolic acidosis ± a well-maintained systolic blood pressure, especially in those with severe abdominal tenderness and distension
### Table 1. Hemodynamic Assessment: Continuum of Hemodynamic Changes

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Stable Condition</th>
<th>Compensated Shock</th>
<th>Hypotensive Shock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensorium</td>
<td>Clear and lucid</td>
<td>Clear and lucid (shock can be missed if you do not touch the patient)</td>
<td>Change of mental status (restless and combative)</td>
</tr>
<tr>
<td>Capillary refill time</td>
<td>Brisk (&lt;2 sec)</td>
<td>Prolonged (&gt;sec)</td>
<td>Very prolonged, mottled skin</td>
</tr>
<tr>
<td>Extremities</td>
<td>Warm and pink</td>
<td>Cool peripheries</td>
<td>Cold and clammy</td>
</tr>
<tr>
<td>Peripheral pulse</td>
<td>Good volume</td>
<td>Weak and thready</td>
<td>Feeble or absent</td>
</tr>
<tr>
<td>Heart rate</td>
<td>Normal for age</td>
<td>Tachycardia</td>
<td>Severe tachycardia with bradycardia in the late shock</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>Normal for age</td>
<td>Normal systolic pressure but rising diastolic pressure</td>
<td>Narrowed pulse pressure (&lt;20 mmHg)</td>
</tr>
<tr>
<td></td>
<td>Normal pulse</td>
<td>Narrowing pulse pressure</td>
<td>Hypotension (see definition below)</td>
</tr>
<tr>
<td></td>
<td>pressure for age</td>
<td>Postural hypotension</td>
<td>Unrecordable BP, Metabolic acidosis</td>
</tr>
<tr>
<td>Respiratory rate</td>
<td>Normal for age</td>
<td>Tachypnea</td>
<td>Hyperpnea, Kussmaul breathing</td>
</tr>
</tbody>
</table>

Source: WHO and Special Programme for Research and Training in Tropical Diseases. Dengue Guidelines for Diagnosis, Treatment, Prevention and Control 2009.2

### Table 2. Calculation for Normal Maintenance of Intravenous Fluid Infusion

Normal maintenance fluid per hour can be calculated based on the following formula* (Equivalent to Holliday-Segar formula):

- 4 mL/kg/h for first 10 kg body weight
- + 2 mL/kg/h for next 10 kg body weight
- + 1 mL/kg/h for subsequent kg body weight

*For overweight/obese patients calculate normal maintenance fluid based on ideal body weight (IBW) (Adapted from WHO 1997)

IBW for overweight/obese adults can be estimated based on the following formula

- Female: 45.5 kg + 0.91 (height – 152.4) cm
- Male: 50.0 kg + 0.91 (height – 152.4) cm

Gilbert DN, et al 2007

### Table 3. Hourly Maintenance Fluid Regime for Obese or Overweight Patients

<table>
<thead>
<tr>
<th>Estimated body weight, or IBW (kg)</th>
<th>Normal maintenance fluid [mL/hour] based on Holiday-Segar formula</th>
<th>Fluid regimen based on 2-3 mL/kg/hour (mL/hour)</th>
<th>Regimen based on 1.5-2 mL/hour (mL/hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>10</td>
<td>10-15</td>
<td>90-120</td>
</tr>
<tr>
<td>10</td>
<td>20</td>
<td>20-30</td>
<td>105-140</td>
</tr>
<tr>
<td>15</td>
<td>30</td>
<td>30-45</td>
<td>120-150</td>
</tr>
<tr>
<td>20</td>
<td>60</td>
<td>40-60</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>65</td>
<td>50-75</td>
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<tr>
<td>30</td>
<td>70</td>
<td>60-90</td>
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<tr>
<td>35</td>
<td>75</td>
<td>70-105</td>
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<tr>
<td>40</td>
<td>80</td>
<td>80-120</td>
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<tr>
<td>50</td>
<td>90</td>
<td>100-150</td>
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<tr>
<td>60</td>
<td>100</td>
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<tr>
<td>70</td>
<td>110</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>120</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: For adults with IBW >50 kg, 1.5-2 mL/kg can be used for quick calculation of hourly maintenance fluid regime. For adults with IBW >50 kg, 2-3 mL can be used for quick calculation of hourly maintenance fluid regime
Action Plan

- Give 5-10 mL/kg of fresh packed red blood cells or 10-20 mL/kg of fresh whole blood at an appropriate rate and observe the clinical response.
- A good clinical response includes improving hemodynamic status and acid-base balance.
- Consider repeating the blood transfusion if there is further blood loss or no appropriate rise in hematocrit after blood transfusion.
- Although there is little evidence to support the practice of platelet concentrates and/or fresh frozen plasma transfusion for severe bleeding, they may be given judiciously.

