Revised Clinical Case Management Guidelines

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Annex A

Dengue case classification has been revised

Old scheme categorized dengue into dengue fever, dengue hemorrhagic fever, and dengue shock syndrome

New scheme categorized dengue by severity

Dengue without warning signs

Probable: 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 one of the following

- CBC (leucopenia with or without thrombocytopenia)
- Dengue NS1 antigen test or dengue IgM antibody test (optional)

Considered “confirmed” if positive in virus culture isolation or PCR

Dengue with warning signs

Lives in or travels to dengue-endemic area, with fever lasting for 2-7 days, plus any of the following:

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

Considered “confirmed” if positive in virus culture isolation or PCR

Annex A

Severe dengue

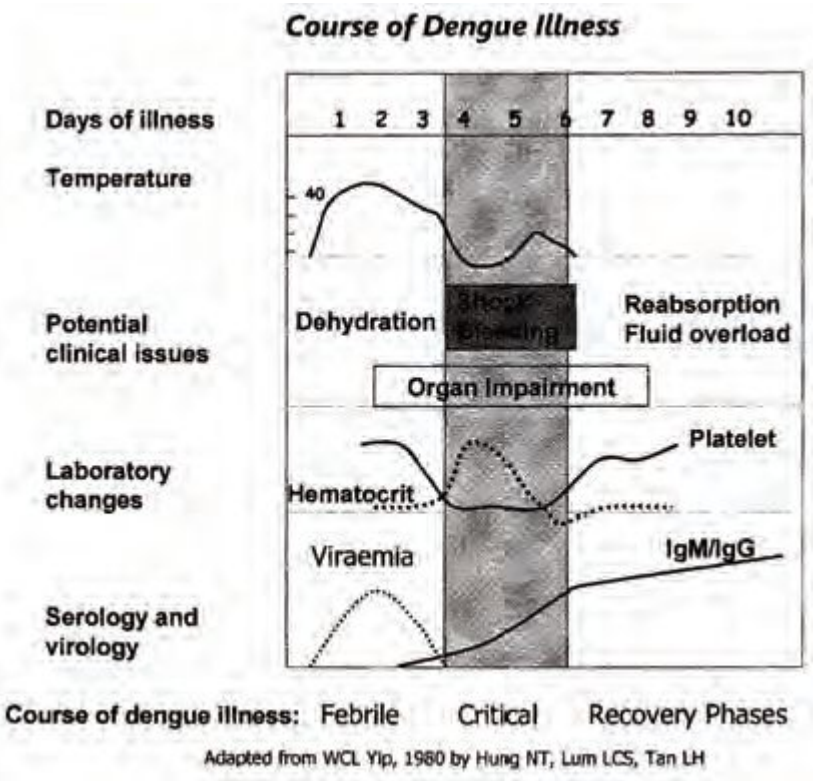
Lives in or travels to a dengue-endemic area with fever of 2-7 days and any of the above clinical manifestations for dengue with or without warning signs, plus any of the following:

- Severe plasma leakage, leading to:
  - Shock
  - Fluid accumulation with respiratory distress
- 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

Annex B

Dengue is divided into three phases

- Acute Febrile Phase
- Critical Phase
- Recovery Phase



Febrile Phase

Usually 2 to 7 days

May have mild symptoms of bleeding such as petechiae or bleeding from mucosa (eg, nose, gums, mouth)

The fever abates to 37.5 to 38 degrees Centigrade or less on Day 3 to 7

This may be followed by improvement or deterioration

Improvement indicates “Dengue without Warning Signs”

Clinically significant problems:

- Dehydration
- Neurological disturbances

Critical Phase

Deterioration is indicated by warning signs, which are a result of increased capillary fragility, and marks the beginning of the critical phase

May further deteriorate to severe dengue, which manifests as plasma leakage, severe bleeding, or severe organ impairment.

Significant plasma leakage usually lasts 24 to 48 hours.

Clinically Significant Problems:

- Shock from plasma leakage
- Fluid accumulation and respiratory distress
- Severe hemorrhage
- Organ damage

Recovery Phase

Reabsorption of extravasated fluid occurs via the lymphatics over the next 48 to 72 hours.

Clinically significant problems:

Hypervolemia from overcorrection

Hemodynamic status stabilizes, diuresis occurs, and the patient feels better.

Annex C

Specific Treatment Guidelines

A stepwise approach to management of dengue

A. ASSESSMENT

Step 1 - Overall Assessment

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, time of last voiding)
- Other important ancillary history:
  - Family members or neighbors with dengue
  - Travel to or residence in dengue-endemic areas
  - Comorbids such as infancy, pregnancy, obesity, diabetes mellitus, hypertension, etc
  - Jungle trekking, waterfall swimming (ddx: leptospirosis, typhus, malaria)
  - Recent unprotected sexual or drug use behavior (ddx: acute HIV seroconversion illness)

A. ASSESSMENT

Step 1 - Overall Assessment

Physical Examination

- Mental state and Glasgow Coma Scale (GCS) score
- Hydration status
- Hemodynamic status
- Tachypnea, acidotic breathing, pleural effusion
- Abdominal tenderness, hepatomegaly, ascites
- Rash and bleeding manifestations
- Tourniquet test (repeat if negative or with no bleeding manifestations)

A. ASSESSMENT

Step 1 - Overall Assessment

Laboratories

- Complete blood count at first visit
- Diagnostics for dengue (Usually not necessary for acute management unless atypical presentation)
  - Viral culture isolation
  - Dengue PCR

A. ASSESSMENT

Step 2 - Diagnosis, Assessment, Classification

1. Is it dengue?
2. If so, which phase?
3. Are there warning signs?
4. What are the hydration status and hemodynamic status?
5. Does the patient require admission?

