Evaluation of Patients

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Patient assessment: four important steps

Step 1: History taking

Step 2: Clinical examination

Step 3: Investigations

Step 4: Diagnosis, phase of disease and severity

Step 1: History taking

What are important histories in dengue patients?

1. Date of onset of fever or illness

2. Symptoms and severity

3. **The 3 golden questions:**

    1) How much oral fluid intake: quantity and quality?
    2) How much urine output: frequency, volume and time of most recent voiding?
    3) What activities can the patient do during the febrile illness?

4. Other fluid losses: diarrhoea, vomiting

5. Presence of warning signs

Step 1: History taking

What are other relevant histories?

6. Family or neighbour with dengue, or travel to dengue-endemic areas

7. Medications (including non-prescription or traditional medicine) in use?
   List of medications and last time they were taken.

8. Co-morbid conditions, risk factors: infancy, pregnancy, obesity, diabetes mellitus, hypertension, gastric ulcers, hemolytic anaemia, etc.
   Why do we ask?

9. Jungle trekking or swimming in waterfall
   Consider leptospirosis, typhus, malaria

10. Recent unprotected sexual or drug use behaviour
    Consider acute HIV seroconversion illness

Step 2: Clinical examination

General assessment:

Mental state

Hydration state

Haemodynamic state

Clinical evidence of warning signs:

Bleeding manifestations: mucosal bleeding

Abdominal tenderness

Liver enlargement

Fluid accumulation: pleural effusion, ascites

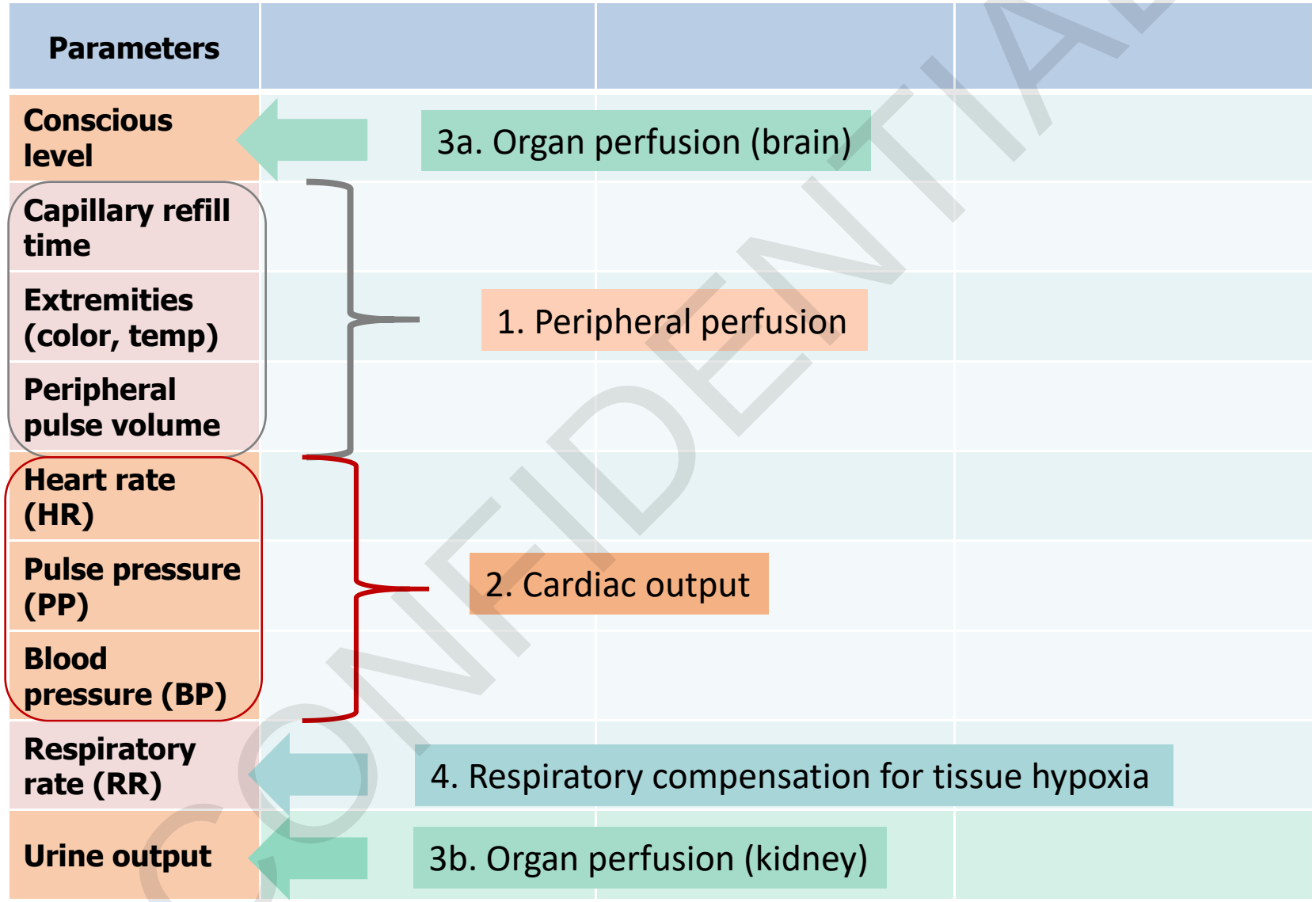
Other important signs:

Rash

Tachypnoea/acidotic breathing: indicates shock

Tourniquet test: repeat if negative or if there is no bleeding manifestation

Hemodynamic Assessment - Clinical Parameters



Hemodynamic Assessment - Stable Circulation

Parameters	Stable Circulation
Conscious level	Clear and lucid
Capillary refill time	Brisk (<2 seconds)
Extremities (color, temp)	Warm and pink
Peripheral pulse volume	Good volume
Heart rate (HR)	Normal HR for age
Pulse pressure (PP)	Normal PP for age
Blood pressure (BP)	Normal BP for age
Respiratory rate (RR)	Normal RR for age
Urine output	Normal

3a. Normal Brain Perfusion

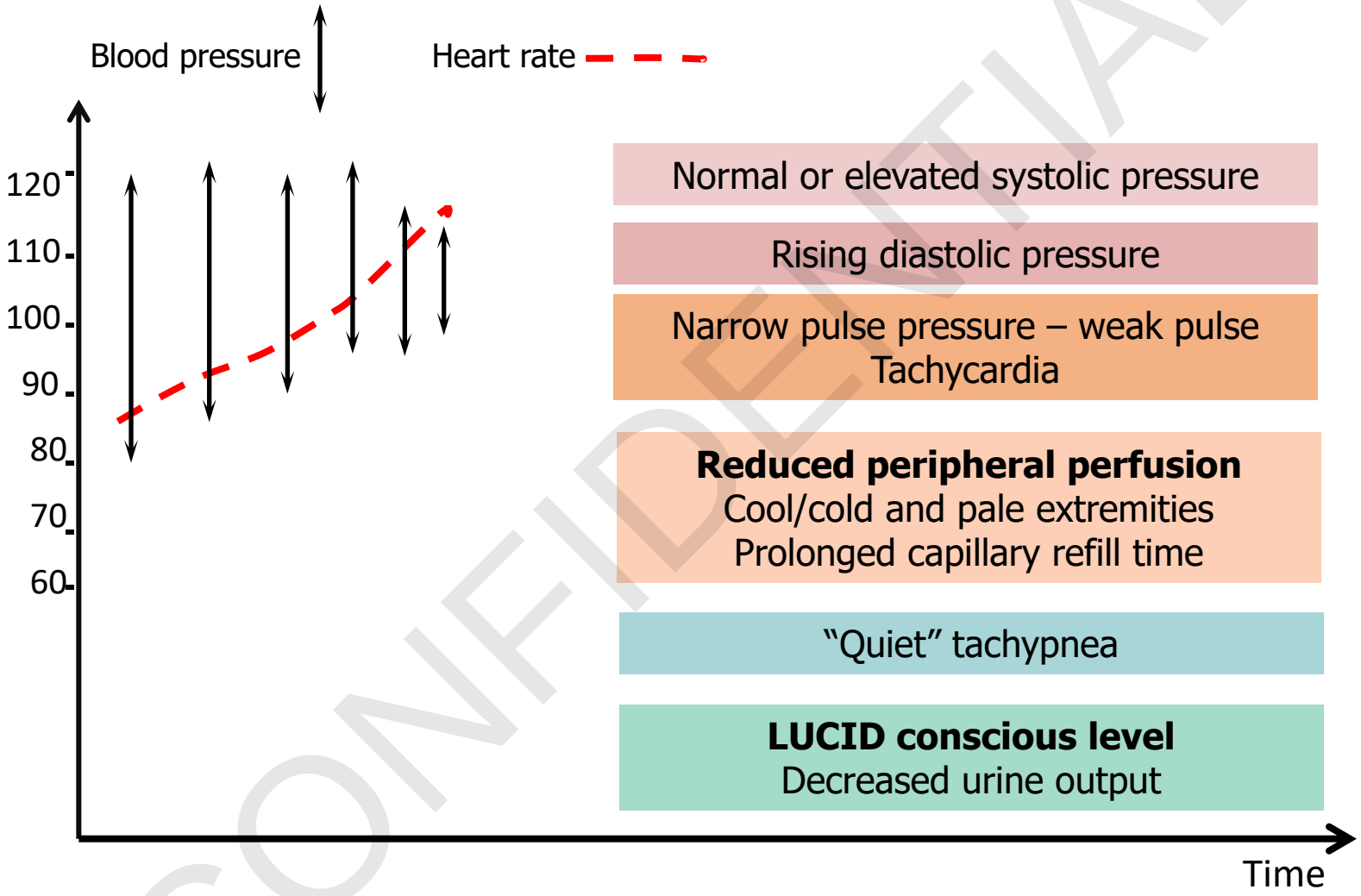
1. Normal Peripheral perfusion

2. Normal Cardiac output

4. No Respiratory compensation

3b. Normal kidney perfusion

Hemodynamic Changes in Compensated Shock



Normal or elevated systolic pressure

Rising diastolic pressure

Narrow pulse pressure – weak pulse
Tachycardia

Reduced peripheral perfusion
Cool/cold and pale extremities
Prolonged capillary refill time

"Quiet" tachypnea

LUCID conscious level
Decreased urine output

LCS Lum

Hemodynamic Assessment – Compensated Shock

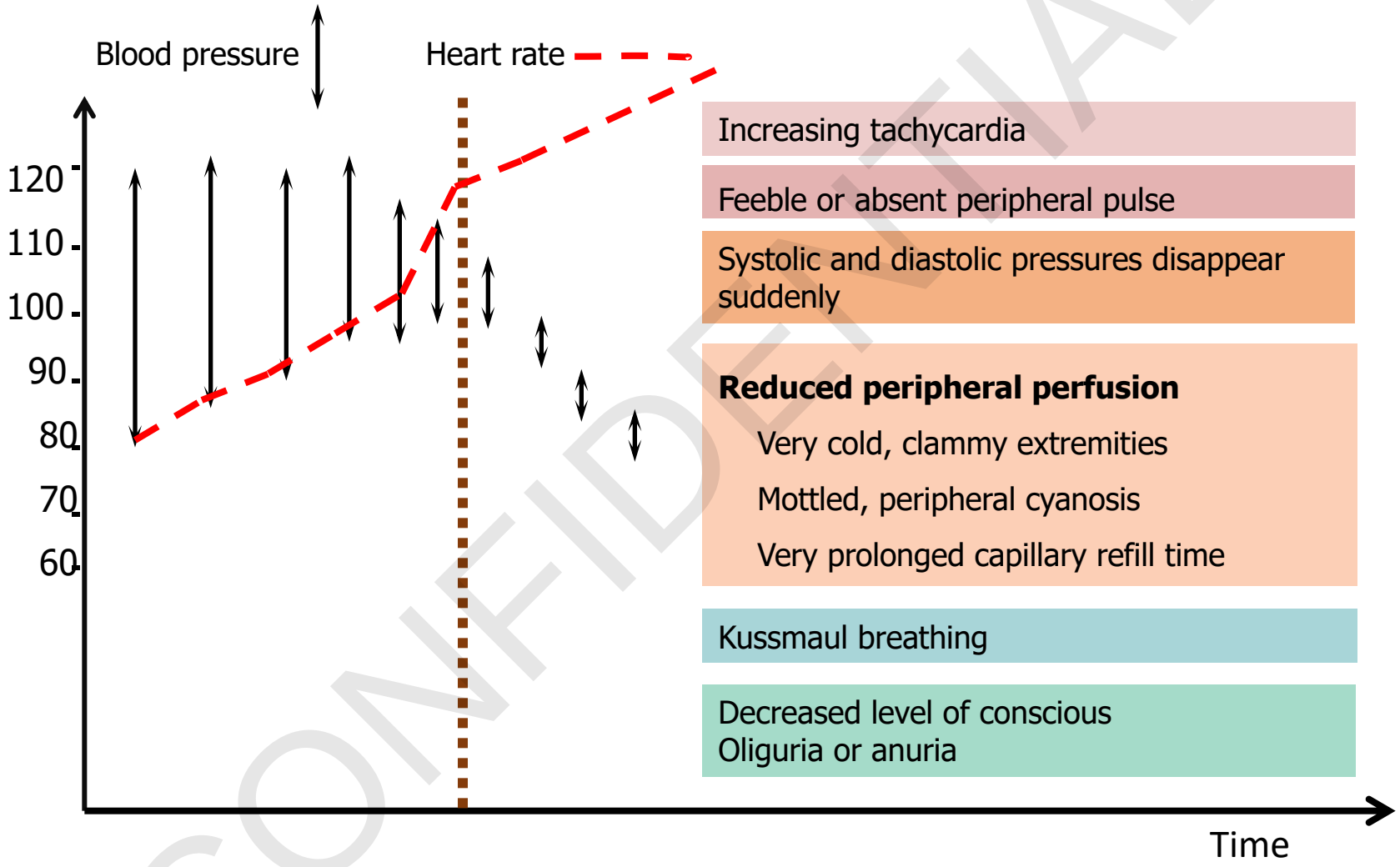
Parameters	Stable Circulation	Compensated shock	
Conscious level	Clear and lucid	Clear and lucid	3a. Normal brain perfusion
Capillary refill time	Brisk (<2 seconds)	Prolonged (>2 sec)	Reduced peripheral perfusion
Extremities	Warm and pink	Cool peripheries	
Peripheral pulse volume	Good volume	Weak & thready	
Heart rate (HR)	Normal HR for age	Tachycardia for age	Reduced cardiac output
Pulse pressure (PP)	Normal PP for age	**Normal systolic** pressure **rising diastolic** pressure	
Blood pressure (BP)	Normal BP for age	Narrowing PP Postural hypotension	
Respiratory rate (RR)	Normal RR for age	"Quiet" tachypnea	Tissue acidosis
Urine output	Normal	Reducing trend	Reduced kidney perfusion

Hemodynamic Assessment - Compensated Shock (cont.)

Parameters	Stable Circulation	Compensated shock
Conscious level	Clear and lucid	Clear and lucid
Capillary refill time	Brisk (<2 sec)	Prolonged (>2 sec)
Extremities	Warm and pink	Cool peripheries
Peripheral pulse volume	Good volume	Weak & thready
Heart rate (HR)	Normal HR for age	Tachycardia for age
Blood pressure (BP)	Normal BP for age	**Normal systolic** pressure, **rising diastolic** pressure
Pulse pressure (PP)	Normal PP for age	Narrowing PP Postural hypotension
Respiratory rate (RR)	Normal RR for age	"Quiet" tachypnea
Urine output	Normal	Reducing trend

Note that changes are seen in all parameters except **conscious level and systolic** blood pressure

Hemodynamic Changes in Hypotensive Shock



Increasing tachycardia

Feeble or absent peripheral pulse

Systolic and diastolic pressures disappear suddenly

Reduced peripheral perfusion

- Very cold, clammy extremities
- Mottled, peripheral cyanosis
- Very prolonged capillary refill time

Kussmaul breathing

Decreased level of conscious
Oliguria or anuria

LCS Lum

Hemodynamic Assessment – Hypotensive Shock (cont.)

Key clinical signs of deterioration: Changes in Mental State

- Restless, confused, extremely lethargic
- Seizures
- Agitation alternating with drowsiness

Infants and young children:

- Failure to recognize parents, focus or make eye contact
- Listen to parents: "Something is wrong with my child."

