Dengue is a leaky-pipe illness

IN PLAIN WORDS

The virus makes blood vessels leak for about two days. The job is timing: spot when the leak starts, give just enough fluid while it lasts, stop when it ends.

Febrile usually 2–7 days	Vessels still hold water. Patient is usually stable. White cells and platelets start to fall. **Drink, test, review daily.**
Critical as fever subsides, usually day 3–7	Plasma leaks out of the vessels. The leak peaks about 24 hours in and usually ends within 48 hours. **Careful fluid, close watch.**
Recovery after the leak ends	Leaked fluid returns. Appetite back, urine pours, platelets climb, HCT settles. **Cut or stop IV fluid.**

Clues the critical phase has begun

- A rapid drop in temperature
- HCT rising **≥20%** from baseline
- Platelets below **100 × 10⁹/L**: the earliest and most useful clue
- Leak seen on PoCUS: thick gallbladder wall, fluid around it, ascites, pleural effusion

Some patients still have a low-grade fever early in the leak.

Sort the patient before the drip

IN PLAIN WORDS

Every dengue patient goes into one of four boxes. The box decides where they are treated.

A

No warning signs. Drinking, passing urine, walking. Haemodynamically stable, stable bloods. No unstable comorbidity or social risk.

Outpatient, daily review

B1

No warning signs, but a comorbidity (hypertension, diabetes, CKD, liver disease, peptic ulcer, on anticoagulant or antiplatelet), a high-risk group (pregnancy, ≥65 years, obesity) or social risk (lives alone, far from care, no transport).

Possible referral, may need observation

B2

One or more warning signs, near or in the critical phase.

Admit

C

Severe dengue: severe plasma leakage (shock or respiratory distress), severe bleeding, or severe organ involvement.

Emergency treatment, ICU

- Never decide referral or admission on one parameter. Use the whole assessment.
- Confirmed dengue in pregnancy: admit.
- ED zones: Red = shock (C). Yellow = warning signs, or unstable comorbidity (B2). Green = stable comorbidity (B1).

CPG p. 28 (Table 6), p. 35 (Table 8), p. 72

Study aid. Follow the full CPG and senior review.

Ten warning signs, read by phase

IN PLAIN WORDS

These are the leak alarms. They count when the fever is settling, not on day one.

1. No improvement, or worse, as the fever subsides
2. Intense abdominal pain or tenderness
3. Persistent vomiting (more than 3 times a day)
4. Lethargy, restlessness, irritability or confusion
5. Fluid accumulation
6. Postural hypotension
7. Liver enlarged more than 2 cm
8. Rising HCT with rapidly falling platelets
9. Bleeding
10. Little or no urine for 4–6 hours

Read them right

- They predict severe dengue best **in the critical phase**.
- Persistent vomiting in the febrile phase is **not** a warning sign.
- Read them with haemodynamic state, HCT trend, urine output and perfusion (CRT >3 s).
- Several signs together predict better than one alone.

Usual HCT in Malaysians

Men ≤60 y	Men >60 y	Women
46%	42%	40%

A rise of ≥20% from baseline marks plasma leakage.

Clinic rules: test, drink, pee, pills

IN PLAIN WORDS

Most patients go home. Four habits keep them safe until the leak window has passed.

Test	Combo rapid test (**NS1 + IgM + IgG**) is first-line. Within 30 days of a dengue vaccine use PCR or NS1; IgM and IgG do not confirm.
Drink	**200 ml every hour while awake**. ORS, juice, coconut water or soup. Not plain water alone. Fluid-restricted patients get their own plan.
Pee	At least **4–6 times a day**, and at least once every 6 hours. Record it.
Pills	Paracetamol at the lowest dose that works, never above 4 g a day; avoid or stop if liver enzymes are deranged. **No NSAIDs, no steroids.**
Usual meds	Statins and metformin can continue if nothing contraindicates. Hold SGLT2 inhibitors while dehydrated, febrile or eating poorly. Antiplatelets: clinical judgement.
Review	Daily through the febrile and critical phases. Re-check the diagnosis each visit. Give written home-care advice. Notify within 24 hours.

Send to hospital

Moderate to severe dehydration needs IV fluid. Patients on anticoagulants need close monitoring and may need referral.

Febrile phase: maintenance only

IN PLAIN WORDS

No leak yet, so the body needs only its normal daily water. Mouth first. A drip is the backup.

On the ward

- Keep a cannula in. Push oral fluids.
- Start IV crystalloid only if the patient cannot drink or is dehydrated.
- Total fluid, **oral + IV**, follows the Holliday-Segar formula.
- Add extra for vomiting, diarrhoea or dehydration.
- Slow or stop the drip once drinking improves.

Holliday-Segar

4 ml/kg/h for the first 10 kg, 2 ml/kg/h for the next 10 kg, then 1 ml/kg/h for each kg after. **Cap the weight at 70 kg.**

30 kg	40 kg	50 kg	60 kg	≥70 kg
70	80	90	100	110

Hourly total in ml (oral + IV). Example, 50 kg: 40 + 20 + 30 = 90 ml/h, 2160 ml a day.