A. ASSESSMENT

Step 3 - Management

Notify agencies of the disease as required

Possible dispositions:

1. Send home (Group A)
2. Refer for in-hospital management (Group B)
3. Emergency treatment and urgent referral (Group C)

B. Treatment (by type of patient)

Group A - Send home

Appropriate for patients who:

- Can tolerate increased oral fluid intake
- Can pass urine at least every 6 hours
- Have no warning signs, especially on resolution of fever

B. Treatment (by type of patient)

Group A - Send home

Ambulatory patients must be reviewed for disease progression until critical period subsides:

- resolution of fever
- decreasing WBC
- Defervescence
- warning signs

Those with **stable hematocrit** advised to return immediately if with **warning signs**

B. Treatment (by type of patient)

Group A - Send home

Action Plan

- Oral Rehydration solution, calculated by weight
- ORS must be adjusted to reduce sodium to 45 to 60 mmol/L
- Sports drinks have a higher osmolarity and may endanger the patient

Calculation of Oral Rehydration Fluids Using Weight (Ludan Method)	
Body weight (kg)	**ORS to be given**
>3-10	100 mL/kg/day
>10-20	75 mL/kg/day
>20-30	50-60 mL/kg/day
>30-60	40-50 mL/kg/day

Source: Ludan A. Chapter 41: Pediatric fluid and Electrolyte Therapy. *Textbook of Pediatrics and Child Health.* del Mundo F, Estrada FA, Santos-Pcampo PD, Navarro XR, editors. Manila: JMC Press. Fourth Edition. 2000:1485-1499

B. Treatment (by type of patient)

Group A - Send home

Action Plan

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

B. Treatment (by type of patient)

Group A - Send home

Action Plan

What should be avoided?

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

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

These are **warning signals for danger**:

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

B. Treatment (by type of patient)

Group B - In-hospital management

Appropriate for patient with any of the following:

a. Warning signs
b. Comorbids that affect dengue and management, including but not limited to:
    - Pregnancy
    - Extremes of age
    - Obesity
    - Diabetes mellitus
    - Renal failure
    - Chronic hemolytic disease
c. Social circumstances that make home care unfeasible

B. Treatment (by type of patient)

Group B - In-hospital management

Action Plan

1.) If *without warning signs*:

- Increase oral fluid intake if tolerated
- Otherwise, start intravenous fluids
- Isotonic solutions are appropriate
- Assess for signs of dehydration

Calculation of Maintenance Intravenous Fluid Infusions (Holliday and Segar Method)

Body Weight (kg)	Total Fluid Requirement (mL/day)
0-10	100 mL/kg
>10-20	1,000 mL + 50 mL/kg for each kg>10 kg
>20	1,500 mL + 20 mL/kg for each kg>20 kg

Source: Holliday MA, Segar WE. Maintenance need for water in parenteral fluid therapy. *Pediatrics* 1957;19:823.

Calculation of Oral Rehydration Fluids Using Weight (Ludan Method)

Body weight (kg)	ORS to be given
>3-10	100 mL/kg/day
>10-20	75 mL/kg/day
>20-30	50-60 mL/kg/day
>30-60	40-50 mL/kg/day

Source: Ludan A. Chapter 41: Pediatric fluid and Electrolyte Therapy. *Textbook of Pediatrics and Child Health.* del Mundo F, Estrada FA, Santos-Pcampo PD, Navarro XR, editors. Manila: JMC Press. Fourth Edition. 2000:1485-1499

B. Treatment (by type of patient)

Group B - In-hospital management

Action Plan

If *without warning signs* BUT *with mild dehydration and NOT in shock*:

- Add volume to compensate for mild dehydration (30 mL/kg for adults)
- Give ½ of total fluid requirement in 8 hours, then the other ½ in the next 16 hours
- Assess and adjust fluid status periodically and as needed

TFR = Maintenance IVF + Fluids as for Mild dehydration*

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

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

Close monitoring of clinical parameters:

- Temperature pattern
- Fluid input/output
- Warning signs
- Hematocrit, WBC, platelet counts

B. Treatment (by type of patient)

Group B - In-hospital management

Action Plan

2.) If *with warning signs*:

- Obtain a reference hematocrit before fluid therapy
- Give only isotonic solutions such as 0.9% NaCl, Ringer's lactate, Hartmann's solution
- Start with 5 to 7mL/kg/hr for 1 to 2 hours
- Then 3 to 5 mL/kg/hr for 2 to 4 hours
- Then 2 to 3 mL/kg/hr or less according to clinical response
- Reassess clinical status and repeat hematocrit

B. Treatment (by type of patient)

Group B - In-hospital management

Action Plan

2.) If *with warning signs*:

If hematocrit remains the same or has minimal rise only, continue 2 to 3 mL/kg/hr for 2 to 4 hours
If vital signs are worsening and hematocrit is rising rapidly, increase to 5 to 10 mL/kg/hr for 1 to 2 hours
Reassess clinical status, repeat hematocrit, and review infusion rates as needed
Give the minimum IV fluid volume enough to maintain good perfusion and urine output of 0.5mL/kg/hr.