D. DISCHARGE CRITERIA

ALL of the following conditions must be present
1. No fever for 48 hours
2. Improvement in clinical status (general well-being, appetite, hemodynamic status, urine output, no respiratory distress)
3. Increasing trend of platelet count
4. Stable hematocrit without intravenous fluids

**Table 4. Estimated Ideal Body Weight for Overweight or Obese Adults**

<table>
<thead>
<tr>
<th>Height (cm)</th>
<th>Estimated IBW (kg) for adult males</th>
<th>Estimated IBW (kg) for adult females</th>
</tr>
</thead>
<tbody>
<tr>
<td>150</td>
<td>50</td>
<td>45.5</td>
</tr>
<tr>
<td>160</td>
<td>57</td>
<td>52</td>
</tr>
<tr>
<td>170</td>
<td>66</td>
<td>61.5</td>
</tr>
<tr>
<td>180</td>
<td>75</td>
<td>70</td>
</tr>
</tbody>
</table>

**ANNEX D**

**ANNOTATIONS**

a. If Hct is not readily available, assess hemodynamic status of patient using parameters in Table 1.

b. Assessment of improvement should be based on 7 parameters: mental status, heart rate, blood pressure, respiratory rate, capillary refill time, peripheral blood volume, extremities as described in Table 1.

c. Crystalloids (Ringer’s lactate or 0.9 NaCl solutions) have been shown to be safe and as effective as colloid solutions (dextran, starch, or gelatin) in reducing the recurrence of shock and mortality. Crystalloids are comparable to colloids in terms of total amount of fluids used in resuscitation and need for both rescue fluid and diuretics so they should be used as first line in fluid resuscitation in moderately severe (compensated) dengue shock. Compared with crystalloids, colloids are associated with increased risk of allergic reactions and new bleeding manifestations and are more expensive. Although there is insufficient data to ascertain the advantage of one type of fluid in cases of severe dengue shock (DHF grade IV) or hypotensive (uncompensated) shock, colloids may be used in patients who primarily present with hemodynamic instability and as rescue fluids in those whose cardiovascular status do not improve after the initial fluid resuscitation.

d. Inotropes

The use of inotropes should be decided on carefully and it should be started after adequate fluid volume has been administered.

- To calculate the AMOUNT of Dopamine to be added to 100 mL of IV base solution:
  \[ \text{mg of} = 6 \times \frac{\text{desired dose [mcg/kg/min]}}{ \text{weight [kg]} } \times \text{desired fluid rate [mL/hr]} \]

- To calculate the VOLUME of drug to be added to 100 mL of IV base solution:
  \[ \text{mL of} = \frac{\text{mg of drug [determined using formula above]}}{ \text{Dopamine concentration of drug (mg/mL)} } \]

- Preparation of Dopamine: 40 mg/mL, 80 mg/mL

Other vasopressors in dengue shock:

- Epinephrine
  - Preparation: 1:10,000
  - Dose: 0.1 to 1 μg/kg per minute by IV/IO infusion (titrate to desired effect)

- Norepinephrine
  - Stock dose: 1 mg/mL
  - Dose: 0.1 to 2 μg/kg per minute by IV/IO infusion (titrate to desired effect)
ANNEX E
DENGUE RECLASSIFICATION DIAGRAM

**Probable dengue:**
Lives in or travels to dengue-endemic area, with fever, plus any two of the following:
- Headache
- Body malaise
- Myalgia
- Arthralgia
- Retro-orbital pain
- Anorexia
- Nausea
- Vomiting
- Diarrhea
- Flushed skin
- Rash (petechial, Hermann’s sign)
- Tourniquet test positive
AND
- Laboratory test, at least CBC (leucopenia with or without thrombocytopenia) and/or dengue NS1 antigen test or dengue IgM antibody test (optional)

**Warning Signs**
- Abdominal pain or tenderness
- Persistent vomiting
- Clinical signs of fluid accumulation
- Mucosal bleeding
- Lethargy, restlessness
- Liver enlargement
- Laboratory: increase in hematocrit and/or decreasing platelet count