Pitfall

The CPG lists two here: unnecessary fluid boluses in the febrile phase, and IV fluid continued into recovery.

CPG pp. 40–42 (Tables 11, 12)

Study aid. Follow the full CPG and senior review.

Leak, no shock: a 48-hour fluid budget

IN PLAIN WORDS

Give the leak a budget: one day of normal fluid plus 50 ml/kg, spread over 48 hours, counting every drink and every drip. It is a ceiling, not a target.

The quota

Maintenance for 1 day + 5% deficit (50 ml/kg), oral and IV together, over 48 hours. Work it out when the critical phase starts. Cap the weight at 70 kg.

30 kg	35 kg	40 kg	45 kg	50 kg
3200	3600	3900	4300	4700

55 kg	60 kg	65 kg	≥70 kg
5000	5400	5700	6000

Total ml over 48 hours. Many patients need less.

IV step-down warning signs and cannot drink

1. **3–5 ml/kg/h** crystalloid for 1 hour, then reassess (the text allows 1–2 hours).
2. Better: **2–3 ml/kg/h** for 1–2 hours.
3. Still better: **1–2 ml/kg/h** or maintenance. Stop IV once drinking.

Drinking 1–2 ml/kg/h by mouth? No IV is needed.

Not better

- Not in shock: take FBC, VBG and lactate, go up to **5–7 ml/kg/h** and titrate.
- In shock: switch to the shock algorithm. The quota no longer applies.

Watch

FBC every 4–12 hours. Urine 0.5–1 ml/kg/h. CCTVR, BP and pulse pressure every 2–4 hours.

CPG p. xiv (Algorithm 1), pp. 38–39, 43–45, 114

Study aid. Follow the full CPG and senior review.

Shock: two speeds of refill

IN PLAIN WORDS

The tank is running low. If the pressure still holds, refill fast for an hour. If the pressure has fallen, refill very fast over 15–30 minutes. Then step down.

Compensated systolic pressure maintained

Looks like	Systolic BP held, with tachycardia, cool peripheries, CRT >3 s, pulse pressure 20–30 mmHg, low pulse volume.
First	**Crystalloid 10 ml/kg/h for 1 hour.**
Better	5–7 ml/kg/h for 1–2 h, then 3–5 for 2–4 h, then 2–3 for 2–4 h. HCT every 4–6 hours.
Not better	Repeat HCT and run another 10 ml/kg/h while waiting.

Decompensated hypotensive

Looks like	Hypotension, pulse pressure <20 mmHg, cold and clammy, thready pulse, CRT >3 s.
First	**Crystalloid 20 ml/kg within 15–30 minutes.**
Better	10 ml/kg/h for 1 h, then 5–7 for 2–4 h, 3–5 for 2–4 h, 2–3 for 2–4 h. HCT every 2–4 hours.
Not better	Repeat HCT and give a second bolus of 10–20 ml/kg, colloid or crystalloid.

Both

- Send bloods and GXM before the first bolus. Start fluid at once; do not wait for an HDU or ICU bed.
- **Crystalloid first.** Colloid only if shock persists; albumin 5% is the colloid of choice. Never colloid for maintenance.
- BMI >27.5: dose on adjusted body weight.
- Shock can recur for 24–48 hours. Consider stopping IV fluid at 48 hours of leakage.
- Shock despite adequate fluid: noradrenaline is the preferred vasopressor.

CPG pp. xv–xvi (Algorithms 2, 3), 12, 47–48, 69

Study aid. Follow the full CPG and senior review.

Still unstable? Read the HCT

IN PLAIN WORDS

Leaking makes blood thicker. Bleeding makes it thinner. After a bolus, the HCT tells you which one you are fighting.

↑ **Up by 20% or more: still leaking**

Give the second bolus. Compensated: crystalloid 10 ml/kg/h. Decompensated: 10–20 ml/kg over ½–1 hour. Shock persists with a high HCT: consider colloid.

↓ **Down by 20% or more: think bleeding**

Suspect a significant occult or overt bleed. Transfuse packed red cells 5–10 ml/kg. Do not wait for a marked fall in HCT.

= **Moves less than 20%, still shocked**

Compensated: one more 10 ml/kg/h bolus. Decompensated or persistent: PoCUS and haemodynamic assessment for another cause: bleed or leak, sepsis, cytokine storm, liver failure, heart, tamponade.

Suspect occult bleeding when

- HCT falls with no clinical improvement despite adequate fluid.
- Severe metabolic acidosis and organ dysfunction persist despite adequate fluid.
- HCT is lower than the degree of shock would predict from leakage alone.

Blood products

- No prophylactic platelets or plasma without active bleeding. The platelet count does not predict bleeding.
- Significant bleeding: cryoprecipitate if fibrinogen <100 mg/dL; consider FFP if PT or aPTT exceeds 1.5 times normal.
- Count transfused volume in the fluid total.