B. Treatment (by type of patient)

Group B - In-hospital management

Action Plan

2.) If *with warning signs*:

IV fluids are usually needed for only 24 to 48 hours
Reduce IV fluids gradually when rate of plasma leakage decreases near the end of the critical phase, as indicated by

- Adequate urine output or oral fluid intake
- Hematocrit decreases below baseline in a stable patient

B. Treatment (by type of patient)

Group B - In-hospital management

Action Plan

2.) If *with warning signs*:

Monitoring should be done until the “at-risk” period is completed. Detailed fluid balance should be maintained. These parameters should be monitored:

- Vital signs, peripheral perfusion (q1 to q4 until critical phase is completed)
- Urine output (q4 to q6)
- Blood glucose
- Other organ function indicators (such as renal, liver, coagulation profiles)

B. Treatment (by type of patient)

Group C - Patients with Severe Dengue Requiring Emergency Treatment and Urgent Referral

Action Plan

a.) Mgmt for px admitted to the hospital with compensated shock

Start IV fluid resuscitation with isotonic crystalloid solutions at 5 to 10 mL/kg/hr for 1 hour, then reassess condition;
If condition improves:

- Reduce to 5 to 7mL/kg/hr for 1 to 2 hours
- Then 3 to 5 mL/kg/hr for 2 to 4 hours
- Then 2 to 3 mL/kg/hr or less; further reduction depends on hemodynamic status, which may be maintained up to 24 to 48 hours

B. Treatment (by type of patient)

Group C - Patients with Severe Dengue Requiring Emergency Treatment and Urgent Referral

Action Plan

a.) Mgmt for px admitted to the hospital with compensated shock

If shock persists (unstable VS), check hematocrit after first bolus
If hematocrit increases or still is high (>50%), repeat second bolus of crystalloid at 10 to 20 mL/kg/hr for 1 hour
If there is improvement, reduce to 7 to 10 mL/kg/hr for 1 to 2 hours, then reduce as above
If hematocrit decreases compared to reference (<40% adult female, <45% adult male), indicates bleeding and need to cross-match and transfuse blood
Further boluses of crystalloid/colloid to be goven as needed in the next 24 to 48 hours

B. Treatment (by type of patient)

Group C - Patients with Severe Dengue Requiring Emergency Treatment and Urgent Referral

Action Plan

b.) Mgmt for px admitted to the hospital with hypotensive shock

- Should be managed more vigorously
- IV crystalloid or colloid 20 mL/kg as bolus over 15 minutes to reverse shock quickly
- If condition improves
  - Crystalloid or colloid at 10 mL/kg/hr
  - Crystalloid infusion at 5 to 7mL/kg/hr for 1 to 2 hours
  - Then 3 to 5 mL/kg/hr for 2 to 4 hours
  - Then 2 to 3 mL/kg/hr or less (up to 24 to 48 hours)

B. Treatment (by type of patient)

Group C - Patients with Severe Dengue Requiring Emergency Treatment and Urgent Referral

Action Plan

b.) Mgmt for px admitted to the hospital with hypotensive shock

If shock persists (unstable VS), check hematocrit after first bolus
If hematocrit increases or still is high (>50%), change IV fluids to colloid at 10 to 20 mL/kg bolus for 30 minutes to 1 hour
Then reduce to 7 to 10 mL/kg/hr for 1 to 2 hours, then return to crystalloid and reduce infusion rate as above
If hematocrit decreases compared to reference (<40% adult female, <45% adult male), indicates bleeding and need to cross-match and transfuse blood

B. Treatment (by type of patient)

Group C - Patients with Severe Dengue Requiring Emergency Treatment and Urgent Referral

Action Plan

b.) Mgmt for px admitted to the hospital with hypotensive shock

Further boluses of fluid may be given in the next 24 hours

Rate and volume should be titrated to clinical response

If with severe dengue: should be admitted to high dependency/intensive care areas

B. Treatment (by type of patient)

Group C - Patients with Severe Dengue Requiring Emergency Treatment and Urgent Referral

Action Plan

c.) Monitoring

- Frequent close monitoring still warranted with detailed fluid balance until completion of critical period
- Correlate hematocrit level to hemodynamic status, clinical response, and acid-base balance; Rising/persistently high hematocrit:
  - with unstable VS (especially narrowing pulse pressure) indicates active plasma leakage and need for further fluid bolus
  - With table hemodynamic status, adequate urine output indicates no extra IV fluid required
  - Hematocrit may start falling within next 24 hours as plasma leakage stops

B. Treatment (by type of patient)

Group C - Patients with Severe Dengue Requiring Emergency Treatment and Urgent Referral

Action Plan

c.) Monitoring

- Correlate hematocrit level to hemodynamic status, clinical response, and acid-base balance; Falling hematocrit:
  - With unstable vital signs (particularly narrowing pulse pressure, tachycardia, metabolic acidosis, poor urine output) indicates major hemorrhage and need for urgent blood transfusion
  - With stable hemodynamic status and adequate urine output indicates hemodilution or reabsorption of extravasated fluids; **discontinue IV fluids immediately** to avoid pulmonary edema

C. TREATMENT OF HEMORRHAGIC COMPLICATIONS

- *Minor mucosal bleeding* may occur in any patient with dengue.
    - if patient remains stable with fluid resuscitation/replacement
    - usually improves rapidly during the recovery phase
- In patients with profound thrombocytopenia:
    - ensure strict bed rest
    - 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.