Yet, some children and young adults continue to have **clear** mental state!

Imminent total cardiorespiratory collapse

Hemodynamic Assessment – Monitoring urine output

Why is monitoring of urine output crucial in haemodynamic monitoring?

Reflects renal blood flow -- kidneys regulate intravascular volume.

In early shock state, kidneys conserve fluids by reducing urine volume.

In severe shock, no urine is produced.

What is considered adequate urine output?

In outpatient setting, the patient should drink enough fluids to pass urine about 4 to 6 times a day.

A patient with dengue shock should pass at least 0.5 ml/kg urine per hour.
An indwelling catheter will give an accurate measurement. If the urine volume exceeds this amount, consider reducing the IV fluid therapy.

Pitfall?

In uncontrolled diabetes or hyperglycemia, inappropriately large quantities of urine is produced.
Shock becomes worse because of glycosuria.

Hemodynamic Assessment – Hypotensive Shock (cont.)

Parameters	Stable Circulation	Compensated shock	Hypotensive shock
Conscious level	Clear and lucid	Clear and lucid	Restless, combative
Capillary refill time	Brisk (<2 sec)	Prolonged (>2 sec)	Very prolonged, mottled skin
Extremities	Warm and pink	Cool peripheries	Cold, clammy
Peripheral pulse vol	Good volume	Weak & thready	Feeble or absent
Heart rate (HR)	Normal HR for age	Tachycardia for age	Severe tachycardia or bradycardia in late shock
Blood pressure	Normal BP for age	Normal syst pr, rising diastolic pr	Hypotension Unrecordable BP
Pulse pressure (PP)	Normal PP for age	Narrowing PP Postural hypotension	Narrowed pulse pressure (≤20 mmHg)
Respiratory rate (RR)	Normal RR for age	"Quiet" tachypnea	Kussmaul breathing
Urine output	Normal	Reducing trend	Oliguria or anuria

Reduced brain perfusion

Reduced peripheral perfusion

Reduced cardiac output

Severe tissue acidosis

No kidney perfusion

Pearls in clinical examination of dengue patients

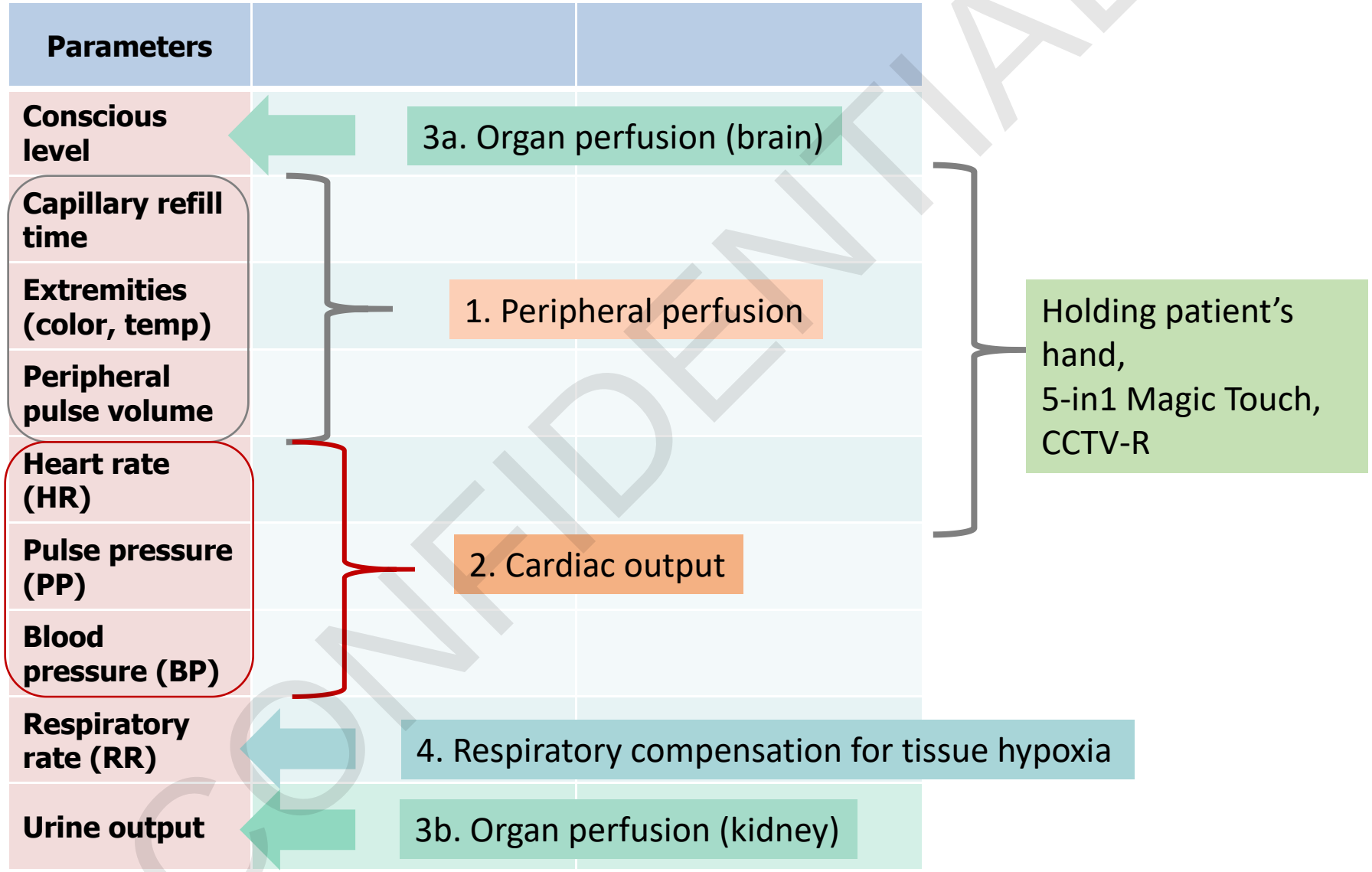
The "5-in-1 maneuver" magic touch – CCTV-R

Hold the patient's hand to evaluate peripheral perfusion.

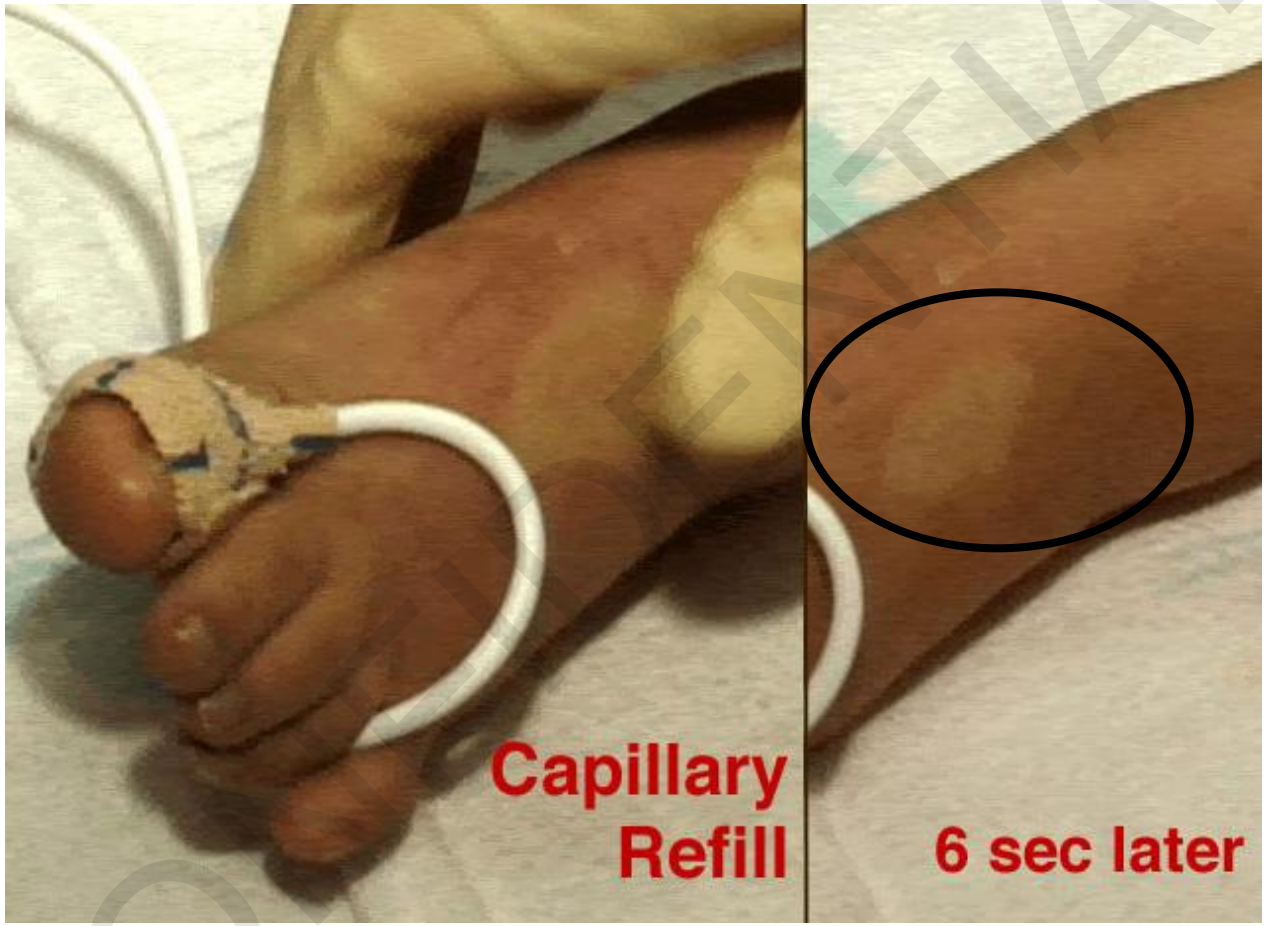
Save life in 30 seconds by recognizing shock

1. **C**olour
2. **C**apillary refill
3. **T**emperature
4. Pulse **V**olume
5. Pulse **R**ate

Hemodynamic Assessment – Holding patient's hand



The "5-in-1 maneuver" magic touch



Delayed capillary refill time.
The blood pressure was normal at this time.

Pitfalls in clinical examination of dengue patients

A patient with high fever (39^{o}C) has tachycardia, cold extremities and delayed capillary refill time.

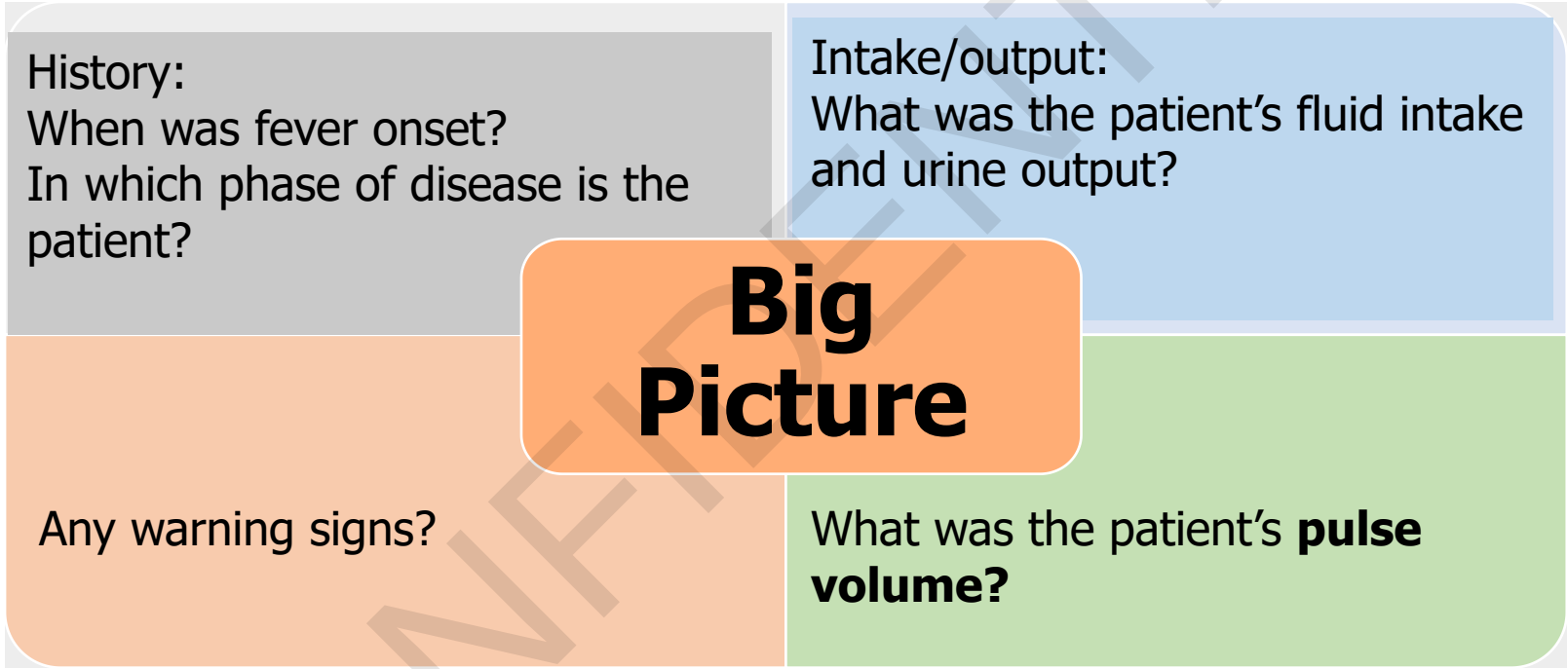
- Is he or she in shock?
- What other features do you need to consider?

* Reminder: Haemodynamic assessment is the foundation of dengue clinical management.

  A wrong interpretation could lead to a wrong decision in fluid management.

Pitfalls in clinical examination of dengue patients

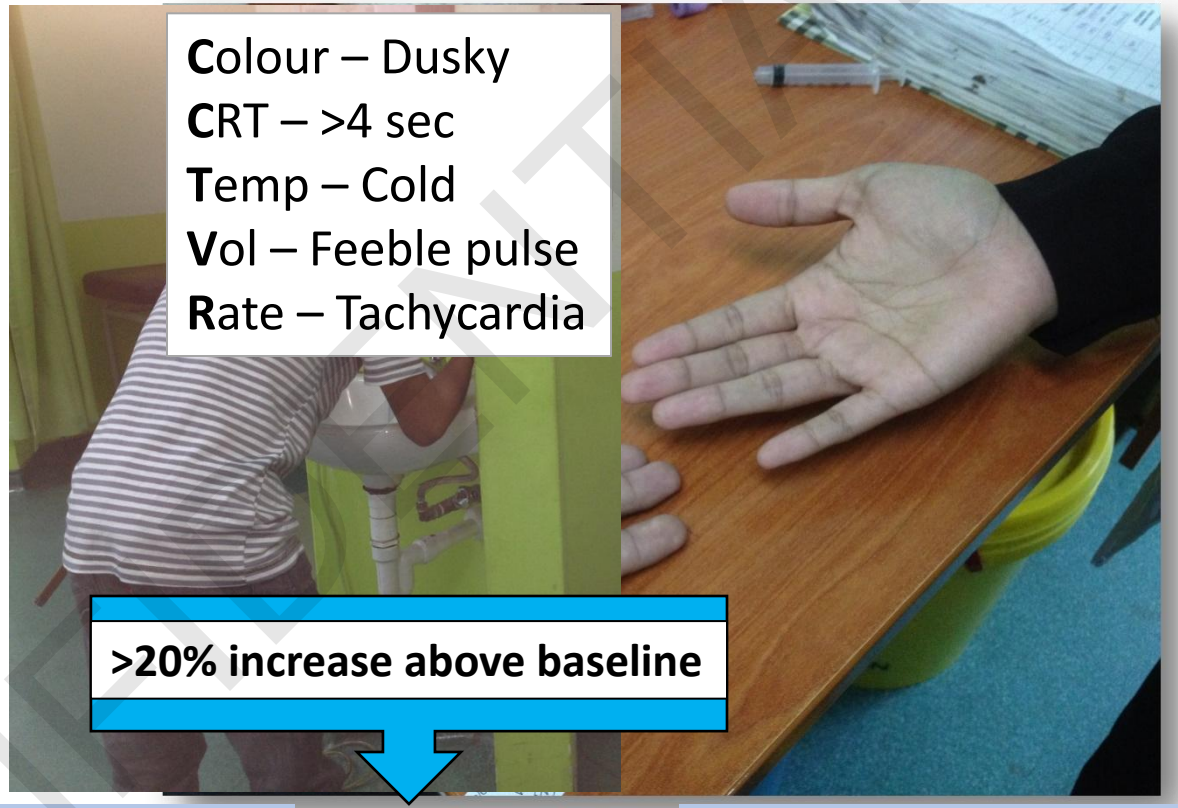
Always look at the **BIG picture** before "zooming in".