CPG pp. xv–xvii (Algorithms 2–4), 17, 53, 55–57

Study aid. Follow the full CPG and senior review.

PoCUS: look for the leak

IN PLAIN WORDS

Ultrasound shows the leaked fluid directly, often before the blood tests or the blood pressure change.

Febrile day 2–7

See	Small or flat IVC (<1.5 cm). Hyperdynamic heart with small ventricles. Meaning: dehydration.
Use it to	Assess volume, guide fluids, screen for early leak.

Critical day 3–7

See	Gallbladder wall **>3 mm**, pleural effusion, ascites: leaking. Low LVOT VTI: shock. Reduced cardiac function: organ dysfunction.
Use it to	Detect the leak, sort the type of shock, guide fluid, blood and vasoactives. Re-scan.

Recovery day 7 onwards

See	Dilated IVC with poor variability: reabsorption. B-lines: fluid overload.
Use it to	Confirm resolution, catch overload, de-escalate fluid.

Worth knowing

- Serial PoCUS picked up early leak more often than HCT monitoring alone (OR 4.42).
- Scanner scarce? Prioritise platelets <97 × 10^9/L or transaminases >51 U/L.
- An adjunct, by a trained operator. IVC alone should not guide fluid.

CPG pp. 24, 36–37, 39, 51, 109 (Appendix 8)

Study aid. Follow the full CPG and senior review.

Recovery: stop the drip, then discharge

IN PLAIN WORDS

The leak has sealed and the lost fluid is coming back by itself. A drip still running now overloads the patient.

Signs of recovery

- General condition and appetite improve
- Diuresis
- Platelets rising, HCT stabilising
- Itchy convalescent rash, often on palms and soles

What to do

Reduce IV fluid step by step or stop it. Watch for fluid overload and pulmonary oedema. FBC daily, observations every 4–6 hours, urine every 6–8 hours.

Discharge when all are true

Clinical

- Afebrile 24–48 hours and improving
- Stable haemodynamics
- Eating and drinking well
- Urine 0.5–1.5 ml/kg/h
- No active bleeding
- No respiratory distress

Laboratory

- Platelets on a rising trend (the trend matters more than the number)
- HCT stable without IV fluid
- Organ dysfunction resolving

Going home

Written advice, good oral intake, usual medicines restarted as instructed, no strenuous activity, follow-up bloods at the clinic as needed.

Special groups: where the rules bend

IN PLAIN WORDS

Some bodies hide shock, and some cannot take a full fluid load. Know which patient you have before you write up the drip.

Pregnancy	Admit every confirmed case, with a multidisciplinary team. No routine prophylactic platelets. Vaginal delivery unless there is an obstetric indication. Avoid IM injections if platelets are low. Breastfeeding continues.
Heart, kidney, liver	Heart failure, ESKD and cirrhosis: individualise fluid, monitor closely.
Diabetes	Stop oral hypoglycaemics, consider insulin. Check metabolic state early and repeatedly to tell dengue shock from DKA or HHS. In DKA or HHS follow that fluid regimen.
Hypertension	Read BP against the patient's baseline. Follow trends, pulse pressure, CCTVR and urine. Consider holding antihypertensives in the acute phase.
Older adults	Acutely unwell with leucopenia? Think dengue even without classic features. Admit if comorbid or poorly supported.
Obesity	In shock, dose on adjusted body weight: IBW + 0.4 × (actual − IBW). IBW: men 50 kg, women 45.5 kg, plus 0.91 × (height in cm − 152).
Thalassaemia	HCT is unreliable for leakage. Fever with falling Hb and platelets: think dengue. Consider early packed cells for symptomatic anaemia.

What changed since 2015

IN PLAIN WORDS

Same illness, tighter fluid. Less IV by default, a hard budget in the leak phase, and rapid tests and ultrasound brought forward.

TOPIC	3RD EDITION, 2015	4TH EDITION, 2026
Maintenance	1.2–1.5 ml/kg/h	**Holliday-Segar, weight capped at 70 kg**
Warning signs, no shock	5, then 3, then 2 ml/kg/h	**3–5, then 2–3, then 1–2 ml/kg/h, inside a maintenance + 5% quota over 48 hours**
Compensated shock	5–10 ml/kg/h for 1 hour	**10 ml/kg/h for 1 hour**
Decompensated shock	20 ml/kg colloid or crystalloid in 15–30 min	**20 ml/kg crystalloid in 15–30 min; colloid only if shock persists**
Grouping	Without warning signs, with warning signs, severe	**A, B1, B2, C tied to place of care; warning signs read by phase**

New emphasis

- Combo rapid test (NS1, IgM, IgG) as the first-line test
- PoCUS as a bedside adjunct in ED and on the ward
- Oral fluid prescribed: 200 ml an hour while awake
- Standard clerking sheets, monitoring charts and audit tools
- Vaccination may be considered in adults, especially with comorbidities

CPG pp. i–iii, 1, 83; 3rd edition Quick Reference (2015)

Study aid. Follow the full CPG and senior review.