

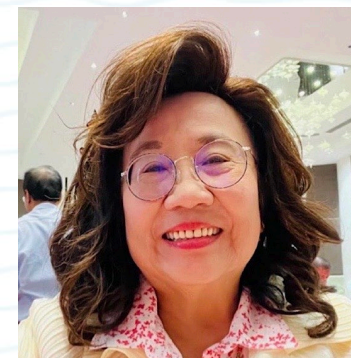


DENGUE: EFFECTIVE ACTION FOR TREATMENT AND PREVENTION

Management of Complicated Dengue



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ที่ปรึกษาศูนย์ความเป็นเลิศด้านไข้เลือดออก สถาบันสุขภาพเด็กแห่งชาติมหาราชินี

ที่ปรึกษาองค์การอนามัยโลกด้านการดูแลรักษาผู้ป่วยโรคไข้เลือดออก

WHO Roster of Expert for Acute Febrile Illness (Dengue fever)

WHO/SEARO Technical Advisory Group on Dengue





Management of Dengue

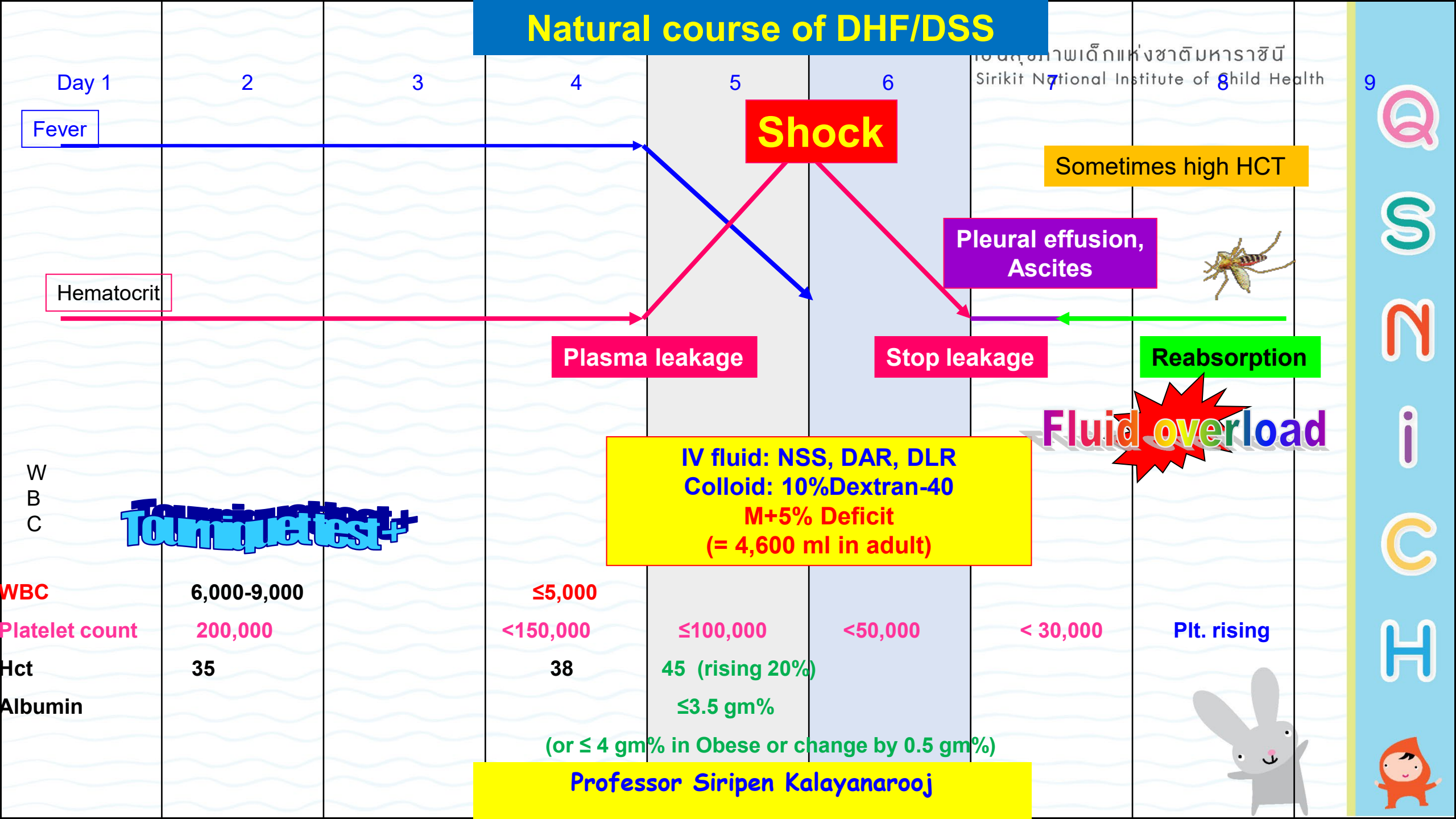
1. Early diagnosis of dengue infections
2. Early detection of plasma leakage and proper IV fluid management
3. Detect and correct common complications: ABCSF
4. Early detection & management of bleeding
5. Diagnosis & management of unusual cases: BBH



