สถาบันสุขภาพเด็กแห่งชาติมหาราชินี
QUEEN SIRIKIT NATIONAL INSTITUTE OF CHILD HEALTH
กรมการแพทย์ กระทรวงสาธารณสุข

DENGUE: EFFECTIVE ACTION FOR TREATMENT AND PREVENTION

กรมการแพทย์
DEPARTMENT OF MEDICAL SERVICES

Management of Dengue with Complications and Unusual Manifestations

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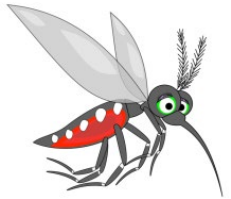
WHO Roster of Expert for Acute Febrile Illness (Dengue fever) WHO/SEARO
Technical Advisory Group on Dengue



Common complications in Dengue Patients

Complications usually occur in the following patients

- Dengue patients who do not response to conventional IV fluid management
- Patients with respiratory distress (fluid overload)
- Patients with prolonged shock
- Patients with organ (s) impairment
- Patients with massive bleeding

Detection & correction of common complications:

- A – Acidosis – Prolonged shock with possible liver/ renal failure
- B – Bleeding – No rising Hct or dropping Hct
- C – Hypocalcemia and other electrolyte imbalance (Hypokalemia, hyponatremia)
- S – Hypoglycemia (30% in DSS)
- F - Fluid overload – Signs & symptoms of fluid overload or persistent high Hct > 25%

Do not wait for laboratory results
(except blood sugar)

Practical management Immediately

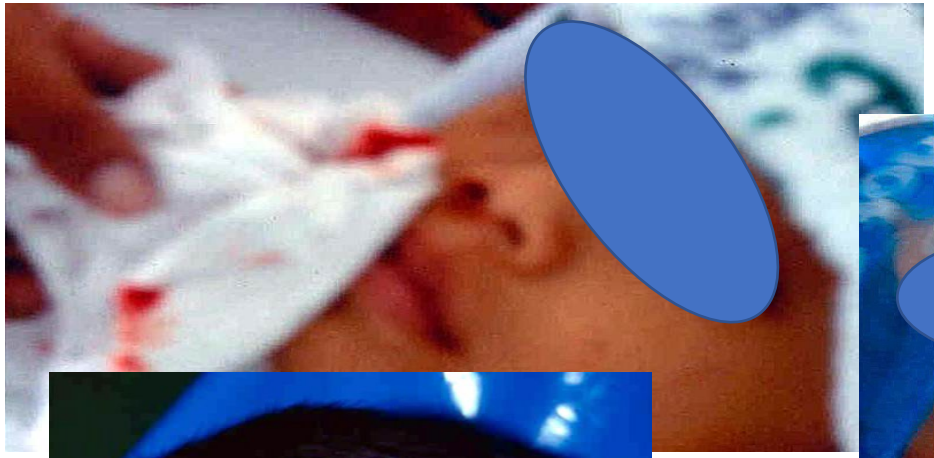
Prolonged hypoglycemia & hypocalcemia causes persistent shock and later convulsion

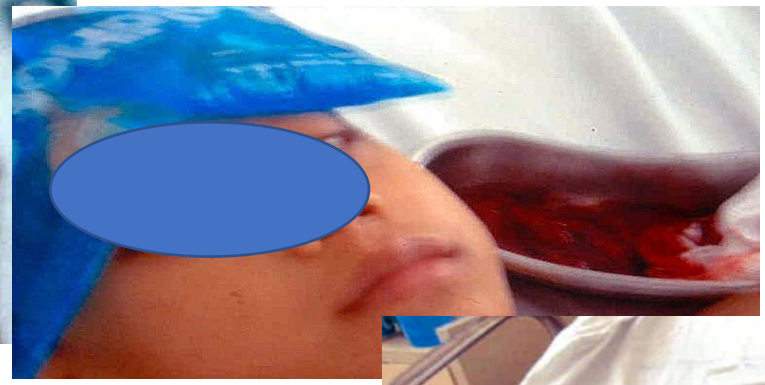
- Check Blood Sugar
- 10% Ca gluconate 10 ml dilute to 20 ml IV push in 10 min (1 ml/kg/dose, maximum dose 10 ml)
- Vitamin K1 IV 10 mg
- NaHCO3 1 ml/kg IV if cyanosis or persisted cold, clammy skin after IV fluid resuscitation