**Lab Confirmed dengue:**
- Viral culture isolation
- PCR

**Probable Dengue ± Warning**

**Without Warning Signs**

With Warning Signs

1. Severe plasma leakage
2. Severe hemorrhage
3. Severe organ impairment

**Severe**

1. Severe plasma leakage leading to:
   - Shock (DSS)
   - Fluid accumulation with respiratory distress
2. Severe bleeding
3. Severe organ impairment
   - Liver: AST or Alt >1000
   - CNS: e.g., seizures, impaired consciousness
   - Heart: e.g., myocarditis
   - Kidneys e.g., renal failure
## Revised Dengue Clinical Case Management Guidelines 2011

### Probable dengue:
Lives in or travels to dengue-endemic area, with fever, plus any two of the following:
- Headache
- Body malaise
- Myalgia
- Arthralgia
- Retro-orbital pain
- Anorexia
- Nausea
- Vomiting
- Diarrhea
- Flushed skin
- Rash (petechial, Hermann’s sign)
AND
- Laboratory test, at least CBC (leucopenia with or without thrombocytopenia) and/or dengue NS1 antigen test or dengue IgM antibody test (optional)

### Warning Signs
- Abdominal pain or tenderness
- Persistent vomiting
- Clinical signs of fluid accumulation
- Mucosal bleeding
- Lethargy, restlessness
- Liver enlargement
- Laboratory: increase in hematocrit and/or decreasing platelet count

### Lab Confirmed dengue:
- Viral culture isolation
- PCR

### Assessment

<table>
<thead>
<tr>
<th>Negative</th>
<th>Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-existing conditions?</td>
<td>Warning Signs</td>
</tr>
<tr>
<td>Social circumstances?</td>
<td>• Abdominal pain or tenderness</td>
</tr>
<tr>
<td>Negative</td>
<td>• Persistent vomiting</td>
</tr>
<tr>
<td>Dengue without Warning Signs</td>
<td>• Clinical signs of fluid accumulation</td>
</tr>
<tr>
<td></td>
<td>• Mucosal bleeding</td>
</tr>
<tr>
<td></td>
<td>• Lethargy, restlessness</td>
</tr>
<tr>
<td></td>
<td>• Liver enlargement</td>
</tr>
<tr>
<td></td>
<td>• Laboratory: increase in hematocrit and/or decreasing platelet count</td>
</tr>
</tbody>
</table>

### Classification

<table>
<thead>
<tr>
<th>GROUP A</th>
<th>GROUP B</th>
<th>GROUP C</th>
</tr>
</thead>
<tbody>
<tr>
<td>May be Sent Home</td>
<td>Referred for In-hospital Management</td>
<td>Require Emergency Treatment</td>
</tr>
</tbody>
</table>

### Management

#### GROUP A
- **Group Criteria**
  - Patients who do not have any of the warning signs, particularly when fever subsides, AND
  - Able to tolerate adequate volumes of oral fluids, and
  - Pass urine at least once every 6 hours

#### GROUP B
- **Group Criteria**
  - Patient with any of the following features:
    - Co-existing conditions that may make dengue or its management more complicated, such as pregnancy, infancy and old age, obesity, diabetes mellitus, renal failure, chronic hemolytic diseases, etc
    - Social circumstances such as living alone, or living far from health facility, or without a reliable means of transport
  - OR
    - Existing Warning Signs

#### GROUP C
- **Group Criteria**
  - Patients with any of the following features:
    - Severe plasma leakage with shock and/or fluid accumulation with respiratory distress
    - Severe bleeding
    - Severe organ impairment

### Laboratory Tests

<table>
<thead>
<tr>
<th>GROUP A</th>
<th>GROUP B</th>
<th>GROUP C</th>
</tr>
</thead>
</table>