C. TREATMENT OF HEMORRHAGIC COMPLICATIONS

- *Major bleeding*
  - 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 intramuscular injection

C. TREATMENT OF HEMORRHAGIC COMPLICATIONS

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

C. TREATMENT OF HEMORRHAGIC COMPLICATIONS

Action Plan

a. 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

b. Good clinical response = improving hemodynamic status and acid-base balance

c. Consider repeating the blood transfusion if:
   i. there is further blood loss, or
   ii. no appropriate rise in haematocrit after blood transfusion

d. Platelet concentrates and/or fresh frozen plasma transfusion for severe bleeding may be given judiciously (although there is little evidence to support the practice).

TABLE 1. Hemodynamic Assessment: Continuum of Hemodynamic Changes			
Parameters	**Stable Condition**	**Compensated Shock**	**Hypotensive Shock**
Sensorium	Clear and Lucid	Clear and lucid (shock can be missed if you do not touch the patient	Change of mental status (restless and combative)
Capillary Refill Time	Brisk (< 2 sec)	Prolonged (> 2 sec)	Very prolonged, mottled skin
Extremities	Warm and pink	Cool peripheries	Cold and clammy
Peripheral pulse	Good volume	Weak and thready	Feeble or absent
Heart Rate	Normal for age	Tachycardia	Severe tachycardia with bradycardia in the late shock
Blood Pressure	• Normal for age • Normal pulse pressure for age	• Normal systolic pressure but rising diastolic pressure • Narrowing pulse pressure • Postural hypotension	• Narrowed pulse pressure (< 20 mmHg) • Hypotension • Unrecordable BP, Metabolic acidosis
Respiratory Rate	Normal for age	Tachypnea	Hyperpnea, Kussmaul breathing

Source: WHO and Special Programme for Research and Training in Tropical Diseases. Dengue Guidelines for Diagnosis, Treatment, Prevention and Control 2009.

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

Estimated body weight, or IBW (kg)	Normal maintenance fluid (mL/hr) *based on Holiday-Segar formula	Fluid regimen based on 2-3 mL/kg/hr (mL/hr)	Regimen based on 1.5-2 mL/hr (mL/hr)
5	10	10 – 15	
10	20	20 – 30	
15	30	30 – 45	
20	60	40 – 60	
25	65	50 – 75	
30	70	60 – 90	

Estimated body weight, or IBW (kg)	Normal maintenance fluid (mL/hr) *based on Holiday-Segar formula	Fluid regimen based on 2-3 mL/kg/hr (mL/hr)	Regimen based on 1.5-2 mL/hr (mL/hr)
35	75	70 – 105	
40	80	80 – 120	
50	90	100 – 150	
60	100		90 - 120
70	110		105 – 140
80	120		120 – 150

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

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 CBC. Fluid resuscitation w/ plain isotonic crystalloid 10mL/kg/hr over 1 hr. Give O2 support.

Is there any improvement? (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 >3 L/day to avoid fluid overload
- Monitor HCT q6 hrs or as necessary
- Reassess hemodynamic status frequently (see Table 1) including urine output
- Monitor for signs of bleeding

Notes:

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

NO

HCT ↑ or high

Box C. Administer 2nd bolus of fluid, colloid/crystalloid, 10 mL/kg in 1 hr

HCT ↓

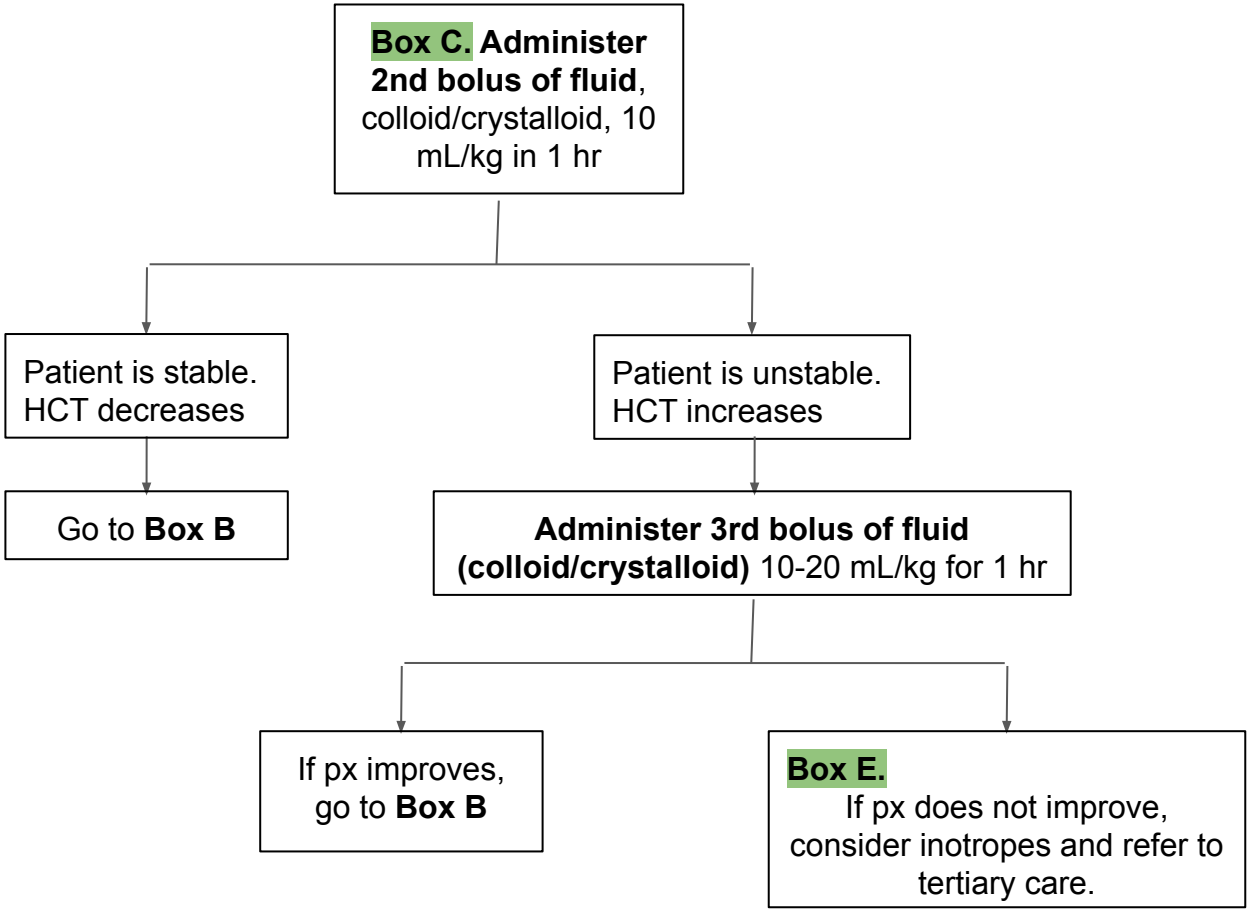
Box D. If there are signs of occult/overt bleeding initiate transfusion with fresh whole blood 20 mL/kg or PRBC 10 mL/kg