Delayed VitaminK1 administration may cause more bleeding

If persistent shock: acidosis has to be corrected rapidly because it may cause more advance DIC

Management of bleeding





Menstruation in women
Hemoglobinuria esp. in boys

Indications for blood transfusion

- Significant blood loss: > 10% of total blood volume (> 6-8 ml/kg or 300 ml in adults)
- HCT dropping but no clinical improvement in spite of adequate volume replacement (Usually blood transfusion when HCT 40-45%)
- No rising HCT enough to explain shock (Usually rising HCT about 20-30% from baseline for shock)

AMOUNT OF BLOOD REPLACEMENT

- Transfuse equal to the amount of estimated loss

  (if can estimate the amount of blood loss)
- Transfuse 10 ml/kg or 1 unit of whole blood if cannot estimate the blood loss or 5 ml/kg of packed red cell (PRC) if the patients have signs of fluid overload
- Do the HCT before and after transfusion to access the rising HCT (about 5 points in children for the above recommended dose)

* ***Rate of transfusion depend on the patients' conditions – usually as rapid as possible in 1-2 hours***

PLATELET PROPHYLAXIS

- No prophylaxis platelet transfusion in children even for those patients who have very low platelet count (< 10,000 cell/mm3)
- In adult patients who had underlying hypertension or heart diseases and platelet count < 10,000 cells/mm3, prophylaxis platelet transfusion is recommended.

Blood components & Platelet transfusion

- Strongly recommend only blood transfusion: RBC will carry oxygen to tissues and correct shock/hypoxia (organs injury)
- In dengue patients with massive bleeding always have advanced DIC and liver failure which both fresh frozen plasma (FFP) and platelets concentrate do not correct both conditions
- Both FFP and Platelets would disappear after 5 hours due to immunological process
- In addition, both FFP and platelet transfusion may lead to fluid overload

Keypoint for Management of Dengue Patients in Critical Phase : Early Dx of DSS

Adults with Multi-organs Failure in DSS

Prolonged shock : Vicious cycle
(lactic acidosis, multi-organ failure, DIC)

Blood transfusion

DIC

Lactic acidosis ⟷ MOFs (hypoxia) → CFR >90%

Modified from Prof Vipa Thanachartwet, Faculty of Tropical Medicine, Mahidol University, Thailand

Fluid Overload

- **Important cause or associated causes of death in > 80% of DHF/DSS/EDS patients**