Natural course of DHF/DSS

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3. 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)





การดูแลรักษาผู้ป่วยโรคไข้เลือดออกที่มีภาวะแทรกซ้อน

แนะนำให้ทำการประเมิน **ABCSF** ในผู้ป่วยโรคไข้เลือดออกที่มีภาวะต่อไปนี้

- ผู้ป่วยที่ได้รับการวินิจฉัยว่ามีภาวะเดงกีช็อกและอาการไม่ดีขึ้น หลังจากที่ผู้ป่วยได้สารน้ำทดแทนทางหลอดเลือดดำในปริมาณเหมาะสม
- ผู้ป่วยที่มีภาวะ prolonged shock
- ผู้ป่วยที่มีภาวะแทรกซ้อนเกิดขึ้น ได้แก่ organs impairment (liver, kidney etc.) ภาวะเลือดออกผิดปกติ และภาวะน้ำเกิน





Practical management Immediately

- 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

Prolonged hypoglycemia & hypocalcemia causes persistent shock and later convulsion

Delayed VitaminK1 administration may cause more bleeding

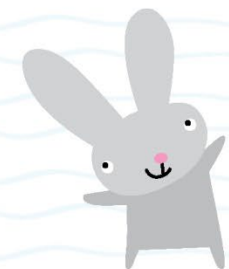
If persistent shock: acidosis has to be corrected rapidly because it may cause more advance DIC





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

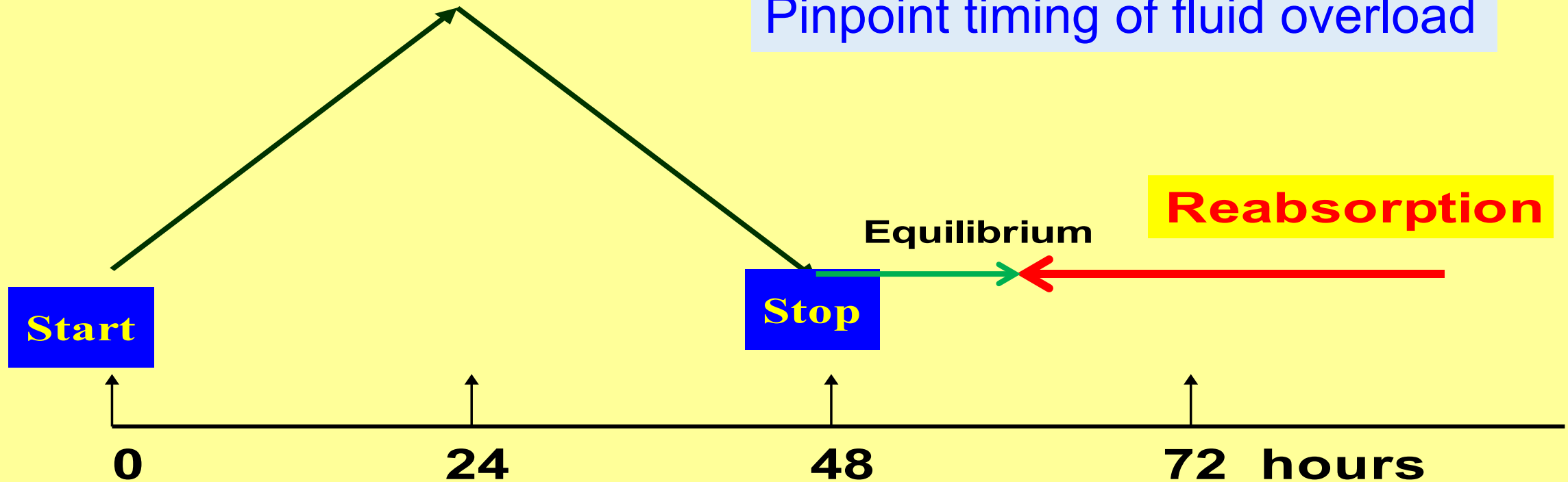
- Supportive & Symptomatic treatment
 - Oxygen : Keep O₂ Sat. > 95%
(O₂ Sat. < 95% : respiratory insufficiency or not enough RBC to carry O₂)
 - Positioning : Fowler's, right lateral,...
 - Insert urinary catheter
- Specific treatment
 - Furosemide 1 mg/kg/dose or 40 mg IV in adult with repeated doses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