Reassess hemodynamic status and bleeding parameters

Notes:

1. *If improved go to **Box B***
2. *If not improved, go to **Box E***

ALGORITHM FOR THE TREATMENT OF COMPENSATED SHOCK



ALGORITHM FOR THE TREATMENT OF HYPOTENSIVE SHOCK

Hypotensive Shock

Box A. Obtain CBC. Fluid resuscitation w/ 10 mL/kg/hr plain isotonic crystalloid or colloid over 15 mins. Give O2 support.

Is there any improvement? (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 >3 L/day to avoid fluid overload
- Monitor HCT q6 hrs or as necessary
- Reassess hemodynamic status frequently (see Table 1) including urine output
- Monitor for signs of bleeding

Notes:

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

NO

HCT ↑ or high

Box C. Administer 2nd bolus fluid (colloid), 10 mL/kg over 15 min. Check hemodynamic parameters (**Table 1**)

HCT ↓

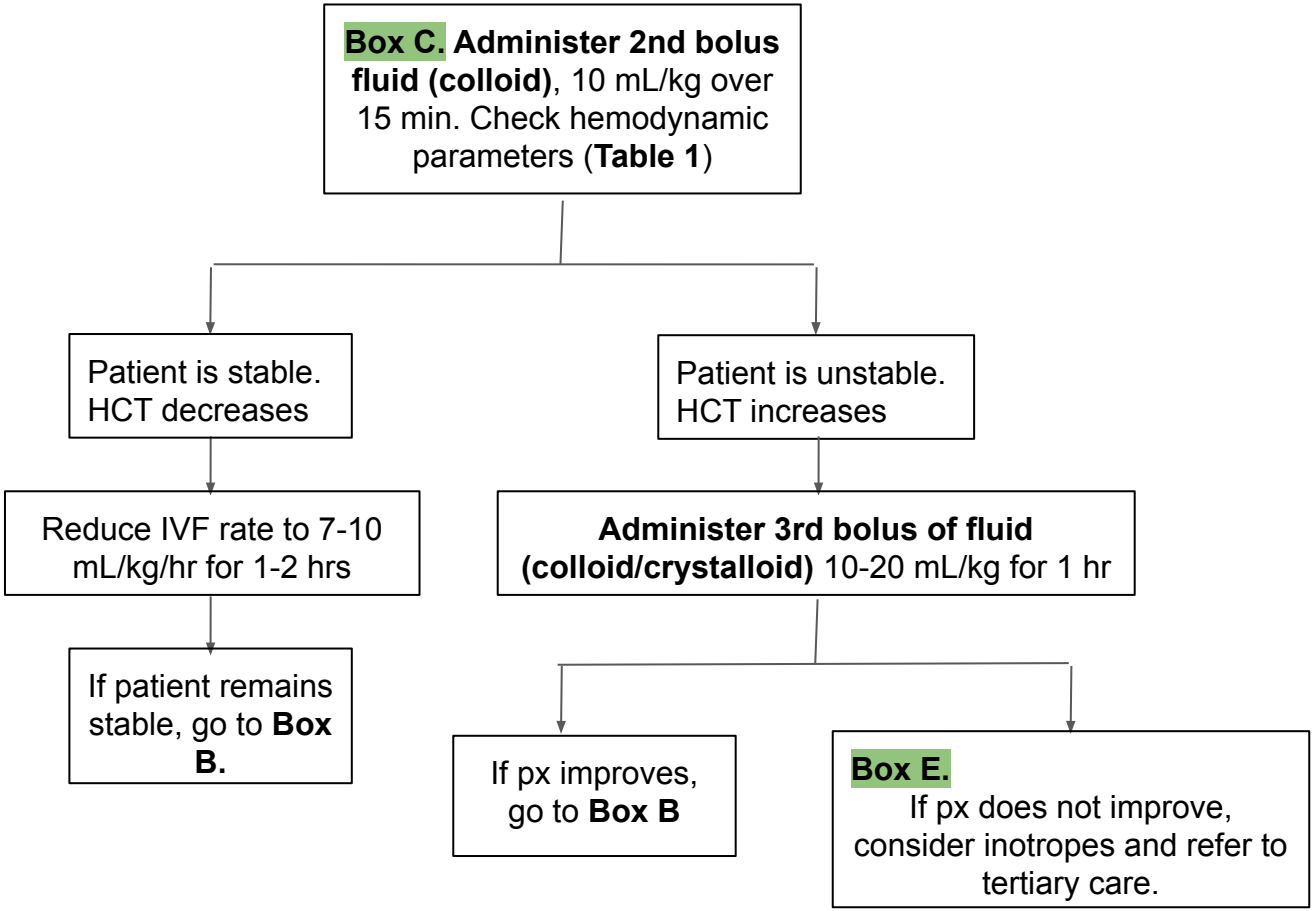
Box D. If there are signs of occult/overt bleeding initiate transfusion with fresh whole blood 20 mL/kg or PRBC 10 mL/kg