Signs of Fluid Overload

- Early
  - Puffy eyelids
  - Distended abdomen
  - Tachypnea

Signs of Fluid Overload

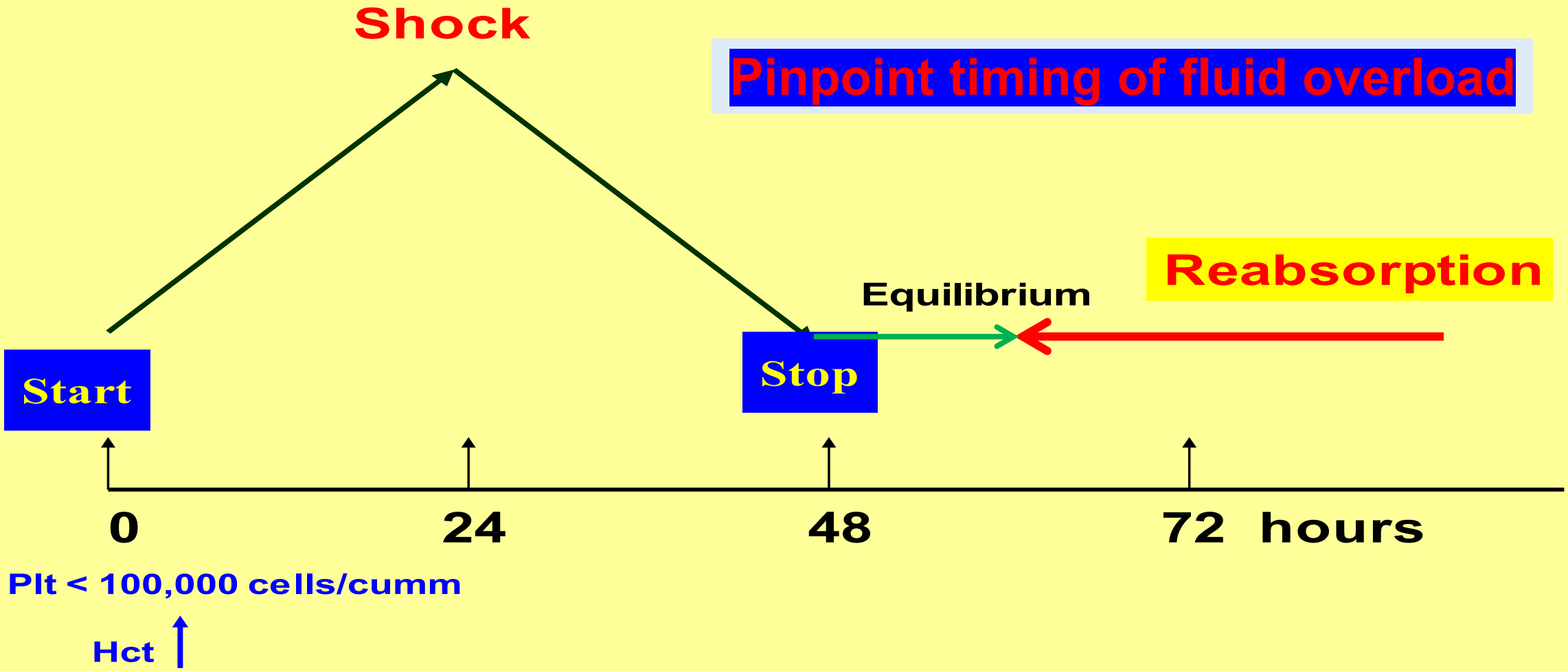
- Late
  - Tachypnea/ Dyspnea
  - Moderate to severe respiratory distress
  - Very Distended abdomen
  - Lung signs: crepitation, wheezing, rhochi

Principle of Management

- Supportive & Symptomatic treatment
  - Oxygen : Keep O2 Sat. > 95%

    (O2 Sat. < 95% : respiratory insufficiency or not enough RBC to carry O2)
  - Positioning : Fowler's, right lateral,…
  - Insert urinary catheter
- Specific treatment
  - Furosemide 1 mg/kg/dose or 40 mg IV in adult with repeated doses if necessary

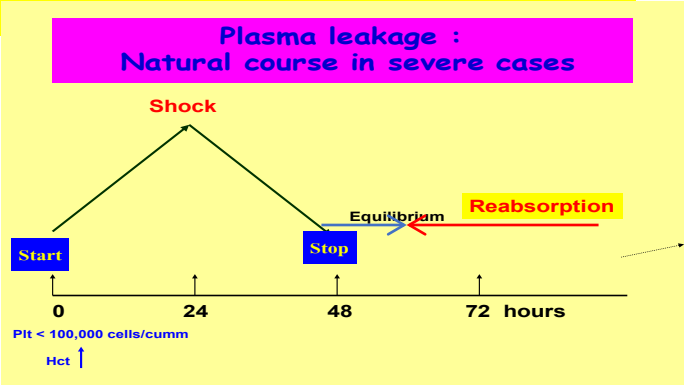
Plasma leakage : Natural course in severe cases



Dextran + furosemide

(in the middle or after 10-15 mins)