Remember:
Clinical features come as a "package", not in isolation.

Case discussion 1

Green Zone: 21 year old, Day 5 of illness on a Saturday



		Saturday	
HCT		45	
PLT		55	
Urea			

Case discussion 2

Mr. SD : **52 years old** ; Height 168 cm ; Weight 69.4 kg ; **IDEAL BODY WEIGHT 64 kg**

Mr SD
52 year old Gentleman

Height	: 168 cm
Weight	: 69.4 kg
Ideal Body Weight	: 64 kg
BMI	: 24.5

No previous medical co-morbidities
Smoker 20 pack years
Lorry driver
Stays at dengue endemic area.

Presented with :
Fever 6 days associated with myalgia and mild arthralgia

- No vomiting ; Can still take fluids.
- Poor oral intake
- Diarrhoea 2 times per day
- No abdominal pain

- Lethargic and unable to work past 3 days
- Spends most hours resting in bed
- Dizziness
- Urine output reported to be normal

Mr SD
52 year old Gentleman

Height	: 168 cm
Weight	: 69.4 kg
Ideal Body Weight	: 64 kg
BMI	: 24.5

No previous medical co-morbidities
Smoker 20 pack years
Lorry driver
Stays at dengue endemic area.

Presented with :
Fever 6 days associated with myalgia and mild arthralgia

- No vomiting ; Can still take fluids.
- Poor oral intake
- Diarrhoea 2 times per day
- No abdominal pain
- Lethargic and unable to work past 3 days
- Spends most hours resting in bed
- Dizziness
- Urine output reported to be normal

IN TRIAGE

Alert, Walked into Consultation,
Examination: Pink , Coated tongue , mildly dehydrated

Temp	**: 37.9 Celsius**
BP	**: 134 / 66 mmHg**
Pulse	**: 70 bpm (volume good, CRT <2 seconds, peripheries warm and pink)**
SPO_2	**: 100% RA**
Lungs	**: Clear**
PA	**: Soft and Non Tender ; No hepatosplenomegaly**

Mr SD
52 year old Gentleman

Height	: 168 cm
Weight	: 69.4 kg
Ideal Body Weight	: 64 kg
BMI	: 24.5

No previous medical co-morbidities
Smoker 20 pack years
Lorry driver
Stays at dengue endemic area.

Presented with :
Fever 6 days associated with myalgia and mild arthralgia

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- Diarrhoea 2 times per day
- No abdominal pain
- Poor oral intake
- Lethargic and unable to work past 3 days
- Spends most hours resting in bed
- Dizziness
- Urine output reported to be normal

IN TRIAGE

Alert, Walked into Consultation,
Pink , Coated tongue , mildly dehydrated

Temp	: 37.9 Celsius
BP	: 134 / 66 mmHg
Pulse	: 70 bpm (volume good, CRT <2 seconds, peripheries warm & pink)
SPO2	: 100% RA
Lungs	: Clear
PA	: Soft and Non Tender ; No hepatosplenomegaly

	Day 6 8:30 pm	
Hb	18.8	
HCT	**0.55**	
WBC	4.8 [N64 L28]	
PLT	**115**	
Urea/Creat	4.3 / 89	
TCO_2	24	
Na/K	134 / 3.9	

WHAT IS YOUR NEXT STEP OF MANAGEMENT ?

ENCOURAGE to drink adequate amounts of fluid & discharge

RUN 1 pint of normal saline and reassess clinically for discharge

RUN 1 pint of normal saline and repeat FBC before deciding discharge

REFER MEDICAL for admission to ward for IV Drip

Mr. SD : **52 years old** ; Height 168 cm ; Weight 69.4 kg ; **IDEAL BODY WEIGHT 64 kg** **DENGUE FEVER DAY 6** **8:00 PM**

Mr SD
52 year old Gentleman
Height : 168 cm
Weight : 69.4 kg
Ideal Body Weight : 64 kg
BMI : 24.5

No previous medical co-morbidities
Smoker 20 pack years
Lorry driver
Stays at dengue endemic area.

Presented with :
Fever 6 days associated with myalgia and mild arthralgia

- No vomiting ; Can still take fluids.
- Diarrhoea 2 times per day
- No abdominal pain
- Poor oral intake
- Lethargic and unable to work past 3 days
- Spends most hours resting in bed
- Dizziness
- Urine output reported to be normal

IN TRIAGE

Alert, Walked into Consultation,
Pink , Coated tongue , mildly dehydrated

Temp : 37.9
BP : 134 / 66 mmHg
Pulse : 70 bpm (volume good, CRT <2 seconds, peripheries warm & pink)
SPO2 : 100 % RA
Lungs : Clear
PA : Soft and Non Tender ; No hepatosplenomegaly

	Day 6 8:30 pm
Hb	18.8
HCT	**0.55**
WBC	4.8 [N64 L28]
PLT	**115**
Urea/Creat	4.3 / 89
TCO2	24
Na/K	134 / 3.9

WHAT IS YOUR NEXT STEP OF MANAGEMENT ?

- ENCOURAGE to drink adequate amounts of fluid & discharge
- RUN 1 pint of normal saline and reassess clinically for discharge
- RUN 1 pint of normal saline and repeat FBC before deciding discharge
- REFER MEDICAL for admission to ward for IV Drip

Mr SD
52 year old Gentleman

Height	: 168 cm
Weight	: 69.4 kg
Ideal Body Weight	: 64 kg
BMI	: 24.5

No previous medical co-morbidities
Smoker 20 pack years
Lorry driver
Stays at dengue endemic area.

Presented with :
Fever 6 days associated with myalgia and mild arthralgia

- No vomiting ; Can still take fluids.
- Diarrhoea 2 times per day
- No abdominal pain
- Poor oral intake
- Lethargic and unable to work past 3 days
- Spends most hours resting in bed
- Dizziness
- Urine output reported to be normal

IN TRIAGE

Alert, Walked into Consultation,
Pink , Coated tongue , mildly dehydrated

Temp	: 37.9
BP	: 134 / 66 mmHg
Pulse	: 70 bpm (volume good, CRT <2 seconds, peripheries warm & pink)
SPO2	**: 100 % RA**
Lungs	**: Clear**
PA	: Soft and Non Tender ; No hepatosplenomegaly

	Day 6 8:30 pm	
Hb	18.8	
HCT	**0.55**	**IS THE HEMATOCRIT NORMAL FOR HIM ?**
WBC	4.8 [N64 L28]	
PLT	**115**	
Urea/Creat	4.3 / 89	
TCO2	24	
Na/K	134 / 3.9	

8:00 PM

Mr SD
52 year old Gentleman
Height : 168 cm
Weight : 69.4 kg
Ideal Body Weight : 64 kg
BMI : 24.5

No previous medical co-morbidities
Smoker 20 pack years
Lorry driver
Stays at dengue endemic area.

Presented with :
Fever 6 days associated with myalgia and mild arthralgia

- No vomiting ; Can still take fluids.
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- No abdominal pain
- Poor oral intake
- Lethargic and unable to work past 3 days
- Spends most hours resting in bed
- Dizziness
- Urine output reported to be normal

IN TRIAGE

Alert, Walked into Consultation,
Pink , Coated tongue , mildly dehydrated

Temp : 37.9
BP : 134 / 66 mmHg
Pulse : 70 bpm (volume good, CRT <2 seconds, peripheries warm & pink)
SPO2 : 100 % RA
Lungs : Clear
PA : Soft and Non Tender ; No hepatosplenomegaly

	Day 6 8:30 pm	
	18.8	
HCT	**0.55**	
WBC	4.8 [N64 L28]	
PLT	**115**	
Urea/Creat	4.3 / 89	
TCO2	24	
Na/K	134 / 3.9	

IS THE HEMATOCRIT NORMAL FOR HIM ?

GUESS HIS BASELINE HCT…

THE STORY CONTINUES …

This patient was given 1 pint of NS over next 2 hours and allowed for discharge.
BP 130/70 mmHg and Pulse was 80 bpm.

Discharged at 12 Midnight and asked to recheck bloods again in Clinic in the morning.

Mr SD
52 year old Gentleman

Height	: 168 cm
Weight	: 69.4 kg
Ideal Body Weight	: 64 kg
BMI	: 24.5

No previous medical co-morbidities
Smoker 20 pack years
Lorry driver
Stays at dengue endemic area.

Presented with:
Day 7 of illness associated with myalgia and mild arthralgia

- No vomiting
- Diarrhoea 2 times per day
- No abdominal pain
- Poor oral intake
- Lethargic and unable to work past 3 days
- Spends most hours resting in bed
- Dizziness
- Urine output reported to be normal

Day 7 morning, follow-up in CLINIC as advised by ED Dr
Still poor oral intake ; No vomiting ; Diarrhoea x 2 over-night.

On examination : Looked generally well (walked into clinic)
Temp 36.8°C
BP 117/78 mmHg
Pulse 102 bpm ;
Good pulse volume / CRT <2 sec
Lungs : Clear

Plan : FBC STAT

Interpret His Symptoms And Physical Findings ?

What Would You Write As The Diagnosis ?

List The Current Problems To Highlight To The Managing Team In The Ward.

Mr. SD : **52 years old** ; Height 168 cm ; Weight 69.4 kg ; **IDEAL BODY WEIGHT 64kg** **DENGUE FEVER DAY 7 10 AM**

Presented with :

Fever 7 days associated with myalgia and mild arthralgia

- No vomiting
- Diarrhoea 2 times per day
- No abdominal pain
- Poor oral intake
- Lethargic and unable to work past 3 days
- Spends most hours resting in bed
- Dizziness
- Urine output reported to be normal

Presented the next morning for follow-up (DAY 7)

Still poor oral intake ; No vomiting ; Diarrhoea x 2 over-night.

On examination : Looked generally well (walked into clinic)
Temp 36.8°C
BP 117/78 mmHg
Pulse 102 bpm ;
Good pulse volume / CRT <2 sec
Lungs : Clear

Plan : FBC STAT

	Day 6	Day 7
Hb	18.8	19.5
HCT	**0.55**	**0.59**
WBC	4.8 [N64 L28]	7.3 [N49 L24 A 22]
PLT	**115**	**82**
Urea/Creat	4.3 / 89	
TCO_2	24	
Na/K	134 / 3.9	

CURRENT DIAGNOSIS

Presumed Dengue Fever Day 7 Illness
In Critical Phase with Compensated Shock.

Warning Signs :
Dehydration ; Lethargy
Hemoconcentration with rapid PLT drop.
Tachycardia

Do You Think There Is Any Plasma Leakage At This Point ?

THE STORY CONTINUES …

Mr. SD was planned for admission and IV Drip started at Clinic.

But, no infusion pump in clinic ….

Upon arrival to ward at 12 noon, only 250 c.c. was given over past 2 hours.

How much of IV Fluids would you plan to give Mr SD, while in the clinic & upon arrival to ward at 12 noon.

Presented with :
Fever 7 days associated with myalgia and mild arthralgia

- No vomiting ; Can still take fluids.
- Diarrhoea 2 times per day
- No abdominal pain
- Poor oral intake
- Lethargic and unable to work past 3 days
- Spends most hours resting in bed
- Dizziness
- Urine output reported to be normal

WARD REVIEW

Presumed Dengue Fever Day 7 Illness
In Critical Phase with ? Compensated Shock.

Warning Signs :
Dehydration; Lethargy
Hemoconcentration with rapid PLT drop.
Tachycardia

On Review 2 pm:

Alert ; Pink
BP : 132/92 mmHg
Pulse : 98 bpm

Good pulse volume ; CRT < 2 seconds

Lungs : No pleural Effusion

PA : Liver palpable 3 FB with shifting dullness

Urine : 200 c.c. at 2:00 PM (*)

WHAT WOULD BE YOUR NEXT STEP OF MANAGEMENT ?

PTO

WHAT WOULD BE YOUR NEXT PLAN OF MANAGEMENT ?

REDUCE IV drip as patient is having ascites (1 cc/kg/Hr)

IV Drip 3 cc/kg/Hr

IV Drip 5 cc/kg/Hr for 2 hours and reassess again in 2 hours (to make up for inadequate IVF)

IV Drip 7 – 10 cc/kg/Hr and reassess (since IV fluid given in Clinic was inadequate)

THE STORY CONTINUES …

Mr. SD was given IV Drip 3 cc/kg/Hr and repeat bloods 2 hours later (**4 pm**)

Passed over to on-call team to review FBC and general condition.

FBC repeated 2 hours post IV fluids (**4 pm**)

On-Call review **10:00 pm**

IV Drip 3 c.c./kg/Hr continued till on-call review.

Ward Review by On-Call Team

On Review : No vomiting
c/o Abdominal colicky pain
Alert
Temp : 37.2 ºc
BP : 110/78 mmHg
Pulse : 102 bpm :
Good pulse volume ; CRT < 2 seconds
Warm Peripheries

Lungs : Clear
PA : Soft and Non tender ;
No hepatosplenomegaly

Urine output : Concentrated

WHAT WOULD BE YOUR NEXT PLAN OF MANAGEMENT ?

- REDUCE IV Drip to 1 cc/kg/Hr
- REDUCE IV Drip to 2 cc/kg/Hr
- MAINTAIN IV Drip at 3cc/kg/Hr
- INCREASE IV Drip 5cc/kg/Hr and re-assess again in 2 hours

Mr. SD : **52 years old** ; Height 168 cm ; Weight 69.4 kg ; **IDEAL BODY WEIGHT 64 kg** **DENGUE FEVER DAY 7** **10 PM**

Ward Review by On Call Team

On Review :
No vomiting ;
Abdominal colicky pain

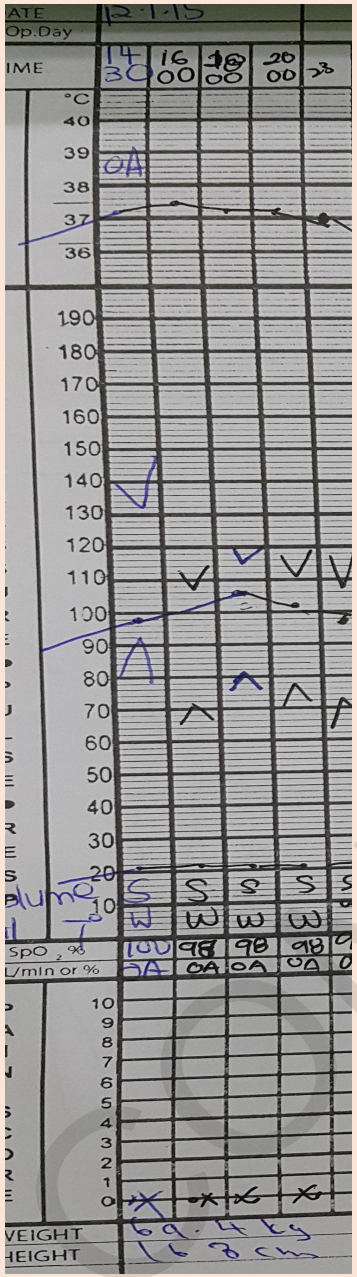
Alert
Temp : 37.2 ºc
BP : 110/78 mmHg
Pulse : 102 bpm :