Plasma leakage : Natural course in severe cases

Shock

Pinpoint timing of fluid overload



Plt < 100,000 cells/cumm

Hct ↑

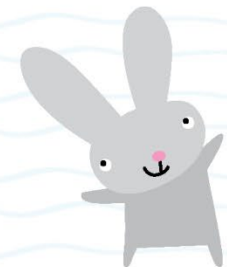
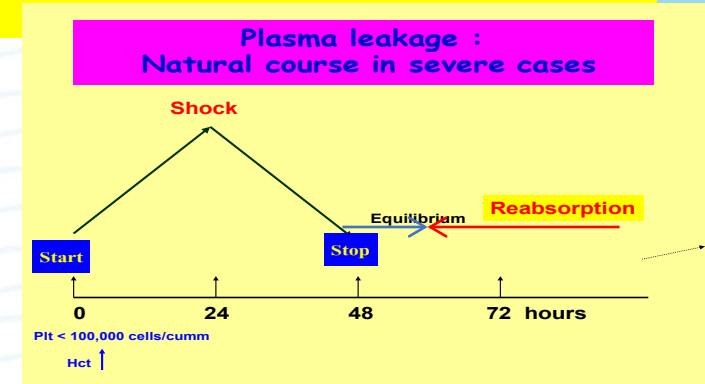
Dextran + furosemide

(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 osmolarity 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)

- 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)

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

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

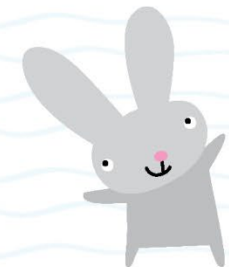
Not improve

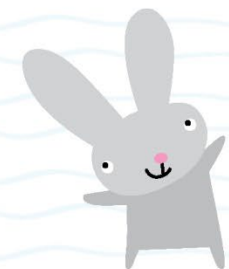
- PRC/FWB IV drip in 1–2 h
- 5-10 ml/kg (children)
 - 1 unit (adults)





Fluid Overload





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10 minutes after furosemide 10 ml



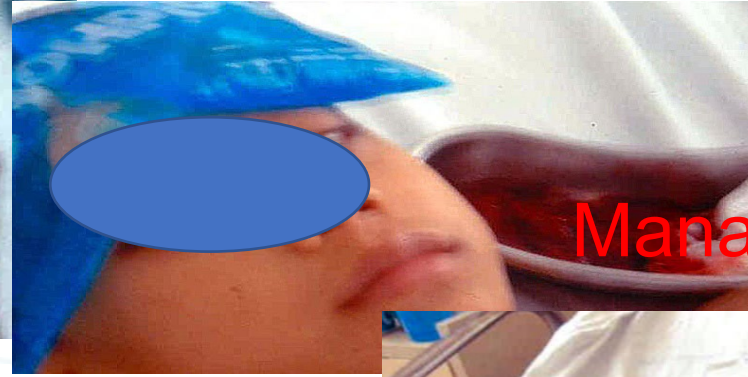
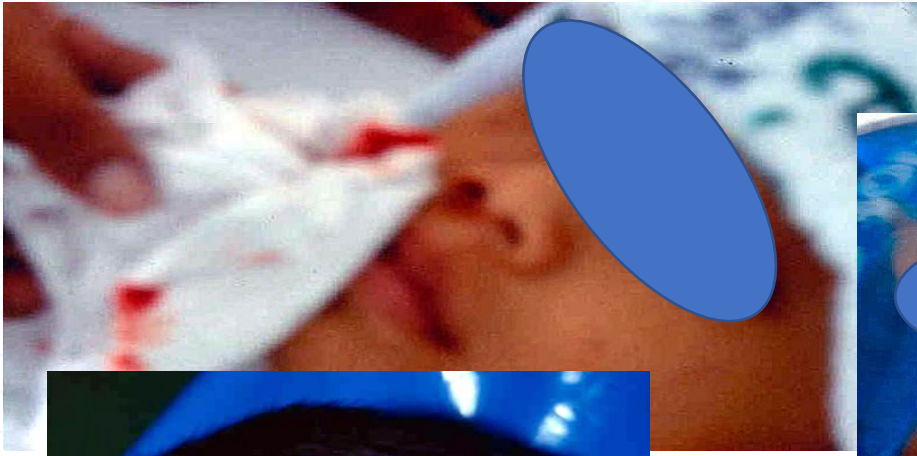