- Shock
- During critical period,
- Not in reabsorption phase

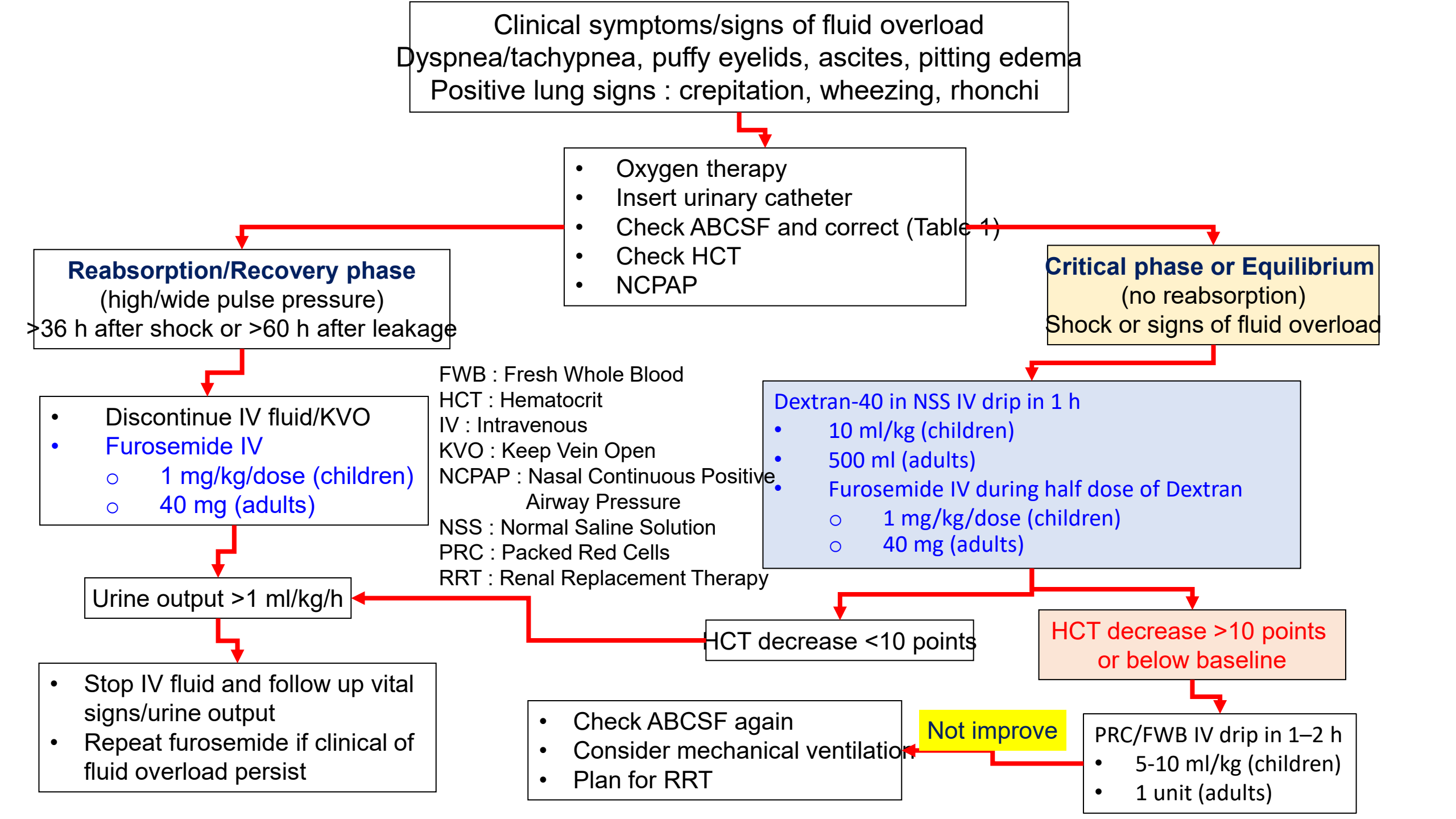


Furosemide depletes intravascular volume, (not deplete ascites or pleural effusion)