Good pulse volume ;
CRT < 2 seconds :
Warm Peripheries

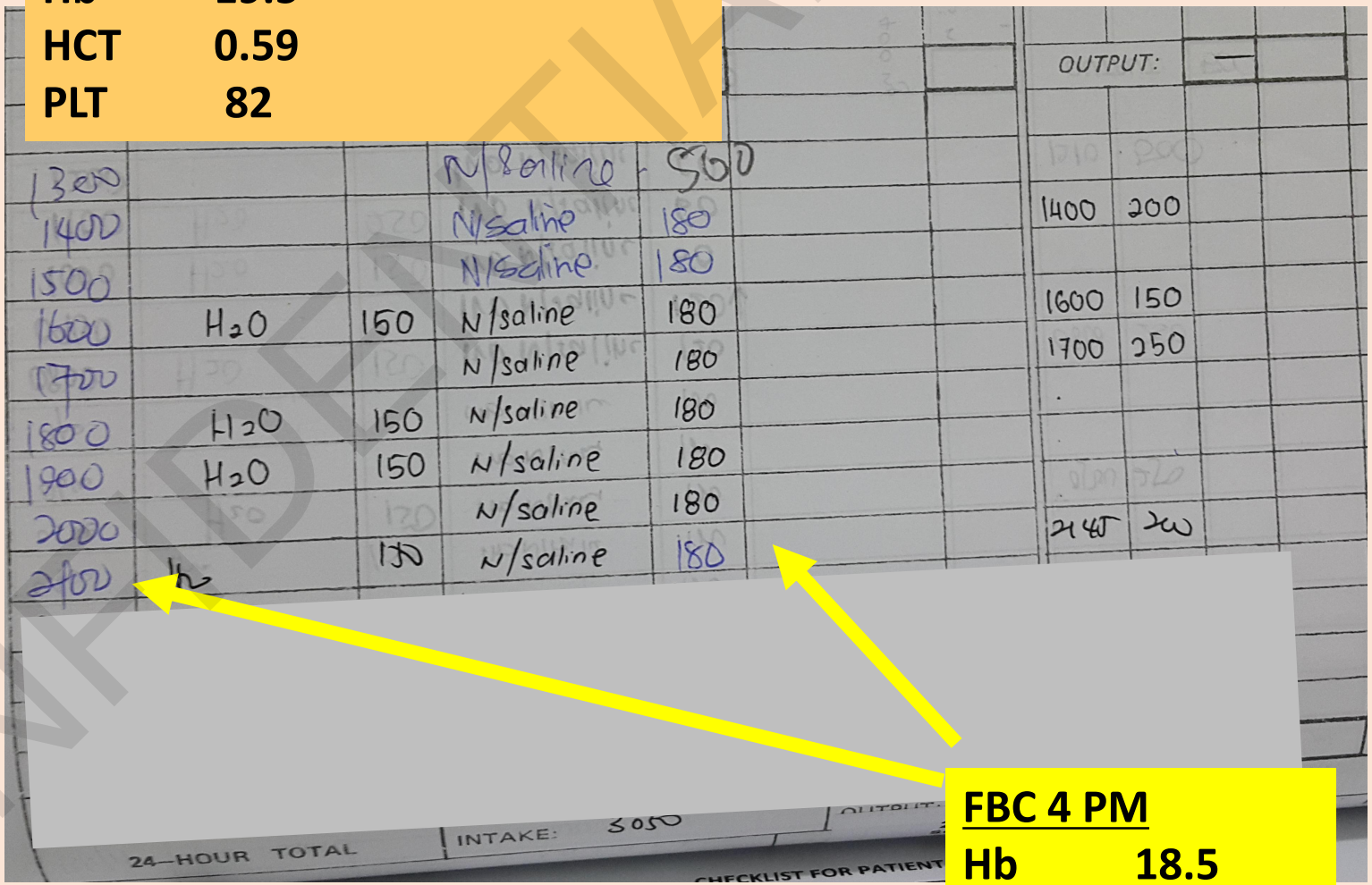
Lungs : Clear

PA : Soft and Non tender ;
No hepatosplenomegaly

Urine output : Concentrated



FBC 12 NOON
Hb 19.5
HCT 0.59
PLT 82



FBC 4 PM
Hb 18.5
HCT 0.54
PLT 67

Mr. SD : **52 years old** ; Height 168 cm ; Weight 69.4 kg ; **IDEAL BODY WEIGHT 64 kg** **DENGUE FEVER DAY 7** **10 PM**

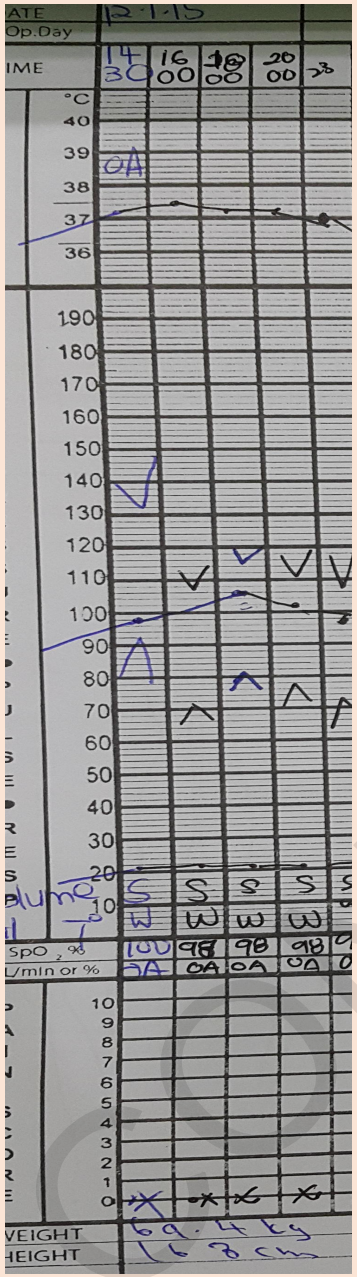
WHAT WOULD BE YOUR NEXT PLAN OF MANAGEMENT ?

REDUCE IV Drip to 1 cc/kg/Hr

REDUCE IV Drip to 2 cc/kg/Hr

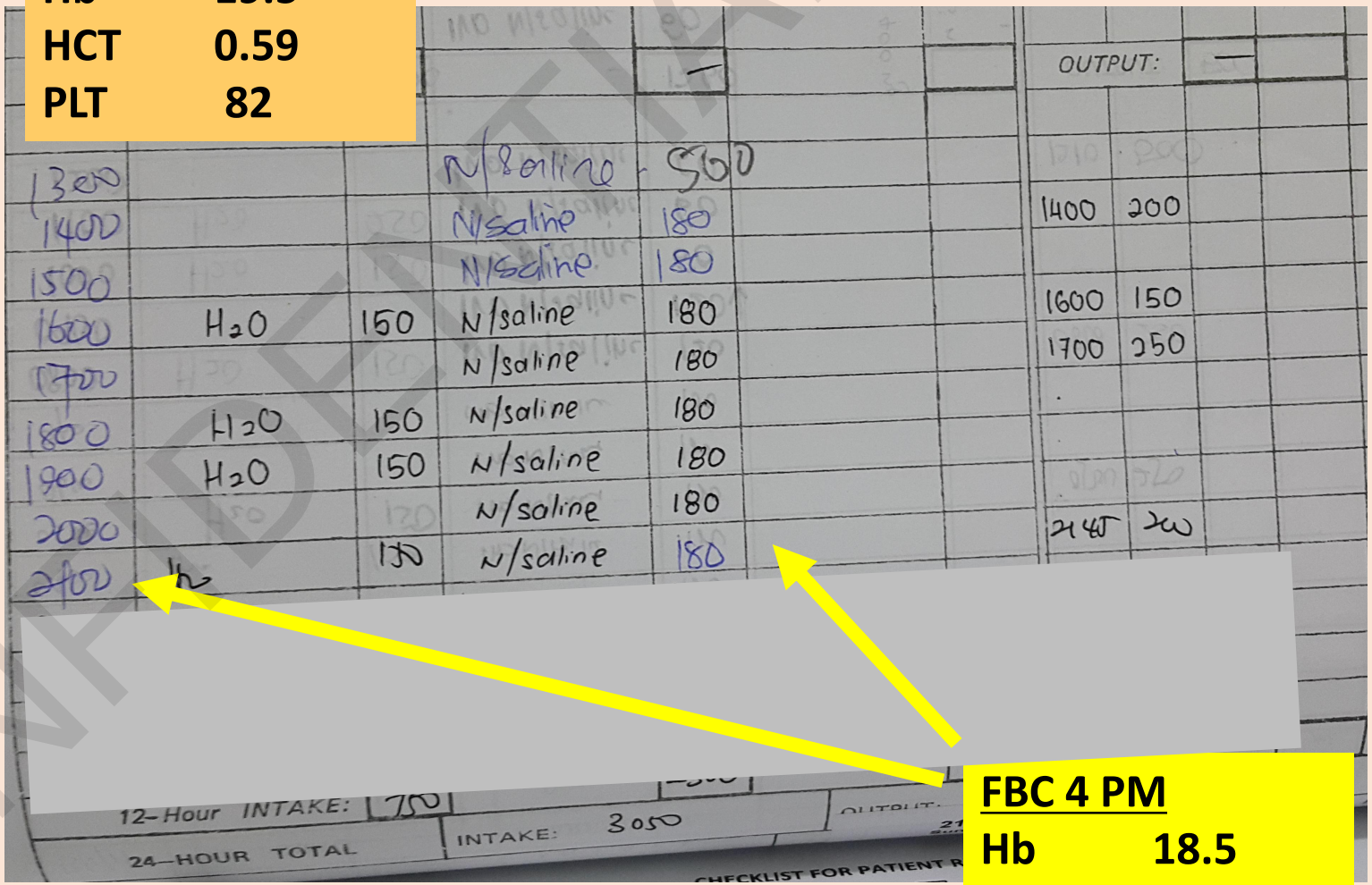
MAINTAIN IV Drip at 3cc/kg/Hr

INCREASE IV Drip 5cc/kg/Hr and re-assess again in 2hours



FBC 12 NOON

Hb	19.5
HCT	0.59
PLT	82



FBC 4 PM

Hb	18.5
HCT	0.54
PLT	67

Ward Review by On Call Team

On Review :
No vomiting ;
Abdominal colicky pain

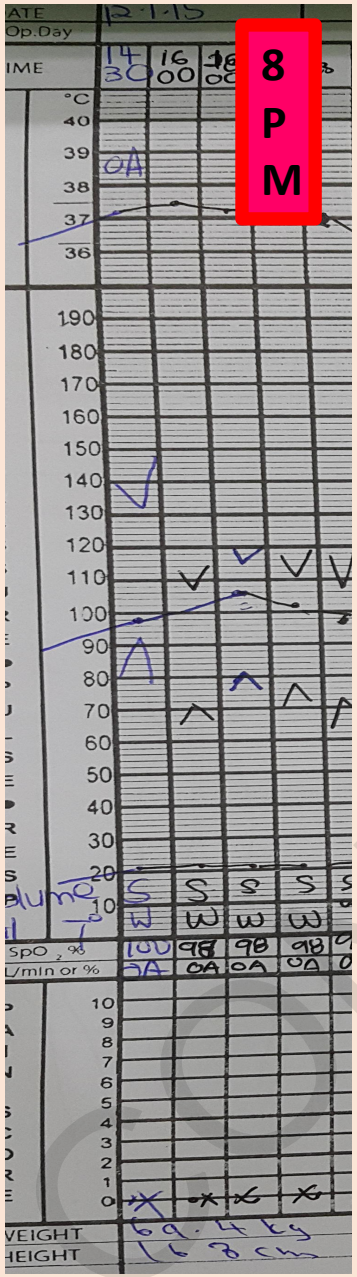
Alert
Temp : 37.2 ºc
BP : 110/78 mmHg
Pulse : 102 bpm :

Good pulse volume ;
CRT < 2 seconds :
Warm Peripheries

Lungs : Clear

PA : Soft and Non tender ;
No hepatosplenomegaly

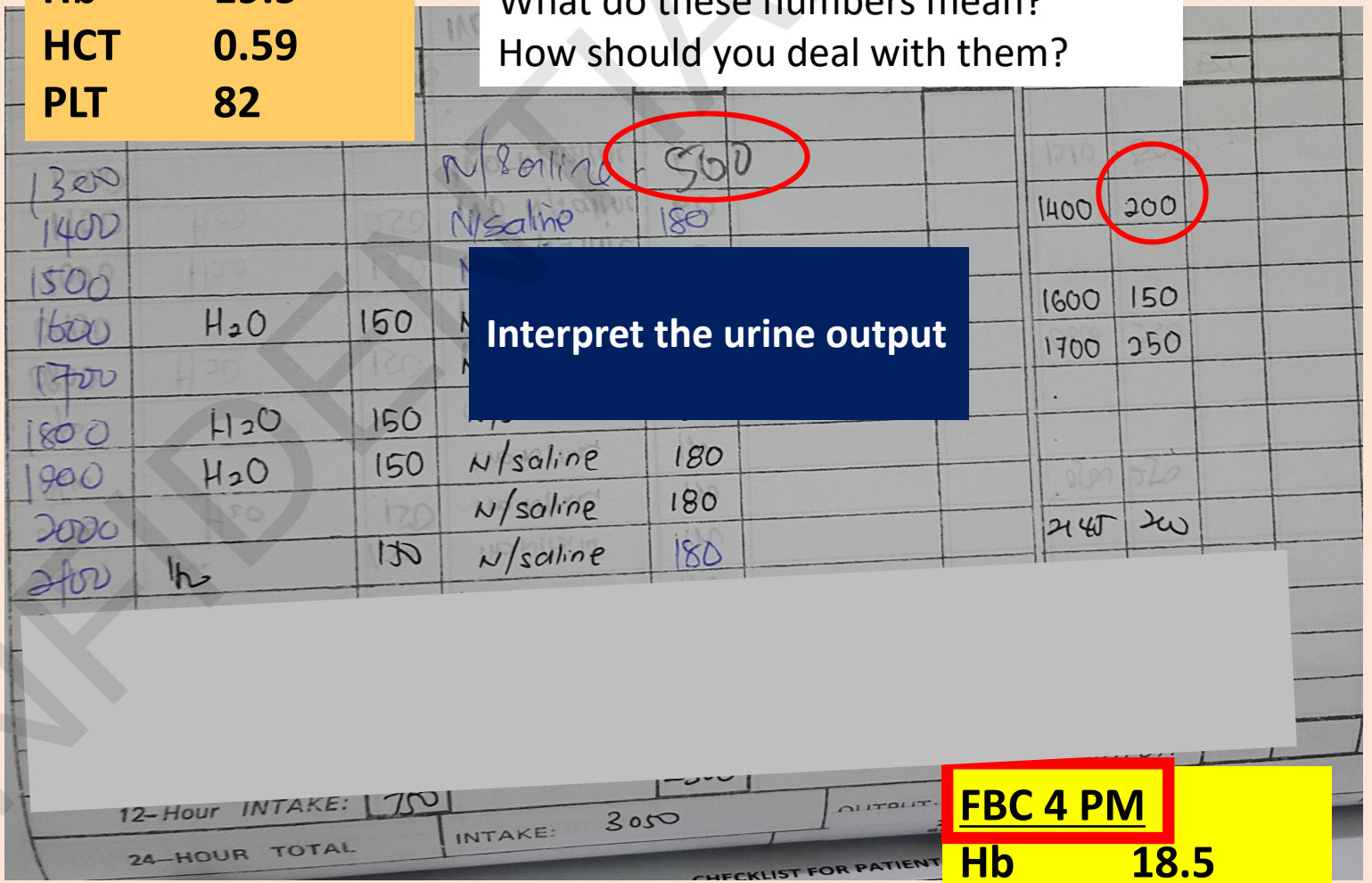
Urine output : Concentrated



FBC 12 NOON

Hb	**19.5**
HCT	**0.59**
PLT	**82**

What do these numbers mean?
How should you deal with them?