Reassess hemodynamic status and bleeding parameters

Notes:

1. *If improved go to **Box B***
2. *If not improved, go to **Box E***

ALGORITHM FOR THE TREATMENT OF HYPOTENSIVE SHOCK



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 IVF

TABLE 4. Estimated Ideal Body Weight for Overweight or Obese Adults

Height (cm)	Estimated IBW (kg) for adult males	Estimated IBW (kg) for adult females
150	50	45.5
160	57	52
170	66	61.5
180	75	70

ANNEX D

ANNOTATIONS

C1. **Crystalloids**

- have been shown to be safe and as effective as colloid solutions in reducing the recurrence of shock and mortality
- comparable to colloids in terms of:
  - total amount of fluids used in resuscitation, and
  - need for both rescue fluid and diuretics
- they should be used as first line in fluid resuscitation in moderately severe (compensated) dengue shock

ANNEX D

ANNOTATIONS

A. If hematocrit is not readily available, assess hemodynamic status of the patient using the following parameters: *sensorium, capillary refill time, extremities, peripheral blood volume, heart rate, blood pressure, and respiratory rate* (**see Table 1).**

B. **Assessment of improvement** should be based on the **7 parameters** (as above) described in **Table 1**.

ANNEX D

ANNOTATIONS

C1. **Crystalloids**

i.) **0.9% saline [“normal” saline]/NSS**

- Normal plasma chloride ranges from 95 to 105 mmol/L.
- Suitable option for initial fluid resuscitation
- Repeated large volumes may lead to hyperchloremic acidosis which may aggravate or be confused with lactic acidosis from prolonged shock.
- Monitoring the chloride and lactate levels will help to identify this problem.
- When serum chloride level exceeds the normal range, it is advisable to change to other alternatives such as Ringer’s lactate.

ANNEX D

ANNOTATIONS

C1. **Crystalloids**

ii.) **Ringer's Lactate**

- Has lower sodium (131 mmol/L) and chloride (115 mmol/L) contents and osmolality of 273 mOsm/L.
- May not be suitable for resuscitation of patients with severe hyponatremia
- Suitable solution after 0.9 Saline has been given and the serum chloride level has exceeded the normal range.
- Should probably be avoided in liver failure and patients taking metformin where lactate metabolism may be impaired.

ANNEX D

ANNOTATIONS

C2. **Colloids**

- are associated with increased risk of allergic reactions and new bleeding manifestations
- more expensive
- 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
- One of the biggest concerns regarding their use is their impact on coagulation.

ANNEX D

ANNOTATIONS

C2. **Colloids**

- Types of colloid:*gelatin-based, dextran-based, starch-based solutions*
- *Dextrans* - may bind to von Willebrand factor/Factor VIII complex and impair coagulation the most
  - However, this was not observed to have clinical significance in fluid resuscitation in dengue shock
  - Dextran 40 can potentially cause an osmotic renal injury in hypovolemic patients
- *Gelatin* - has the least effect on coagulation among all the colloids
  - BUT the highest risk of allergic reactions (fever, chills and rigors)

ANNEX D

ANNOTATIONS

D. **Inotropes**

- should be decided on carefully
- 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:

$$\text{mg of Dopamine} = 6 \times \frac{\text{desired dose [mcg/kg/min]}}{\text{desired fluid rate [mL/hr]}} \times \text{weight [kg]}$$

• To calculate the VOLUME of drug to be added to 100 mL of IV base solution:

$$\text{mL of Dopamine} = \frac{\text{mg of drug [determined using formula above]}}{\text{concentration of drug (mg/mL)}}$$