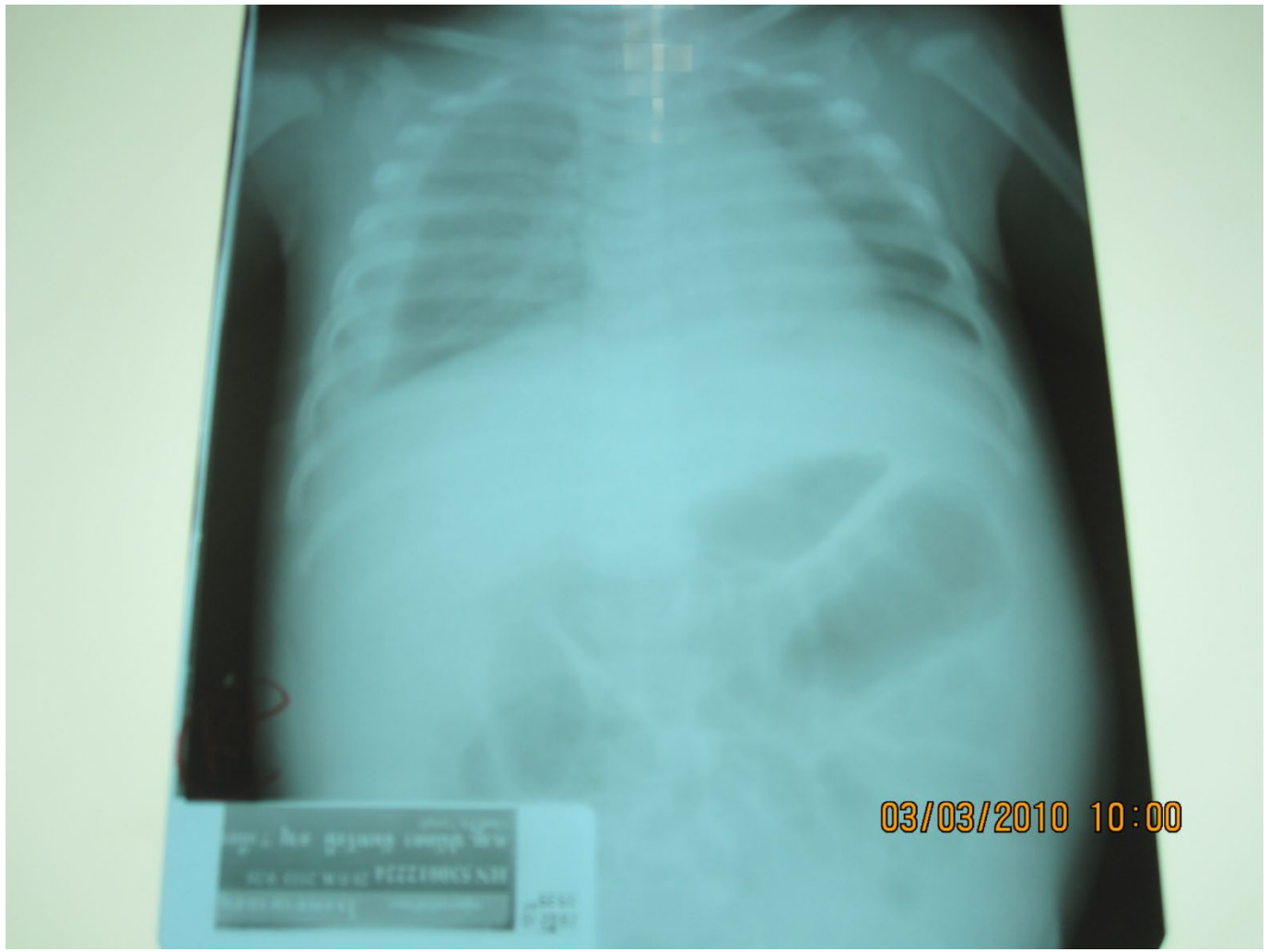
Dextran holds intravascular volume and draws back ascites and pleural effusion

Type of Colloidal solution used in DHF/DSS with fluid overload

- **Plasma expander (high osmolarity, high oncotic pressure than plasma)**
  - **10% Dextran-40 in NSS (2.7 times higher osmolarity than plasma)**
  - **20% albumin (6 times higher osmo;arity than plasma) – preferable need ICU monitoring**
  - **PRC transfusion**
- **Plasma substitute**
  - **6%Dextran-70 or 6%Dextran-40**
  - **Starch**
  - **Gelatin**
  - **5% Albumin**