FBC 4 PM

Hb	**18.5**
HCT	**0.54**
PLT	**67**

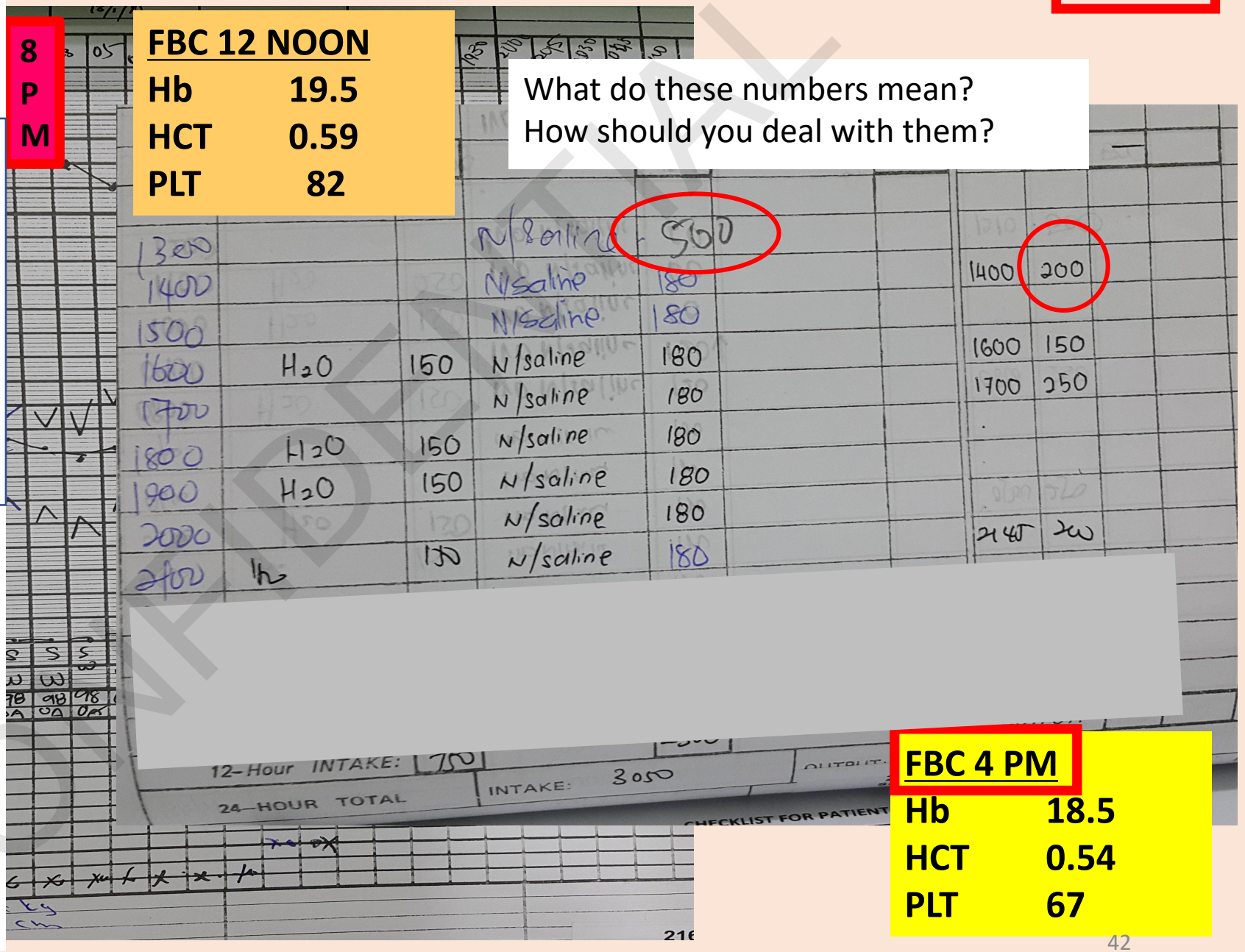
How best to interpret urine output chart at 10 PM?

8 P M

FBC 12 NOON

Hb	**19.5**
HCT	**0.59**
PLT	**82**

What do these numbers mean?
How should you deal with them?



FBC 4 PM

Hb	**18.5**
HCT	**0.54**
PLT	**67**

THE STORY CONTINUES …

Mr. SD was allowed to sleep that night.

PLAN : IV Drip 2cc/kg/Hr till the next morning review at 8 am, Day 8.

Ward Review The Next Morning 8 AM [18 hours from admission]

On Review : Having abdominal pain
No vomiting / diarrhoea / bleeding

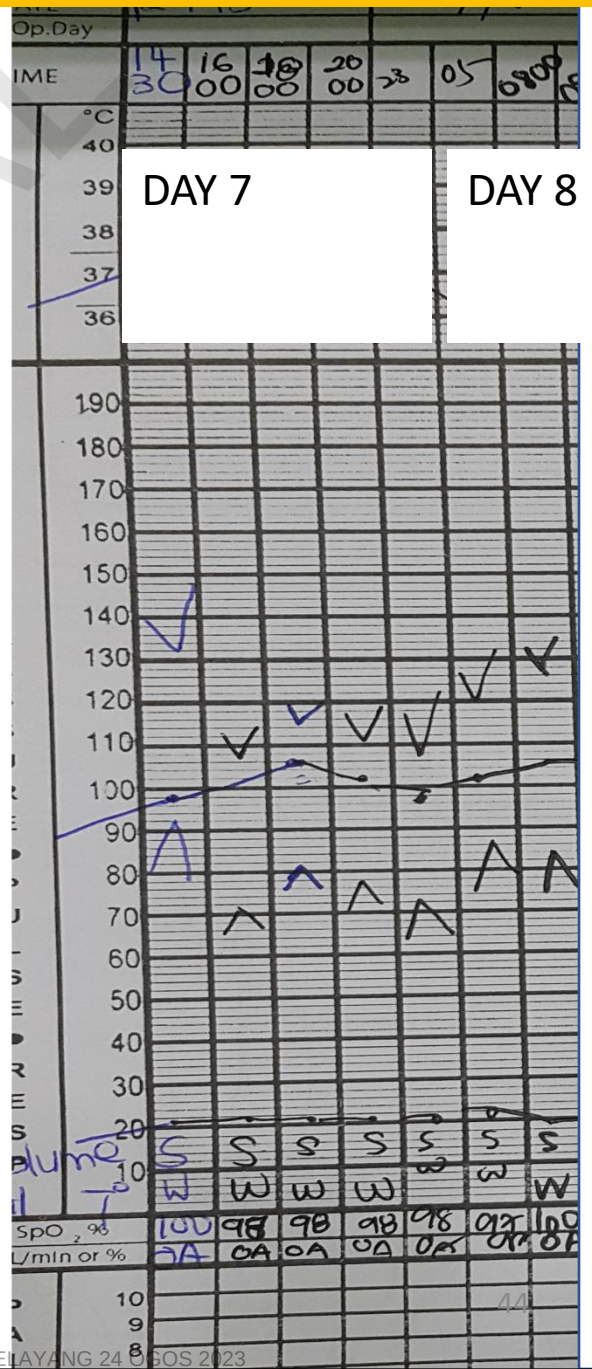
Hydration good
Temp : 37.0 ºc
BP : 126/88 mmHg
Pulse : 100 bpm, good pulse volume
SPO_2 : 100% RA

Lungs : Reduced air entry right basal
PA : Soft and Non tender

I/O : 4010 / **1050 cc [+ 2960] over 18 Hours**

FBC pending

WHAT DO YOU THINK IS HAPPENING IN THE MORNING ?
WHAT WOULD YOUR ORDERS BE ?



Ward Review @ 08:00 [18 hours from admission]

On Review : Having abdominal pain
No vomiting/diarrhoea /bleeding

Hydration good
Temp : 37.0 ᵒ c
BP : 126/88 mmHg
Pulse : 100 bpm, good pulse volume
SPO2 : 100% RA

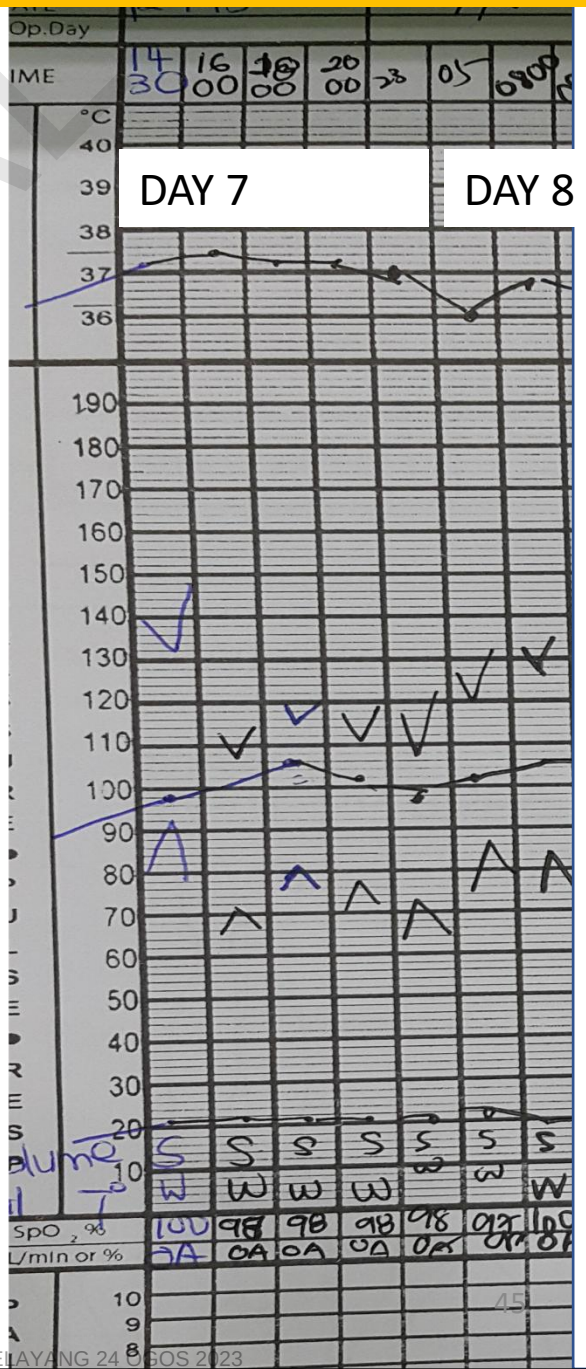
Lungs : Reduced air entry right basal
PA : Soft and Non tender

I/O : 4010 / 1050 cc [+ 2960] over 18 Hours

FBC pending

WHAT WOULD YOU DO NEXT ?

- REDUCE IV Drip to 1 cc/kg/Hr
- MAINTAIN IV Drip to 2 cc/kg/Hr
- INCREASE IV Drip Rate
- NO DECISION till FBC is ready.



THE STORY CONTINUES …

Since pulse volume was still good;
IV Drip was reduced to 1 cc/kg/Hr between 9 am → 12 Noon

FBC was reviewed 11 AM

At 12 noon, 4 HOURS after Morning Review

Increasing Respiratory Rate

Developed diaphoresis / Cold Clammy
Pulse was weak and thready

Increase In Hematocrit

Increase In WBC

	Day 6 (ED)	Day 7 12 noon	Day 7 4pm	Day 8 7am
Hb	18.8	19.5	18.5	19.7
HCT	**0.55**	**0.59**	**0.54**	**0.59**
WBC	4.8 [N64 28]	7.3 [N49 L24 A 22]	8.4 [N60 L18 A 11]	13.4
PLT	**115**	**82**	**67**	**42**
Urea/Creat	4.3 / 89		3.8 / 73	4.3 / 79
TCO2	24		21	20
Na/K	134 / 3.9		135 / 3.7	137 / 4.2
	500cc STAT	Overnight with no IV Drip	After 3cc/kg/Hr for 2 hours	After reducing to 2cc/kg/Hr overnight

Ward Review : 12 noon, 4 Hours LATER

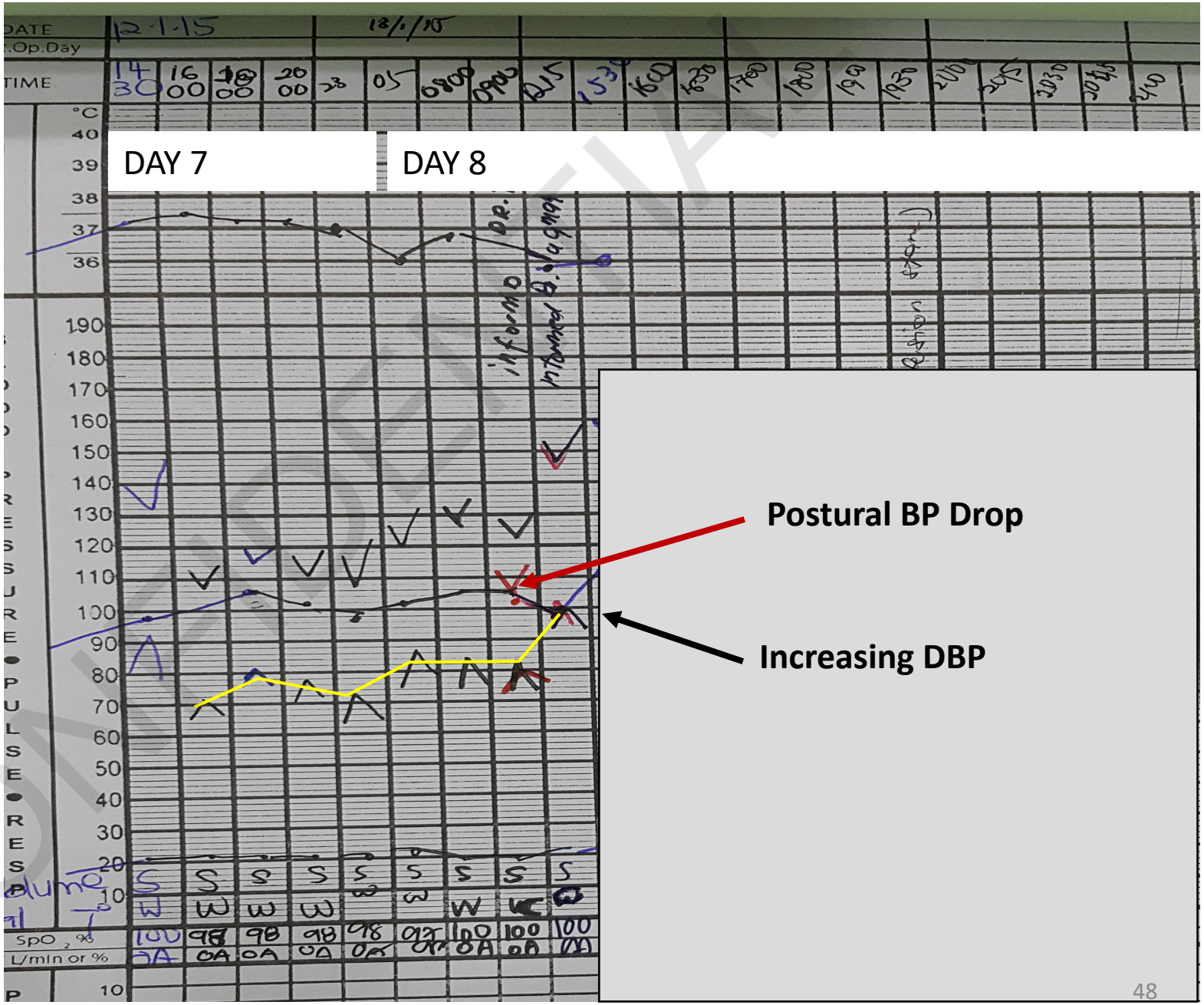
On Review : Cramp like abdominal pain (feels better after MMT/PPI)
Was still trying to drink water as much as he can (increasing lethargy)

Mild tachypnoea , Dry tongue
Temp : 37.0 ^{o}c
BP : **146/100** mmHg
Pulse : 98 bpm (weak to moderate pulse volume) : CRT < 2s
SPO_2 : **100% RA**

Lungs : Reduced air entry right basal
PA : Soft with mild tenderness @ epigastrium

WHAT DO YOU THINK IS HAPPENING NOW ?