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

ANNEX D

ANNOTATIONS

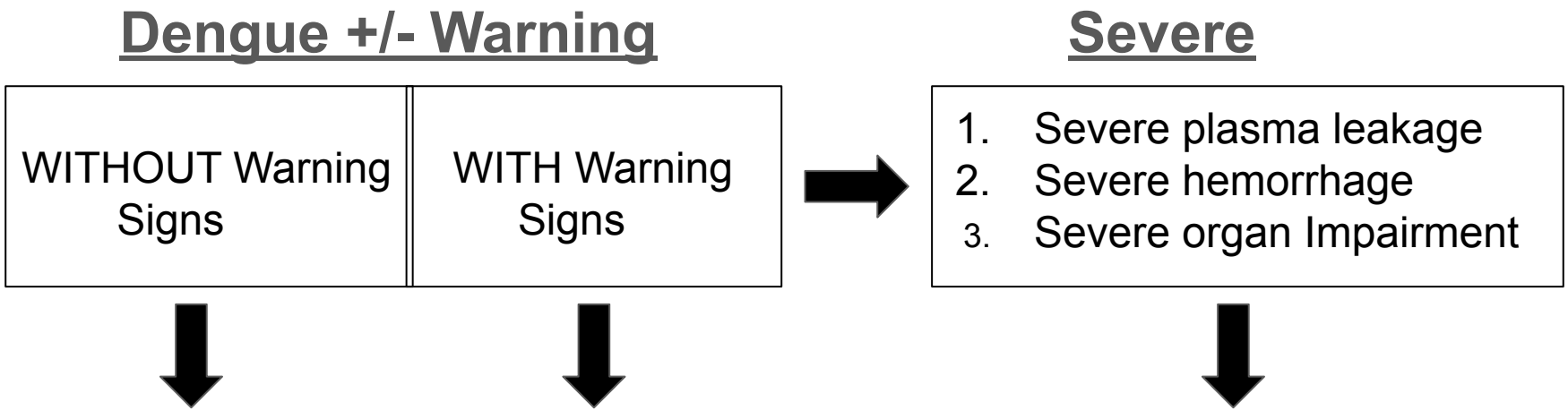
D. **Inotropes**

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 Classification 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

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

Lab Confirmed Dengue:

- Viral culture isolation
- PCR

ANNEX F

REVISED DENGUE CLINICAL CASE MANAGEMENT GUIDELINES 2011

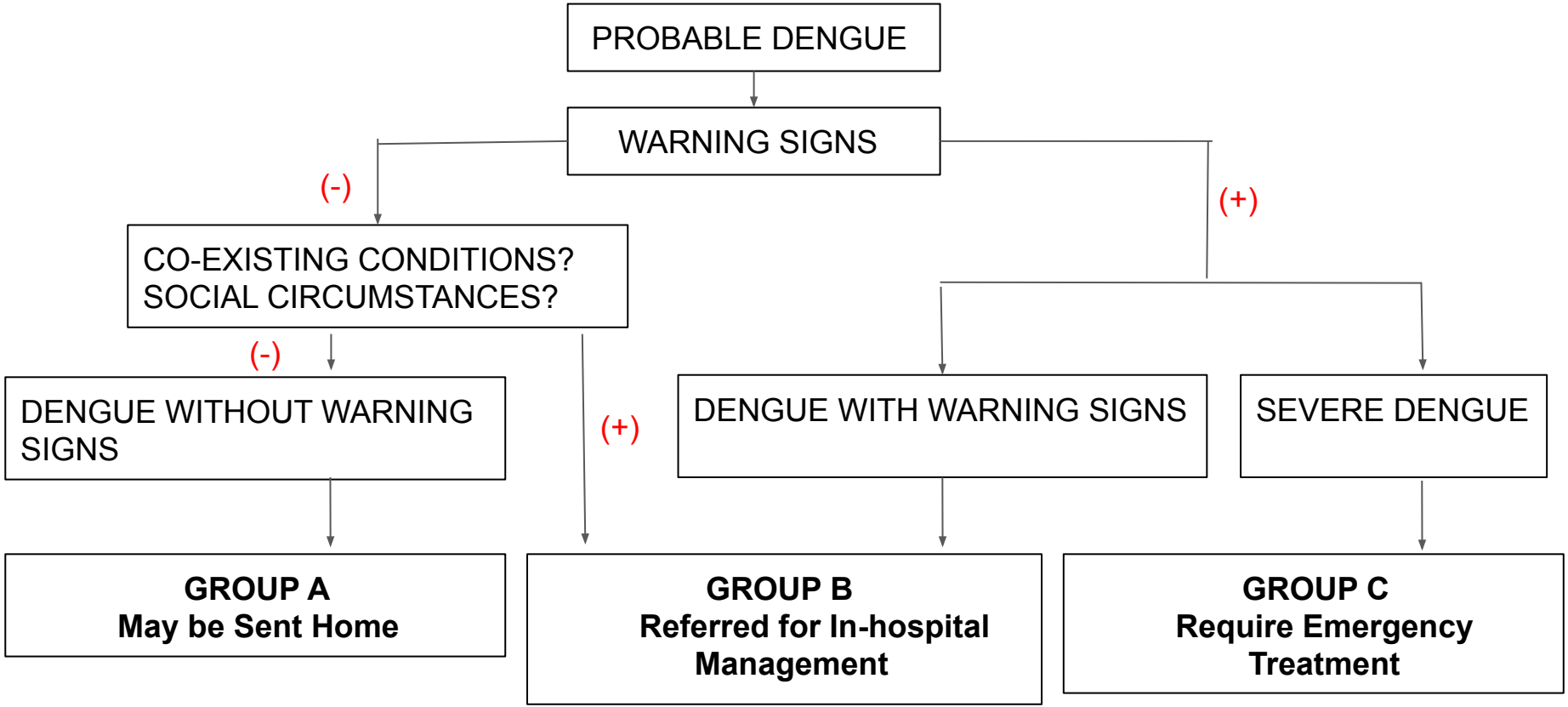
ASSESSMENT

↳ CLASSIFICATION

↳ MANAGEMENT

↳ DISCHARGE

ASSESSMENT AND CLASSIFICATION



MANAGEMENT

GROUP A - May be sent home

I. **Group Criteria**

Patients who do not have any of the following signs, particularly when fever subsides,