Clinical symptoms/signs of fluid overload
Dyspnea/tachypnea, puffy eyelids, ascites, pitting edema
Positive lung signs : crepitation, wheezing, rhonchi
• Oxygen therapy
• Insert urinary catheter
• Check ABCSF and correct (Table 1)
• Check HCT
• NCPAP
Reabsorption/Recovery phase
(high/wide pulse pressure)
>36 h after shock or >60 h after leakage
Critical phase or Equilibrium
(no reabsorption)
Shock or signs of fluid overload
• Discontinue IV fluid/KVO
• Furosemide IV
○ 1 mg/kg/dose (children)
○ 40 mg (adults)
FWB : Fresh Whole Blood
HCT : Hematocrit
IV : Intravenous
KVO : Keep Vein Open
NCPAP : Nasal Continuous Positive Airway Pressure
NSS : Normal Saline Solution
PRC : Packed Red Cells
RRT : Renal Replacement Therapy
Dextran-40 in NSS IV drip in 1 h
• 10 ml/kg (children)
• 500 ml (adults)
• Furosemide IV during half dose of Dextran
○ 1 mg/kg/dose (children)
○ 40 mg (adults)
Urine output >1 ml/kg/h
HCT decrease <10 points
HCT decrease >10 points or below baseline
• Stop IV fluid and follow up vital signs/urine output
• Repeat furosemide if clinical of fluid overload persist
• Check ABCSF again
• Consider mechanical ventilation
• Plan for RRT
Not improve
PRC/FWB IV drip in 1–2 h
• 5-10 ml/kg (children)
• 1 unit (adults)

Fluid Overload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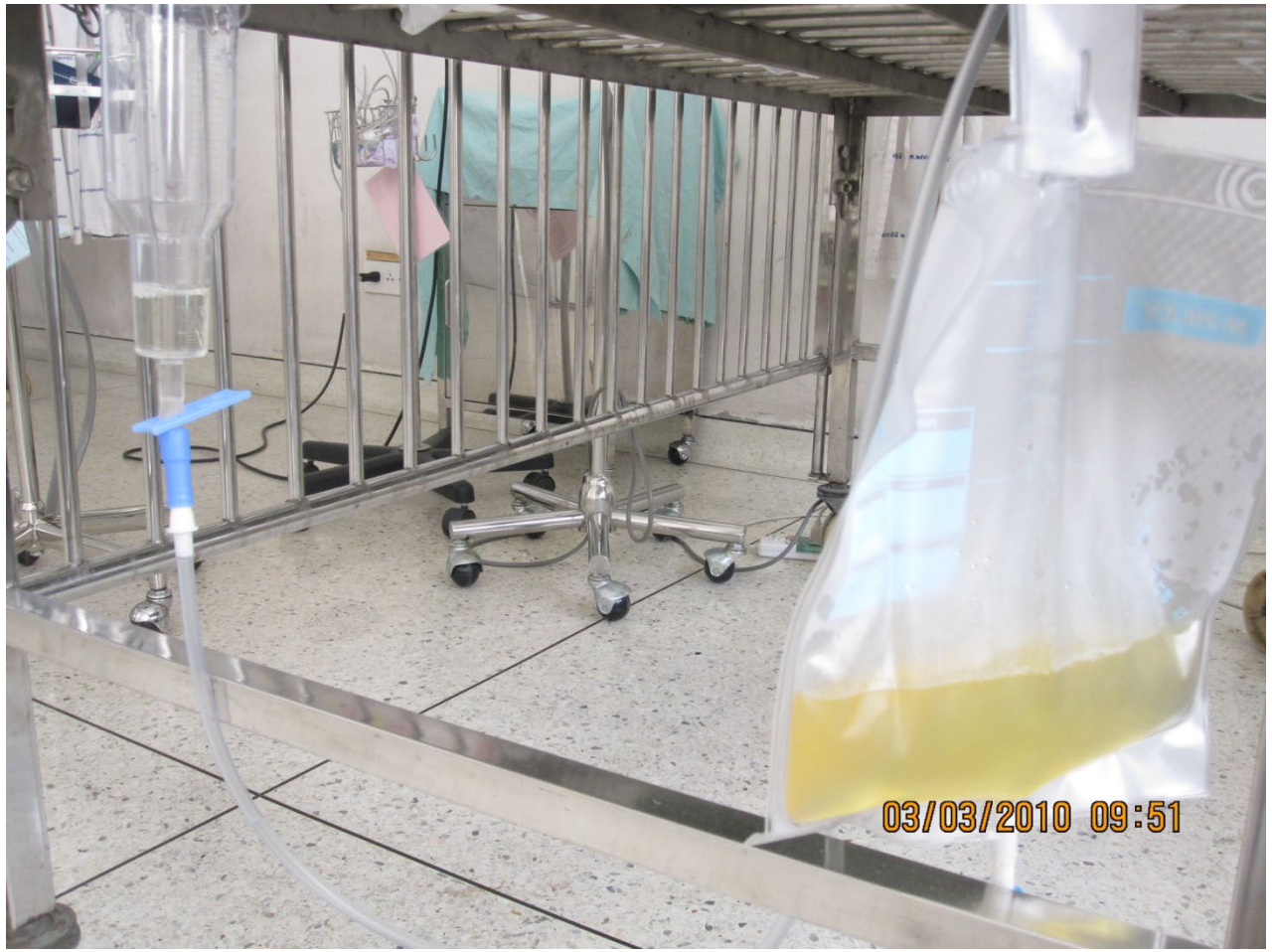
10 minutes after furosemide 10 ml