Mr. SD : **52 years old** ; Height 168 cm ; Weight 69.4 kg ; **IDEAL BODY WEIGHT 64kg** **DENGUE FEVER DAY 8** **12 NOON**



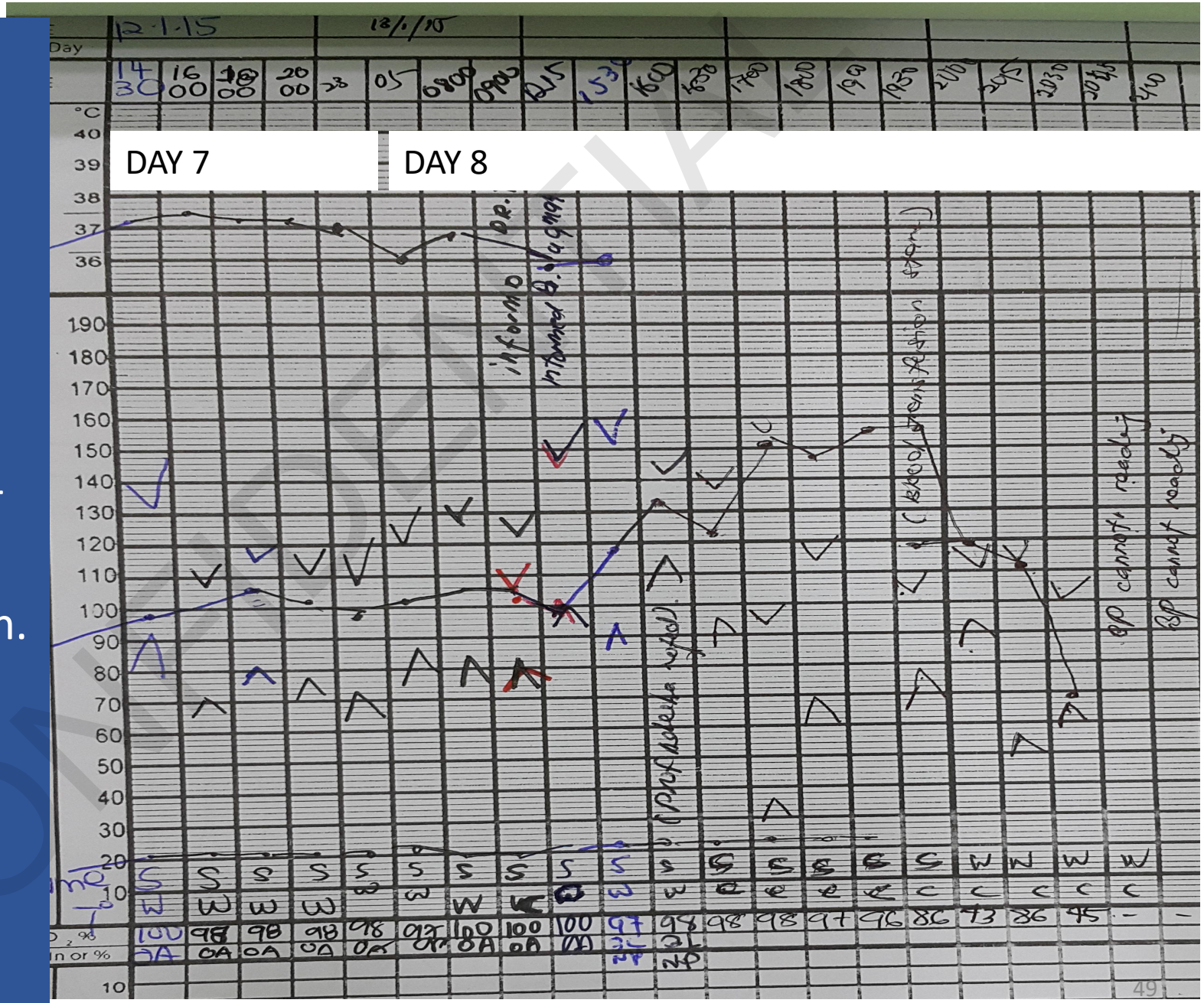
THE STORY CONTINUES …

Eventually failed resuscitation attempt.

What can we learn from this dengue patient?

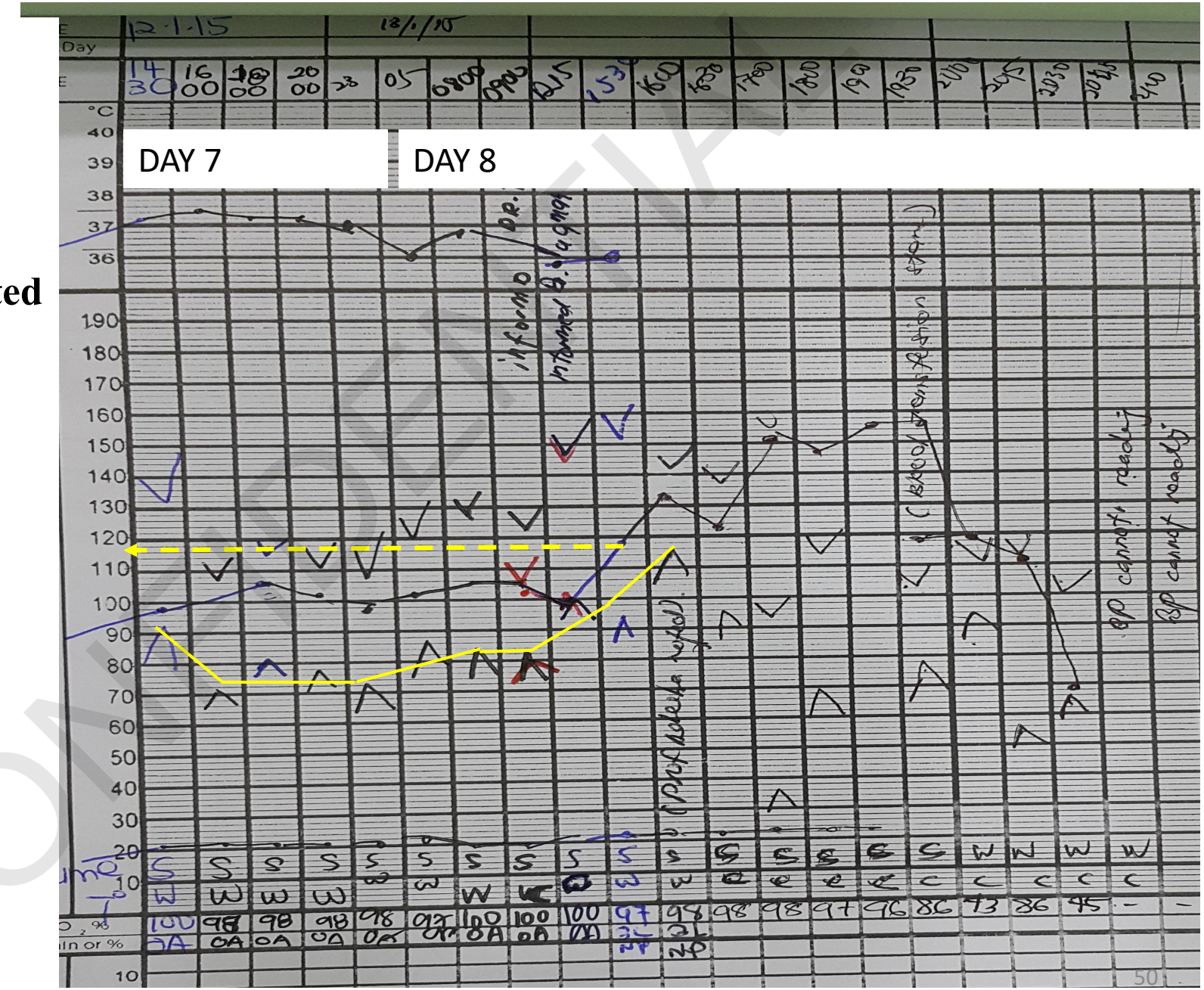
Poor outcome if they are NOT ADEQUATELY Resuscitated in the first 24 hours of admission.

WHAT We Can Learn From The Effects Of Dengue When A Patient Is Intravascularly Depleted.

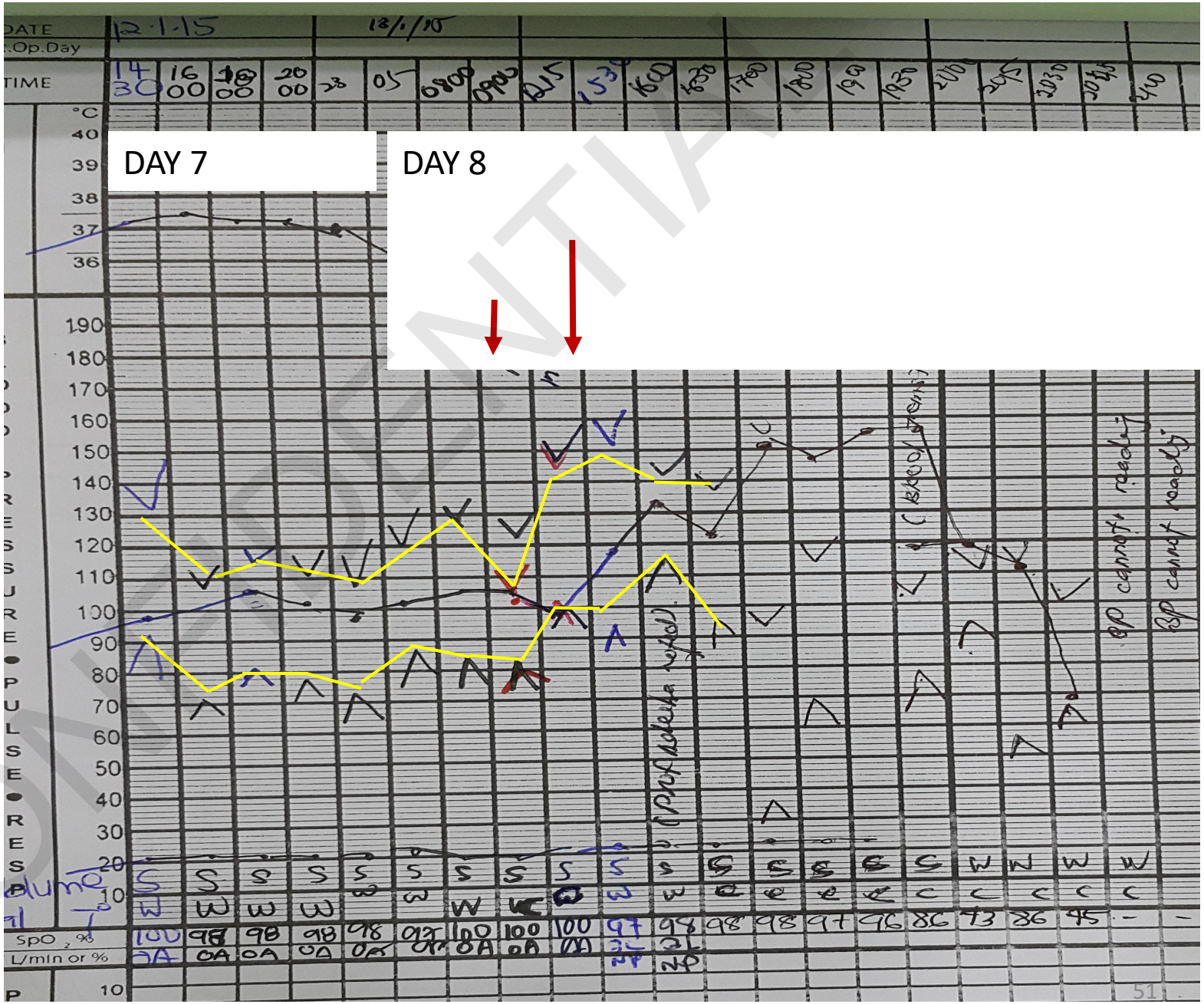


INCREASING DIASTOLIC pressure (Peripheral vasoconstriction)

Increasing systolic pressure during the phase of compensated shock



NARROWING PULSE PRESSURE



What Can We Learn From Mr. SD's Case ?

1. ED and Clinic:
   DO NOT BE TRICKED into thinking that just because the patient is able to walk, he must be "well" or "stable"!
   Listen to the STORY – Poor oral intake, not able to work…..For past 6 days, regardless of blood results

2. During ward admission and when taking over the management:

   REVIEW The History and Previous Management Given. Was it Adequate ? Catch Up IV Fluids?

   Evaluate every Hematocrit result. Trace blood investigation results and interpret results in REAL-TIME

   RECOGNISE the Problem In Real-Time. Assessment to be done in Real-Time. Then - identifying the Problem List.

   COMMUNICATION between colleagues – ward doctors and on-call doctors.

3. **Management during the first 12 to 24 hours of admission is critical in determining the outcome**

Case Discussion 3

NJ – 54 yr old female @ KK 1

- **16 Feb** – onset of fever

17 Feb – Walked into KK 1,
Fever for 2 days with decreased oral intake
Associated with myalgia
No vomiting, no abdominal pain, no warning signs.

Phy exam: Temp 39.2°C, BP 137/62, HR – 108,
CVS and Lungs – normal

Management: Paracetamol 1 gm QID, CBC next morning

18 Feb – same clinic KK 1, day 3 of fever

Dizziness, headache, decreased oral intake

No URTI symptoms

No vomiting, No diarrhea, No abd pain, No chest pain, No myalgia/arthralgia

Phy exam: Temp 37.9^{o}C, BP 134/70, PR 95, Good volume pulse, CRT <2 sec

CBC- WBC 3.1, Hb 13.7, HCT 39.6, Platelet 132

Management: Paracetamol – 1 g qid,
Notify as dengue,
Dengue alert card given,
Advice patient to seek medical help if worsening symptoms.
Repeat CBC next morning

19 Feb @ KK 2 – Day 4, late afternoon

Less oral intake, nausea

No vomiting/diarrhoea, No abd pain, No URTI, No bleeding.

Pink, good hydration, warm peripheries, CRT < 2 sec, Good pulse volume
Lungs, CVS, abdomen – normal
Temp 36.5°C, BP 130/90, PR 92

TWC – 2.9, Hb 13.2, HCT 39.8, Platelet 88

Diagnosis: DF, Day 4, in defervescence, No warning signs
Encourage fluid intake
Advice – go to nearest hospital if warning signs
Repeat CBC next day.

NJ – 54 yr old female

Time line

Day 1 16 Feb	Day 2 17 Feb	Day 3 18 Feb	Day 4 19 Feb
Fever onset	Fever, Myalgia Headache	Dizziness, Headache	
	Decr oral intake No D.V.AP. WS	Decr oral intake. No D.V.AP. WS	Less oral intake, nausea No D. V. AP. WS
	Temp 39.2°C	Temp 37.9°C	Temp 36.5°C
	Good perfusion	Good perfusion	Good perfusion
		WBC 3.1, HCT 39.6	WBC 2.9, HCT 39.8
		Hb 13.7, Platelet 132	Hb 13.2, Platelet 88
	Encourage oral fluid	Encourage oral fluid	Encourage oral fluid

NJ – 54 yr old female

20 Feb – KK 3 – Day 5, 9.45 am

Brought by daughter

Severe headache, dizziness, has not taken anything orally for past 2 days.

Lethargic looking, severely dehydrated, coated tongue, dry lips, no petechiae
Temp – 36.7^{o}C, BP 118/60, PR 120, small pulse volume, CRT > 2 sec
Lungs clear, abdomen – soft

CBC: WBC 2.6, HCT 46.2, Hb 15.2, Platelet 56

Dengue with dehydration and shock
Management: IV 500 ml NS, referred to nearest hospital.

Timeline

Day 1 16 Feb	Day 2 17 Feb	Day 3 18 Feb	Day 4 19 Feb	Day 5 20 Feb
Fever onset	Fever, Myalgia Headache Decr oral intake **No D,V,AP, WS**	Dizziness, Headache Decr oral intake **No D,V,AP, WS**	Less oral intake, nausea **No D,V,AP, WS**	Dizziness Not eaten anything for **past 2 days**.
	Temp 39.2^{o}C	Temp 37.9^{o}C	Temp 36.5^{o}C	Temp 36.7^{o}C
	Good perfusion	Good perfusion	Good perfusion	Poor perfusion
		WBC 3.1,	WBC 2.9,	WBC 2.6,
		HCT 39.6 Hb 13.7,	HCT 39.8 Hb 13.2,	HCT 46.2, Hb 15.2,
		Platelet 132	Platelet 88	Platelet 56
	Encourage oral fluid	Encourage oral fluid	Encourage oral fluid	**Dengue Shock**

Why does this patient who had daily follow-up and blood tests from early febrile phase and who had **no warning signs at all**, yet developed shock?

Discuss how this outcome can be avoided

Lessons Learnt

1) Draw the timelines – understand cumulative effects of illness, plot trajectory **versus** seeing patient in **“silo”**

2) Reduced oral intake vs persistent vomiting

   Three golden questions :

   1. **Fluid intake**
   2. **Urine output**
   3. **Activities**

3) After 72 hours, esp when temperature is normal, anyone with reduced oral intake should be admitted for intravenous rehydration

Initial Management of Severe Dengue

Sharifah Faridah Syed Omar
ID Consultant

Universiti Malaya Medical Centre

Indications of IV fluid therapy

- Resuscitation Therapy
- Rehydration Therapy – Deficit
- Replacement Therapy – on-going abnormal losses
- Maintenance Therapy – "**Just enough**" IV fluid for metabolic rate – Oral + Parenteral

Summary of management of dengue

Group A – Sent home (all of following)	Group B (any of following)	Group C (any of following)
1. Give anticipatory guidance before sending home (see patient handout) 2. Follow up daily 3. Do serial CBCs 4. Identify warning signs early	1. Admit for inpatient care 2. Monitor haemodynamic status frequently 3. Use HCT to guide interventions 4. Use isotonic IVF judiciously 5. Titrate fluid resuscitation to haemodynamic state 6. Correct metabolic acidosis, electrolytes as needed	As Group B **PLUS**: 1. Larger initial volume at a faster rate 2. Use colloids if several boluses of crystalloids already given 3. After improvement, a further resuscitation precedes step-wise IVF reduction 4. Monitor for occult bleeding 5. Prophylactic platelet transfusions not indicated

Group C: Emergency treatment

Compensated shock (systolic pressure maintained + reduced perfusion)

Conduct CBC, HCT, GXM and other blood investigations before fluid resuscitation

Obtain reference blood readings for all shock patients before fluid therapy.