About 45 minutes after Furosemide 100 ml

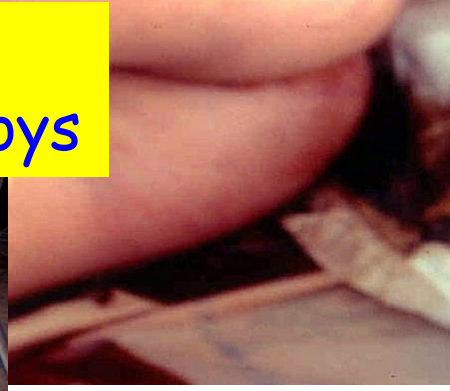




Management of bleeding



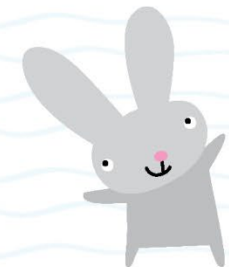
Menstruation in women
Hemoglobinuria esp. in boys





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)

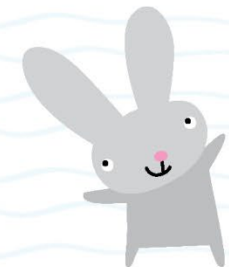


AMOUNT OF BLOOD REPLACEMENT



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- 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



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- **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.



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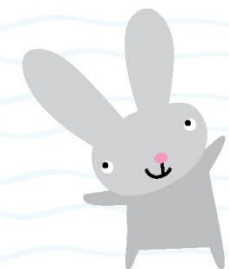
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Blood components & Platelet transfusion

- Strongly recommend only blood transfusion: RBC will carry oxygen to tissues and correct shock/hypoxia
- 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

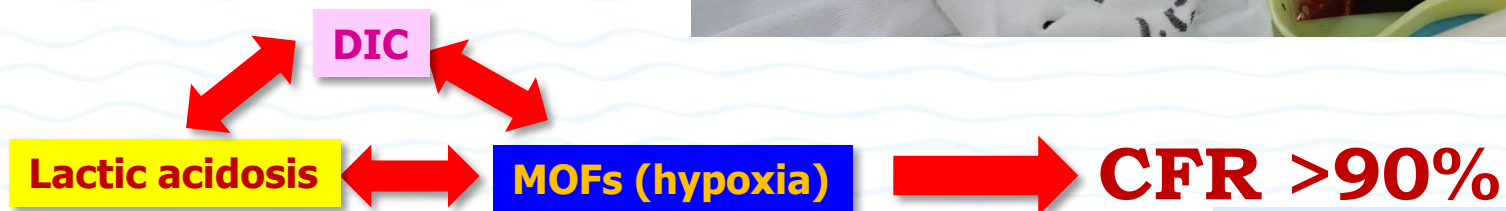


Adults with Multi-organs Failure in DSS



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

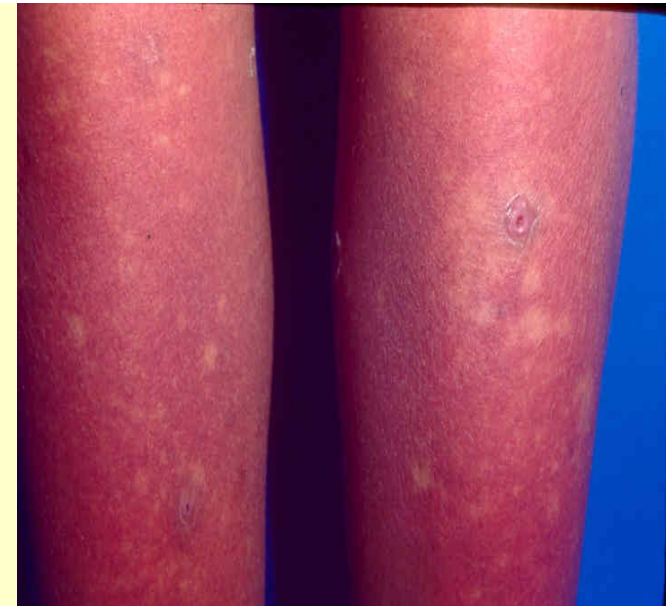
Blood transfusion



Convalescence

- Reabsorption 8-12 hrs. after leakage is stopped
- Decreased the rate of IV fluid or stopped IV fluid