About 45 minutes after Furosemide 100 ml



Management of Expanded Dengue Syndrome (Unusual Manifestations)

1. **Presented with shock and high fever or non-shock with fever**
2. **Presented with neurological manifestations**
   - **Confusion**
   - **Convulsion**
   - **Coma**
3. **Presented with**
   - **Co-morbidity**
   - **Co-infections**

Making early diagnosis by NS1Ag/IgM/IgG is very important!

Challenges in dengue diagnosis & management of dengue

- Clues to the diagnosis of dengue
- Evidence of plasma leakage
- Expanded dengue syndrome
- Common associated complications

Clues to the diagnosis of Dengue

- Bleeding signs & symptoms
  - Petechiae, ecchymosis, epistaxis, gum bleeding, hematemesis, melena, hematuria, hemoglobinuria, hypermennorrhea
  - Thrombocytopenia
- Evidence of plasma leakage
  - Rising Hct ≥ 20% (Except in those with significant bleeding)
  - Physical examination: pleural effusion, ascites*
  - Chest X-ray (Right lateral decubitus)*
  - Serum albumin: ≤ 3.5 gm% or ≤ 4 gm% in overweight patients or change in ALB by 0.5 gm%
  - Ultrasound: Pleural effusion, ascites, Fluid in hepato-renal pouch, thickening of gall bladder/ gall bladder edema (Operator dependent)
- Elevation of AST/ALT > 200 U with rapid elevation on 6-12 hours follow up

Common associated complications

BBH

- Concealed bleeding
- Superimposed bacterial infections
- Hepatitis (liver injury, liver failure)

Rising /continue rising AST/ALT in DHF/DSS : Transaminitis/Liver failure

- DHF/DSS – Ischemia/hypoxia: -
  - Inadequate circulation - urine output?
  - Inadequate RBC (bleeding, hemolysis) – no rising or dropping of Hct
  - Inadequate ventilation: hypoxia – signs of fluid overload
- Underlying diseases – liver diseases
- Toxic - drugs

Transaminitis in dengue: AST > 200 U

Not typical as DSS

- No leukopenia – Leukocytosis and increase PMN
- No rising Hct – (Concealed) bleeding
- CXR - Portable and very difficult to detect pleural effusion
- Clinical: Pleural effusion & ascites - Too late when detect

Important parameters use to assess management of dengue

- **Hematocrit**
- **Platelet counts**
- **Serum albumin**
- **AST/ALT**
- **Serum Lactate**

WHO Nepal


Rayong


Nan


Songkla


Kathmandu, Nepal

Thank you for your attention