### ANNEX F

REVISED DENGUE CLINICAL CASE MANAGEMENT GUIDELINES

Learn to access drug info on your cellphone. Send PPD to 2600 for Globe/Smart/Sun users.
<table>
<thead>
<tr>
<th>Management</th>
<th>Treatment</th>
<th>Treatment</th>
<th>Treatment</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advice for</td>
<td>• Encourage oral fluid intake</td>
<td>1. Obtain a reference hematocrit before fluid therapy</td>
<td>1. Start intravenous fluid resuscitation with isotonic crystalloid solutions at 5-10 mL/kg/hour over 1 hour, then reassess the patients condition (vital signs, capillary refill time, hematocrit, urine output) and decide depending on the situation.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Give oral rehydration solution based on weight</td>
<td>2. Give only isotonic solutions such as 0.9% NaCl (saline), Ringer’s Lactate, Hartmann’s solution. Start with 5-7 mL/kg/hour for 1-2 hours, then reduce to 3-5 mL/kg/hr for 2-4 hours, and then reduce to 2-3 mL/kg/hr or less according to clinical response</td>
<td>2. If the patients condition improves, intravenous fluids should be gradually reduced to</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• If oral fluids are not tolerated, start intravenous fluid therapy, 0.9% NaCl (saline) or Ringer’s Lactate at maintenance rate</td>
<td>3. Reassess the clinical status and repeat the HCT</td>
<td>o 5-7 mL/kg/hr for 1-2 hours, then</td>
<td></td>
</tr>
<tr>
<td>Patients with stable Hematocrit can be sent home</td>
<td>Fluid management for patients who are admitted, without shock</td>
<td>4. If the HCT remains the same or rises only minimally, continue with the same rate (2-3 mL/kg/hr) for another 2-4 hours.</td>
<td>o 1 pt To 3-5 mL/kg/hr for 2-4 hours, then</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Isotonic solutions (D5 LRS, D5 Acetated Ringers, D5 NSS/D5 0.9 NaCl) are appropriate</td>
<td>5. If there are worsening of vital signs and rapidly rising HCT, increase the rate to 5-10 mL/kg/hour for 1-2 hours</td>
<td>o To 2-3 mL/kg/hr and then to reduce further depending on hemodynamic status, which can be maintained for up to 24 to 48 hours.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Compute maintenance IVF using the caloric-expenditure method (Holliday-Segar Method) or calculation Based on Weight</td>
<td>6. Reassess the clinical status, repeat hematocrit and review fluid infusion rates accordingly</td>
<td>3. If shock persists check the hematocrit after the first bolus:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• If the patient shows signs of mild dehydration but is NOT in shock, the volume needed for mild dehydration is added to the maintenance fluids to determine the total fluid requirement (TFR).</td>
<td>7. Give the minimum intravenous fluid volume required to maintain good perfusion and urine output of about 0.5 mL/kg/hr. Intravenous fluids are usually needed for only 24 to 48 hours.</td>
<td>• If hematocrit increases or is still high (&gt;50%), repeat a second bolus of crystalloid solution at 10-20 mL/kg/hr for 1 hour. After this second bolus, if there is improvement, then reduce the rate to 7-10 mL/kg/hr for 1-2 hours, and then continue to reduce as above.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• The following formula may be used to calculate the required volume of intravenous fluid to infuse: TFR – Maintenance IVF + Fluids as for Mild dehydration</td>
<td>8. Reduce intravenous fluids gradually when the rate of plasma leakage decreases towards the end of the critical phase. This is indicated by:</td>
<td>• If hematocrit decreases compared to the initial reference hematocrit (&lt;40% in children and adult females, &lt;45% in adult males), this indicates bleeding and the need to cross-match and transfuse blood as soon as possible (see Treatment for Hemorrhagic Complications)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TFR – Maintenance IVF + Fluids as for Mild dehydration</td>
<td>• Adequate urine output and/or oral fluid intake</td>
<td>4. Further boluses of crystalloid or colloidal solutions may need to be given during the next 24 to 48 hours.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>*Where the volume of fluids for mild dehydration is computed as follows: Infant: 50 mL/kg</td>
<td>• HCT decreases below the baseline value in a stable patient</td>
<td>Treatment of Compensated Shock</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Older Child or Adult: 30 mL/kg</td>
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<tr>
<td></td>
<td>One-half of the computed TFR is given in 8 hours and the remaining one half is given in the next 16 hours</td>
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</tr>
<tr>
<td></td>
<td>The IVF rate may be decreased anytime as necessary based on clinical assessment</td>
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</tr>
<tr>
<td></td>
<td>If the patient shows signs of deterioration, see Management for compensated or hypotensive shock whichever is applicable</td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>1. Start intravenous fluid resuscitation with isotonic crystalloid solutions at 5-10 mL/kg/hr over 1 hour, then reassess the patients condition (vital signs, capillary refill time, hematocrit, urine output) and decide depending on the situation.</td>
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<td>2. If the patients condition improves, intravenous fluids should be gradually reduced to</td>
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<td>o 1 pt To 3-5 mL/kg/hr for 2-4 hours, then</td>
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<td>o To 2-3 mL/kg/hr and then to reduce further depending on hemodynamic status, which can be maintained for up to 24 to 48 hours.</td>
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<td>• If hematocrit increases or is still high (&gt;50%), repeat a second bolus of crystalloid solution at 10-20 mL/kg/hr for 1 hour. After this second bolus, if there is improvement, then reduce the rate to 7-10 mL/kg/hr for 1-2 hours, and then continue to reduce as above.</td>
<td></td>
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<td></td>
<td></td>
<td>• If hematocrit decreases compared to the initial reference hematocrit (&lt;40% in children and adult females, &lt;45% in adult males), this indicates bleeding and the need to cross-match and transfuse blood as soon as possible (see Treatment for Hemorrhagic Complications)</td>
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<tr>
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<td></td>
<td>4. Further boluses of crystalloid or colloidal solutions may need to be given during the next 24 to 48 hours.</td>
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<td></td>
</tr>
</tbody>
</table>