Start IV fluid therapy with isotonic crystalloids: 5–10 ml/kg/hr (adult) or 10–20 ml/kg/hr (child) for 1 hour

Start IV fluid resuscitation

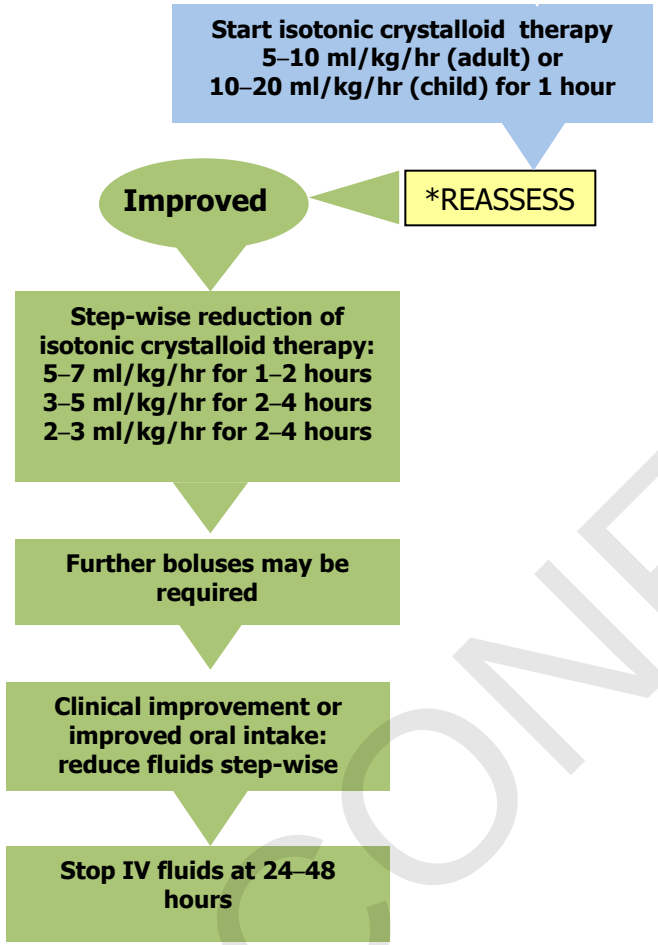
*REASSESS

Then reassess haemodynamic response:
– Vital signs
– Peripheral perfusion: "5-in-1 magic touch", CCTV-R
– Urine output
Decide if improved or not improved

*** Reassess the patient's clinical condition: vital signs, pulse volume, capillary refill time and temperature of extremities and decide on the situation.**
NOTE: Colloids are preferable if the patient has already received several boluses of crystalloid

Group C: Emergency treatment

Compensated shock (systolic pressure maintained + reduced perfusion)



If patient's condition improves after first bolus, reduce IV fluids gradually in step-wise manner.

Reassess and repeat HCT after 3–6 hours

If improved, decrease IV fluid volume and rate

Reassess and repeat HCT

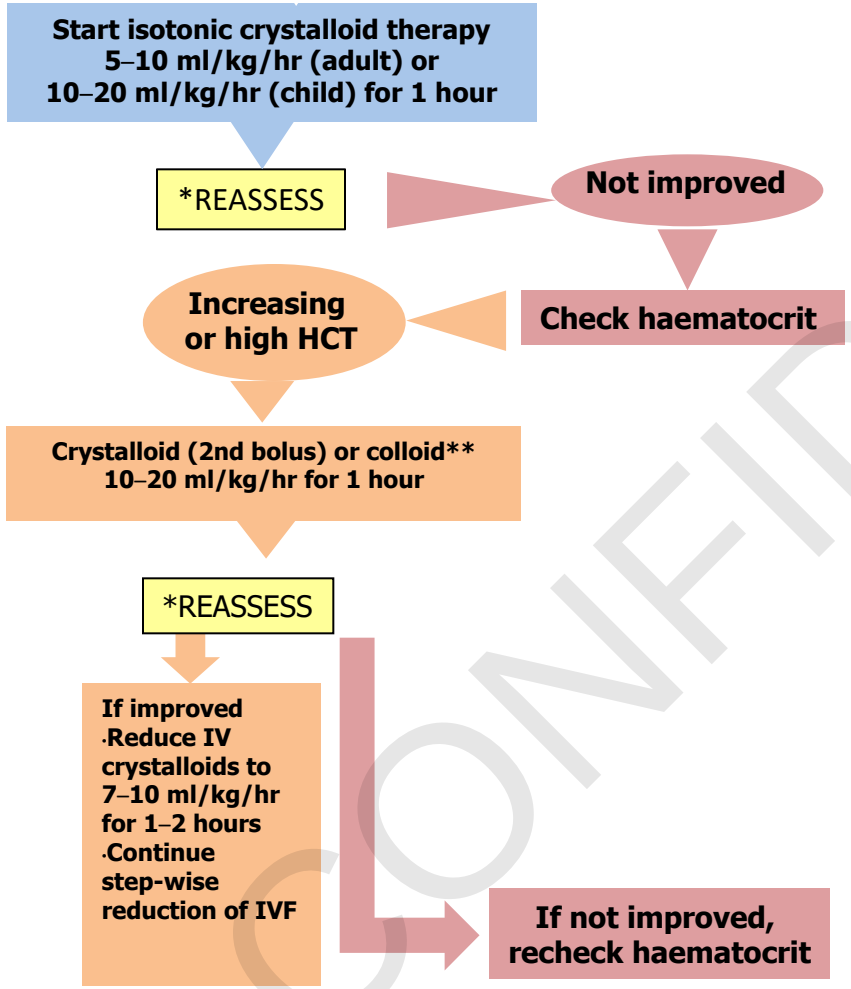
If plasma leakage is still ongoing, further boluses may be required

If oral intake and urine output improve, reduce IV fluid volume and rate further

Stop IV fluid therapy at 24–48 hours

Group C: Emergency treatment

Compensated shock (systolic pressure maintained + reduced perfusion)



After first bolus, **if patient has not improved,** check HCT.

If HCT increases or is still high, give second bolus of crystalloid at 10–20 ml/kg/hr for 1 hour. Use colloid** if patient has already received several boluses of crystalloid.

*REASSESS

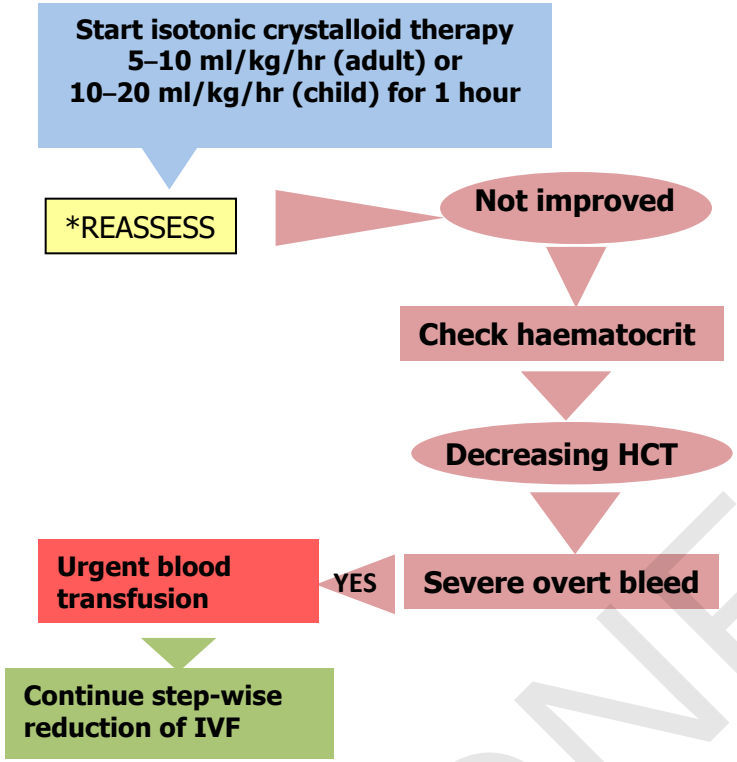
If patient improves, reduce IVF rate to 7–10 ml/kg/hr for 1–2 hours, and continue step-wise reduction of IVF.
If plasma leakage continues, further boluses may be required in the next 24–48 hours.

If not improved, recheck haematocrit

*** Reassess the patient's clinical condition: vital signs, 5-in-1 magic touch, urine output; decide on the situation.**

Group C: Emergency treatment – bleeding?

Compensated shock (systolic pressure maintained + reduced perfusion)



After first bolus, **if patient has not improved,** check HCT.

If HCT decreases or is lower than baseline, look for severe bleeding (gastrointestinal haemorrhage, haematoma)

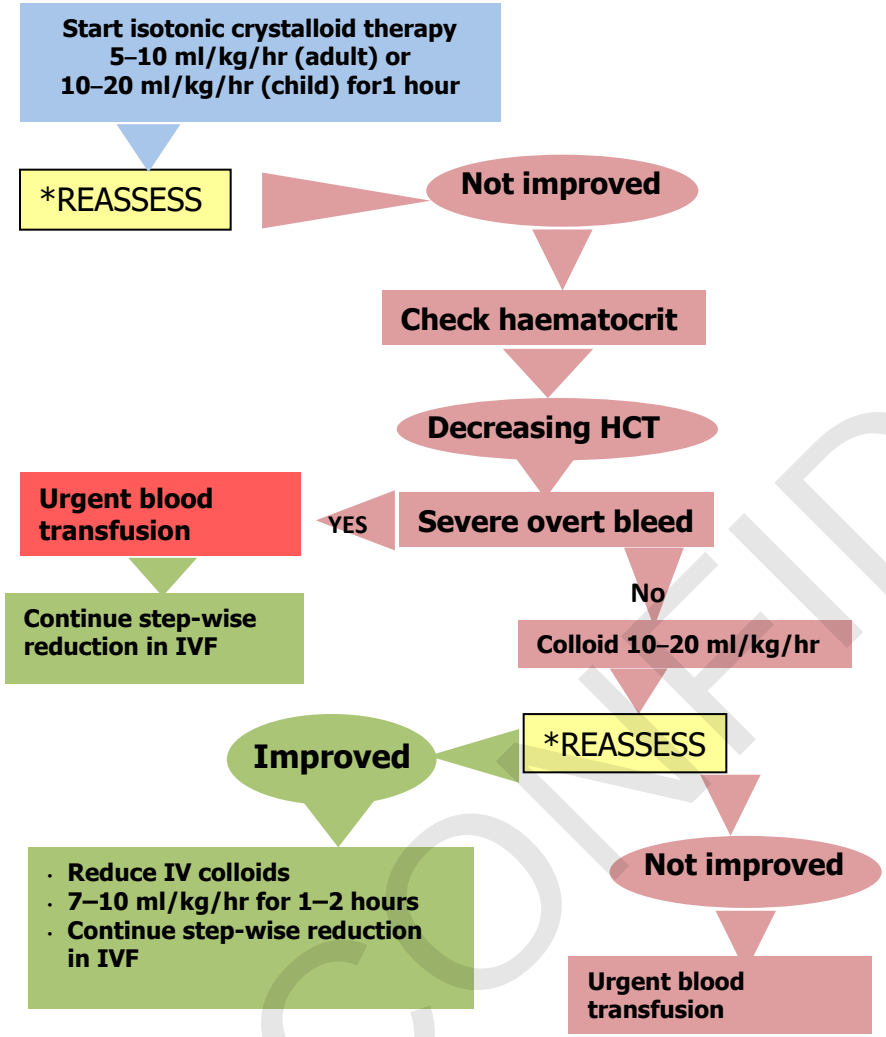
If severe bleeding is present, transfuse blood urgently, using 5–10 ml/kg packed red cells or 10–20 ml/kg fresh whole blood. Give colloid until blood becomes available.

If patient improves after blood transfusion, continue step-wise reduction of IVF.

*** Reassess the patient's clinical condition: vital signs, 5-in-1 magic touch, urine output; and decide on the situation.**
**** Colloid is preferable if the patient has already received several boluses of crystalloid**
IV: intravenous, HCT: hematocrit, IVF: intravenous fluids

Group C: Emergency treatment – bleeding? (cont.)

Compensated shock (systolic pressure maintained + reduced perfusion)



After first bolus, **if patient has not improved,** check HCT.

If HCT decreases or is lower than baseline, look for severe bleeding (gastrointestinal haemorrhage, haematoma)

If NO bleeding is seen, give colloid 10–20 ml/kg over 1 hour

*REASSESS

If patient improves after colloids, continue step-wise reduction of IVF

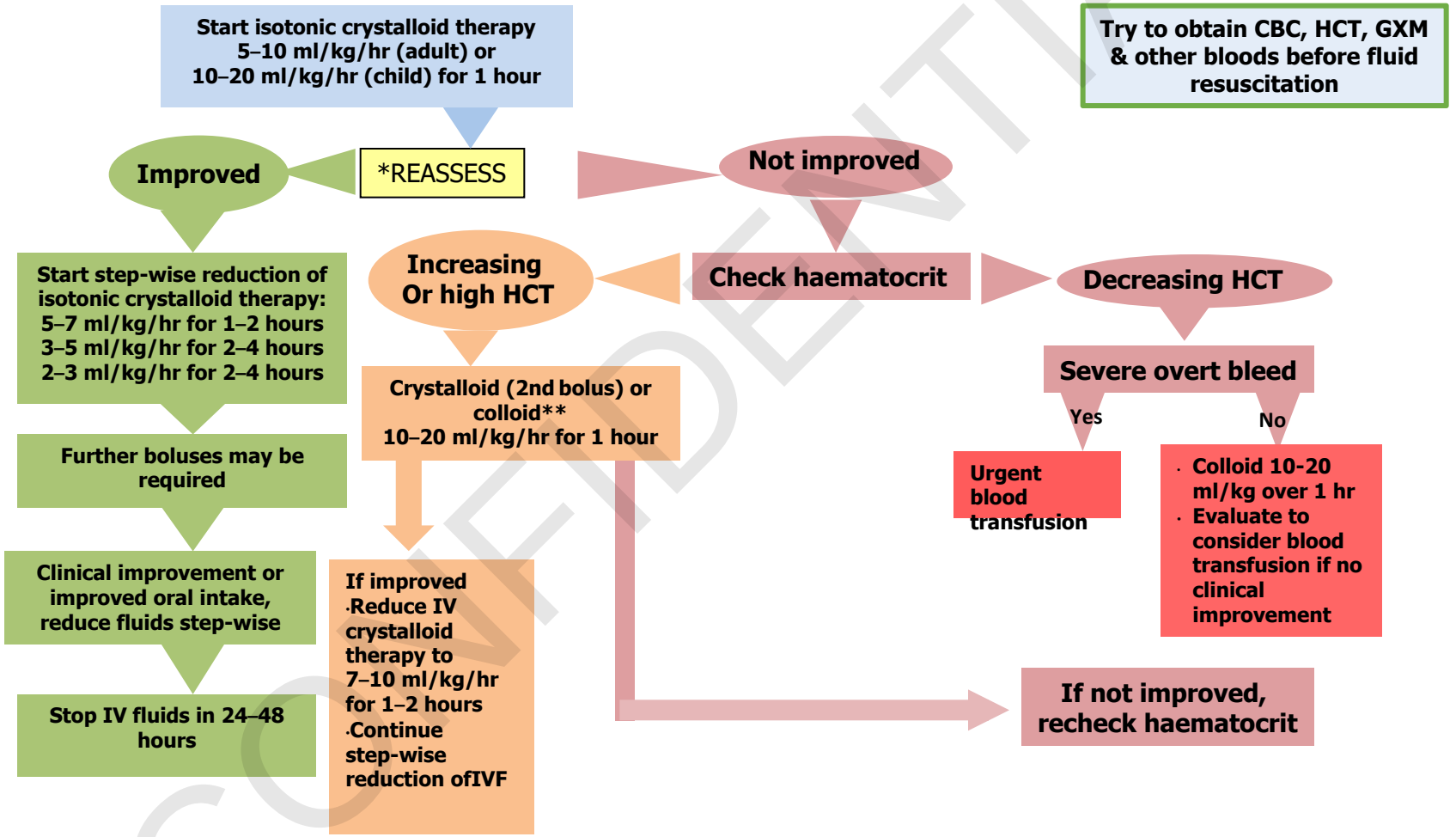
If patient has not improved, HCT would have decreased. Transfuse blood urgently (same volume as previous slide)

*** Reassess the patient's clinical condition: vital signs, 5-in-1 magic touch, urine output; and decide on the situation.**

**** Colloid is preferable if the patient has already received several boluses of crystalloid**

Group C: Emergency treatment – Summary

Compensated shock (systolic pressure maintained + reduced perfusion)



* Reassess the patient's clinical condition: vital signs, peripheral perfusion - 5-in-1 magic touch, urine output; and decide on the situation.