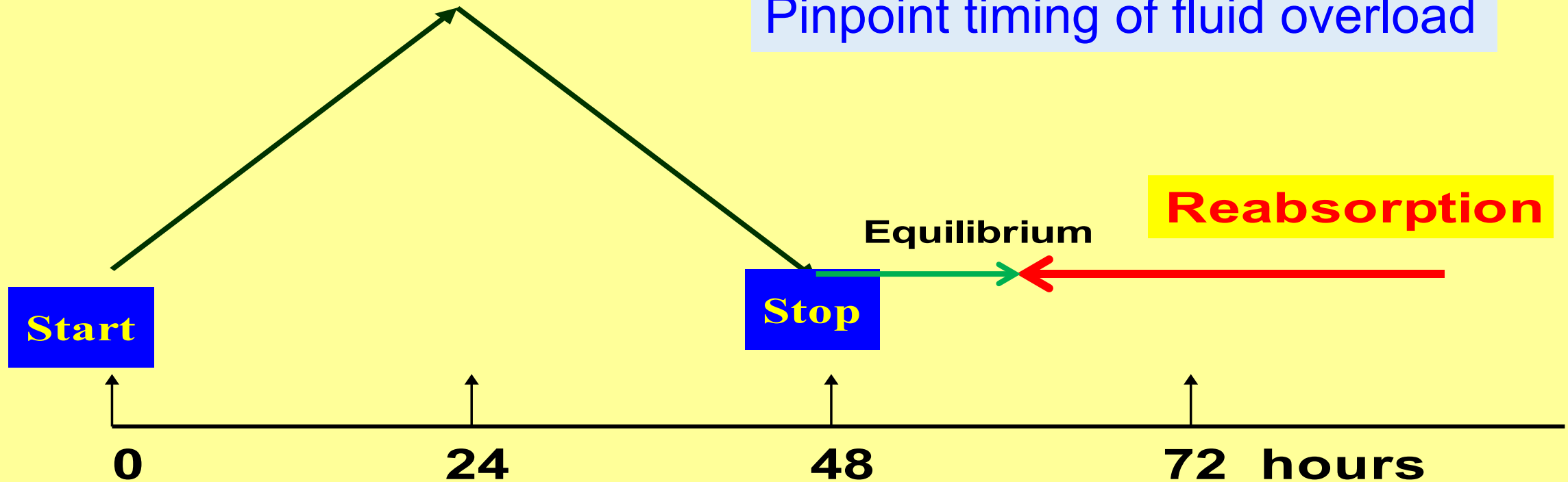
- A – appetite
- B – bradycardia
- C – Convalescence rash, itching
- D – Diuresis: aware of hypokalemia



Plasma leakage : Natural course in severe cases

Shock

Pinpoint timing of fluid overload



Plt < 100,000 cells/cumm

Hct ↑



5. Management of Expanded Dengue Syndrome (Unusual Manifestations)

2.1 Presented with shock and high fever or non-shock with fever

2.2 Presented with neurological manifestations

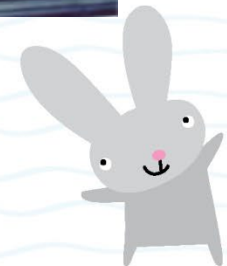
- Confusion
- Convulsion
- Coma

2.3 Presented with

- Co-morbidity
- Co-infections



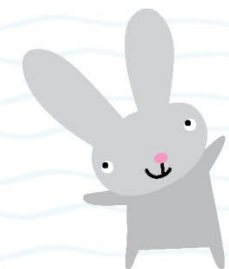
Making early diagnosis by NS1Ag/IgM/IgG is very important!





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, hypermenorrhea
 - Thrombocytopenia
- Evidence of plasma leakage
 - Rising Hct $\geq 20\%$ (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





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

Usually misdiagnosed as Septic Shock especially in adults

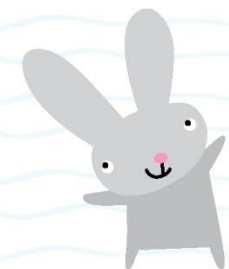




Common associated complications

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

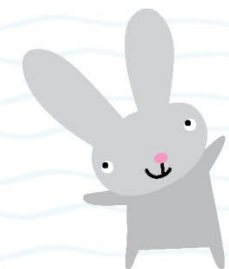
Transaminitis in dengue: AST > 200 U





Important parameters use to assess management of dengue

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





Thank you for your attention