Dengue Fever
### Dengue Fever

**Monitoring**
- Daily review for disease progression
- Decreasing WBC
- Defervescence
- Warning signs (until out of critical period)
- Advice for immediate return to hospital if with development of any warning signs
- Written advice of management (e.g. Home Care Card for Dengue)

**Monitoring**
- Temperature pattern
- Volume of fluid intake and losses
- Urine output (volume and frequency)
- Warning signs
- Hct, WBC and platelet counts

**Monitoring**
- Vital signs and peripheral perfusion (1-4 hourly until patient is out of critical phase)
- Urine output (4-6 hourly)
- Hct (before and after fluid replacement, then 6-12 hourly)
- Blood glucose
- Other organ functions (renal profile, liver profile, coagulation profile, as indicated)

**3. If shock persists, check hematocrit after the first bolus:**
- If hematocrit increases compared to the previous value or remains very high (>50%), change intravenous fluids to colloid solutions at 10-20 mL/kg as a second bolus over ½ to 1 hour. After this dose, reduce the rate to 7-10 mL/kg/hr for 1-2 hours, then change back to crystalloid solution and reduce rate of infusion as mentioned above when the patient’s condition improves.
- If hematocrit decreases compared to the previous value (<40% in children and adult females, <45% in adult males), this indicates bleeding and the need to cross-match and transfuse blood as soon as possible (see treatment for hemorrhagic complications).

**4. Further boluses of fluid may need to be given during the next 24 hours.** The rate and volume of each bolus infusion should be titrated to the clinical response.

**Treatment of Hemorrhagic Complications**
- Give 5-10 mL/kg of fresh packed red blood cells or 10-20 mL/kg of fresh whole blood at an appropriate rate.

---

### Discharge

All of the following conditions must be present
1. No fever for 48 hours
2. Improvement in clinical status (general well-being, appetite, hemodynamic status, urine output, no respiratory distress)
3. Increasing trend of platelet count
4. Stable hematocrit without intravenous fluids
Index of Products of Interest to the Healthcare Practitioner

This index is not part of the order. It lists the products and/or their classes that may be of interest to the doctor. For the doctor’s convenience, brands available in the PPD references are listed under each of the classes. For drug information, refer to the PPD references (PPD, PPD Pocket Version, PPD Text, PPD Tabs, and www.TheFilipinoDoctor.com).

**Fluids/Electrolytes**
- Dextrose in Water
  - B. Braun 10% Dextrose in Water
  - B. Braun 5% Dextrose in Water
- LVP D\(_5\)W
- LVP D\(_5\)W
- Maintesol
- Marivelle-5
- Medisol 10%
- Medisol 5%
- Lactated Ringer’s Solution
  - B. Braun Lactated Ringer’s Solution
  - Marilact
- Normal Saline Solution
  - B. Braun Sodium Chloride 0.9%
  - Soln for Injection
- Oral Rehydration Salts
  - Glucolyte
  - Glucost R
  - Hydrite
  - Pedialyte 45/75
  - Sodalite
- Plasma Volume Expanders
  - Voluven 6%

**Analgesics/Antipyretics**

**Para-Aminophenol Derivatives**
- Paracetamol
  - Aeknil
  - Alvedon
  - Biogesic
  - Calpol
  - Cetra
  - Dolexpel
  - Kiddlets
  - Nahalgesic
  - Naprex
  - Opigesic
  - Pynal
  - Rexidol
  - Sinomol
  - Tempra/Tempra Forte
  - Tylenol