AND

- Able to tolerate adequate volumes of oral fluids, and
- Pass urine at least once every 6 hours

II. **Laboratory Tests**

- Full Blood Count (FBC)
- Hematocrit (HCT)

MANAGEMENT

GROUP A - May be sent home

III. Treatment

ADVICE FOR

- Adequate bed rest
- Adequate fluid intake
- paracetamol , 4 grams max per day in adults and accordingly in children

Patients with stable Hematocrit can be sent home

MANAGEMENT

GROUP A - May be sent home

IV. 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)

MANAGEMENT

<u>GROUP B - Referred for In-hospital Management</u> (With co-existing conditions)

I. **GROUP CRITERIA**

Patient with any of the following features:

- Co-existing conditions that may complicate management
  - pregnancy, old age, obesity, diabetes mellitus, renal failure, etc.
- Social circumstances
  - living alone, or living far from facility, or without reliable means of transport

II. **LABORATORY TESTS**

- Full Blood Count (FBC)
- Hematocrit (HCT)

MANAGEMENT

<u>GROUP B - Referred for In-hospital Management</u> (With co-existing conditions)

III. TREATMENT

.

- Encourage oral fluid intake
- Give oral rehydration solution based on weight
- If oral fluids are not tolerated, start intravenous fluid therapy, 0.9% NaCl (saline) or Ringer’s Lactate at maintenance rate

MANAGEMENT

GROUP B - Referred for In-hospital Management (With co-existing conditions)

III. TREATMENT

Fluid management for patients who are admitted, without shock

- Isotonic solutions (D5 LRS, D5 Acetated Ringers, D5 NSS/D5 NaCl) are appropriate
- Compute maintenance IVF using the caloric-expenditure method (Holliday-Segar Method) or calculation Based on Weight
- 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)

MANAGEMENT

<u>GROUP B - Referred for In-hospital Management</u> (With co-existing conditions)

III. TREATMENT

The following formula may be used to calculate the required volume of intravenous fluid to infuse:

TFR = Maintenance IVF + fluids as for Mild dehydration

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

Infant: 50 mL/kg

Older Child or Adult: 30 mL/kg

MANAGEMENT

GROUP B - Referred for In-hospital Management (With co-existing conditions)

III. TREATMENT

Fluid management for patients who are admitted, without shock

- One-half of the computed TFR is given in 8 hours add the remaining one half is given in the next 16 hours
- The IVF rate may be decreased anytime as necessary based on clinical assessment
- If the patient shows signs of deterioration, see Management for compensated or hypotensive shock whichever is applicable

MANAGEMENT

<u>GROUP B - Referred for In-hospital Management</u> (With co-existing conditions)

IV. MONITORING - -

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

MANAGEMENT

GROUP B - Referred for In-hospital Management (With Existing Warning Signs)

I. GROUP CRITERIA

With warning signs

II. LABORATORY TESTS

- Full Blood Count (FBC)
- Hematocrit (HCT)

MANAGEMENT

<u>GROUP B - Referred for In-hospital Management</u> (With Existing Warning Signs)

III. TREATMENT

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

3. Reassess the clinical status and repeat the HCT

MANAGEMENT

<u>GROUP B - Referred for In-hospital Management</u> (With Existing Warning Signs)

III. TREATMENT

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.

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

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

MANAGEMENT

<u>GROUP B - Referred for In-hospital Management</u> (With Existing Warning Signs)

III. TREATMENT

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:

- Adequate urine output and/or oral fluid intake
- HCT decreases below the baseline value in a stable patient

MANAGEMENT

<u>GROUP B - Referred for In-hospital Management</u> (With Existing Warning Signs)

IV. 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)

MANAGEMENT

GROUP C - Require Emergency Treatment

I. **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

II. **LABORATORY TESTS**

- Full Blood Count (FBC)
- Hematocrit (HCT)
- Other organ function tests as indicated

MANAGEMENT

GROUP C - Require Emergency Treatment

III. TREATMENT OF COMPENSATED SHOCK

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

2. If the patient's condition improves, intravenous fluids should be gradually reduced to:

- 5-7 mL/kg/hr for 1-2 hours, then
- 1 pt 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

MANAGEMENT

GROUP C - Require Emergency Treatment

III. TREATMENT OF COMPENSATED SHOCK

3. If shock persists check the hematocrit after the first bolus:

- If hematocrit increases or is still high (>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.
- 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

MANAGEMENT

GROUP C - Require Emergency Treatment

III. TREATMENT OF COMPENSATED SHOCK

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

MANAGEMENT

GROUP C - Require Emergency Treatment

IV. TREATMENT OF HYPOTENSIVE SHOCK

1. Initiate intravenous fluid with crystalloid or colloid solution (if available) at 20 mL/kg as a bolus given over 15 minutes

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, then
- To 2-3 mL/kg/hr or less, which can be maintained for up to 24 to 48 hours

MANAGEMENT

GROUP C - Require Emergency Treatment

IV. TREATMENT OF HYPOTENSIVE SHOCK

3. If shock persists, check hematocrit after the first bolus:

- If hematocrit increases compared to the previous value or remains very high (>50%), change in 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

MANAGEMENT

GROUP C - Require Emergency Treatment

IV. TREATMENT OF HYPOTENSIVE SHOCK

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 clinical response.

V. TREATMENT OF HEMORRHAGIC COMPLICATIONS

- Give 5-10 mL/kg of fresh packed red blood cells or 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