** Colloid is preferable if the patient has already received several boluses of crystalloid

Summary of management of dengue

Group A – Sent home (all of following)	Group B (any of following)	Group C (any of following)
1. Give anticipatory guidance before sending home (see patient handout) 2. Follow up daily 3. Do serial CBCs 4. Identify warning signs early	1. Admit for inpatient care 2. Monitor haemodynamic status frequently 3. Use HCT to guide interventions 4. Use isotonic IVF judiciously 5. Titrate fluid resuscitation to haemodynamic state 6. Correct metabolic acidosis, electrolytes as needed	As Group B **PLUS**: 1. Larger initial volume at a faster rate 2. Use colloids if several boluses of crystalloids already given 3. After improvement, a further resuscitation precedes step-wise IVF reduction 4. Monitor for occult bleeding 5. Prophylactic platelet transfusions not indicated

Haemodynamic assessment - continuum of haemodynamic changes

Parameters	Stable circulation	Compensated shock	Hypotensive shock
Conscious level	Clear and lucid	Clear and lucid	Restless, combative
Capillary refill time	Brisk (<2 sec)	Prolonged (>2 sec)	Very prolonged, mottled skin
Extremities	Warm and pink	Cool peripheries	Cold, clammy
Peripheral pulse volume	Good volume	Weak & thready	Feeble or absent
Heart rate (HR)	Normal HR for age	Tachycardia	Severe tachycardia or bradycardia in late shock
Blood pressure (BP)	Normal BP for age	Normal systolic pressure but rising diastolic pressure	Hypotension Unrecordable BP
Pulse pressure (PP)	Normal PP for age	Narrowing PP Postural hypotension	Narrowed pulse pressure (<20 mmHg)
Respiratory rate (RR)	Normal RR for age	"Quiet" Tachypnoea	Kussmaul breathing (Metabolic acidosis)
Urine output	Normal	Reducing trend	Oliguria or anuria

*Highlighted boxes are **early signs of shock**.

Group C: Emergency treatment
Hypotensive shock

Patient [illegible] a longer period and should be managed more vigorously.

Try to obtain CBC, HCT, GXM & other blood readings before fluid resuscitation

Obtain reference blood readings for all shock patients before fluid therapy.

Initiate IV resuscitation with crystalloid (NS, LR) or colloid solution as a bolus given at:

- 20 ml/kg (child)
- 10-20 ml/kg (adult)

over 15–30 minutes to bring patient out of shock as quickly as possible.

Start isotonic crystalloid or colloid therapy 10–20 ml/kg (adult) or 20 ml/kg (child) over 15–30 minutes

*REASSESS

Reassess:

- Vital signs
- Peripheral perfusion: 5-in-1
- Mental state
- Urine output

*** Reassess the patient's clinical condition: vital signs, pulse volume, capillary refill time and temperature of extremities and decide on the situation.**
**** Colloid is preferable if the patient has already received several boluses of crystalloid**

Group C: Emergency treatment
Hypotensive shock

If patient's condition improves after first bolus, give a crystalloid or colloid infusion of 10 ml/kg/hr for 1 hour.

*REASSESS

If patient continues to improve, continue with crystalloid and reduce IVF in step-wise manner

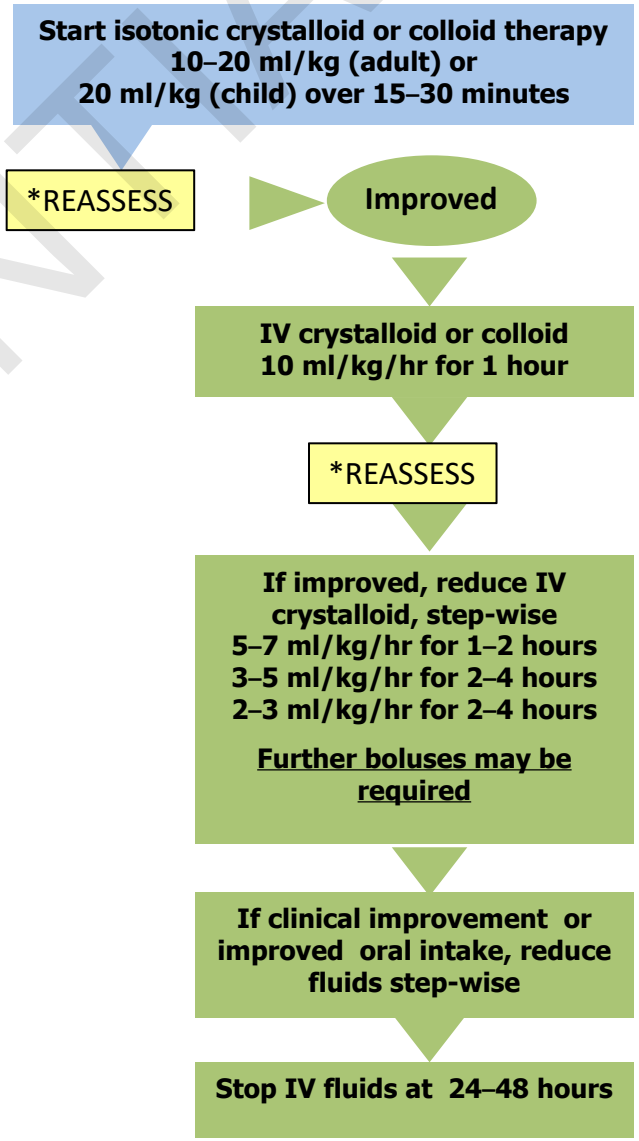
*REASSESS & repeat HCT after 2–4 hours

If improved, decrease IV rate every 2–4 hours

*REASSESS every 2–4 hours

On-going plasma leakage, further boluses required

Continue step-wise reduction if oral intake and urine output improve. Stop IVF at 24–48 hours.



Group C: Emergency treatment
Hypotensive shock

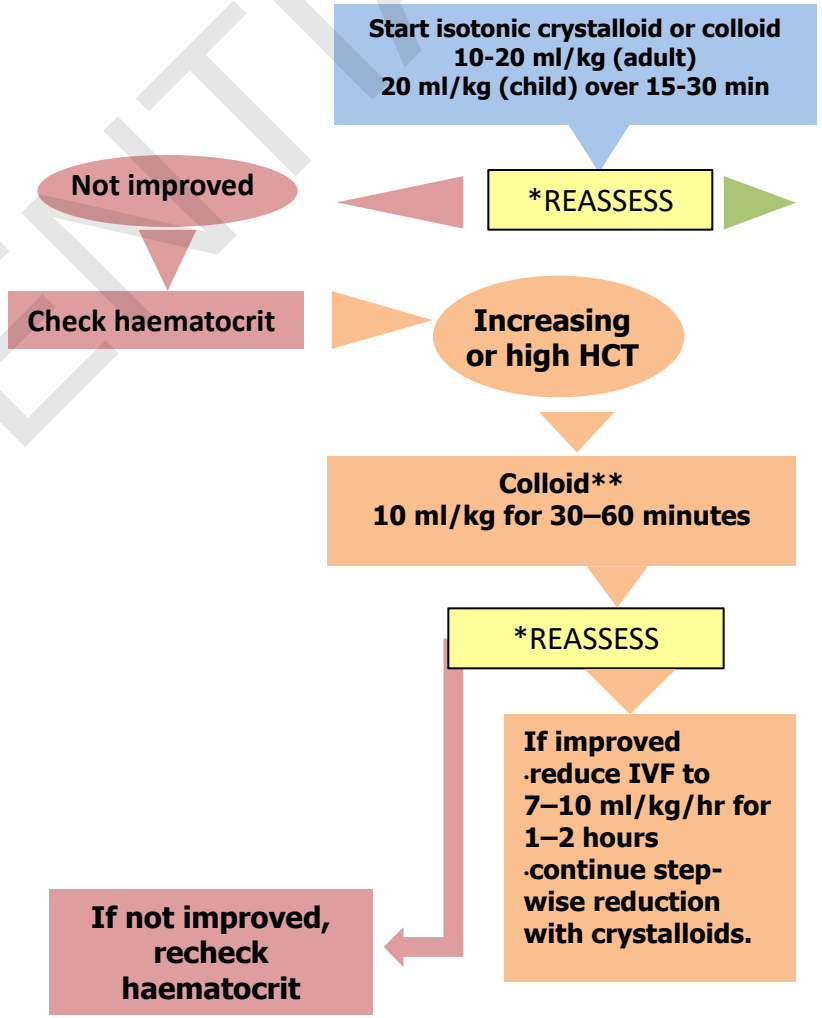
After first bolus, **if patient has not improved,** check HCT.

If HCT increases or is still high, give second bolus of colloid at 10–20 ml/kg over 30–60 minutes.

*REASSESS

If patient improves, reduce IVF rate to 7–10 ml/kg/hr for 1–2 hours. Continue step-wise reduction with crystalloid.
If plasma leakage continues, further boluses may be required.

If patient has not improved, recheck haematocrit.



* Reassess the patient's clinical condition: vital signs, peripheral perfusion (CCTV-R) & urine output and decide on the situation.

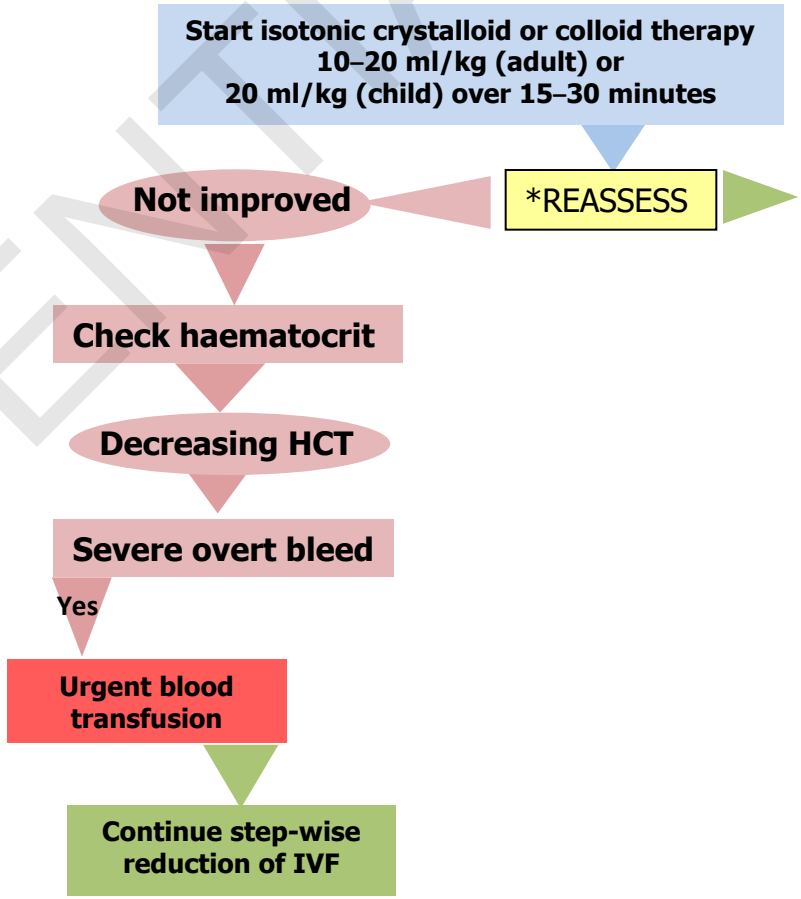
Group C: Emergency treatment
Hypotensive shock – bleeding?

After first bolus, **if patient has not improved,** check HCT.

If HCT decreases or is lower than baseline, look for severe bleeding (gastrointestinal haemorrhage, haematoma).

If severe is bleeding present, transfuse blood urgently, 5–10 ml/kg packed red cells or 10–20 fresh whole blood. Give colloid until blood is available.

If patient improves after blood transfusion, continue step-wise reduction of IVF.



* Reassess the patient's clinical condition: vital signs, peripheral perfusion (CCTV-R) and urine output; decide on the situation.
** Colloids are preferable if the patient has already received several boluses of crystalloids.

Group C: Emergency treatment
Hypotensive shock – bleeding?

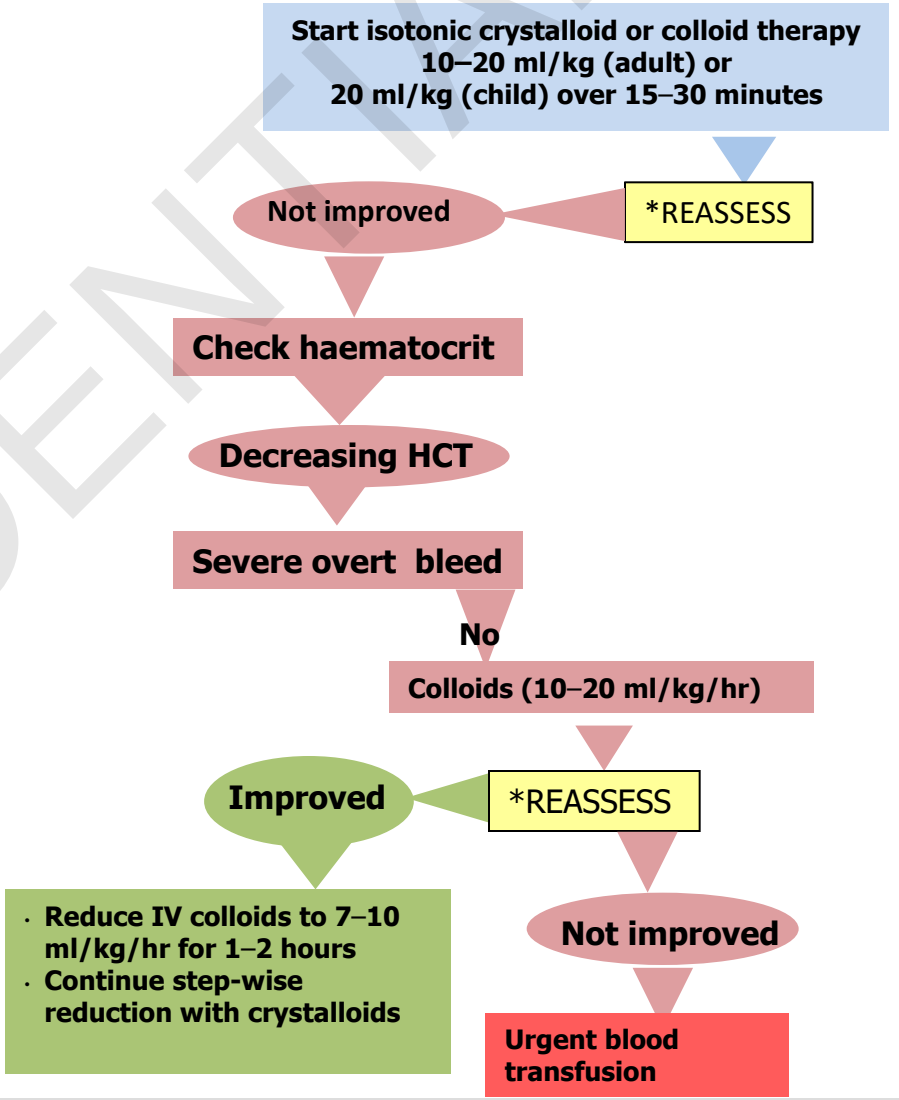
After first bolus, **if patient has not improved, HCT decreases or is lower than baseline,** look for severe bleeding (gastrointestinal haemorrhage, haematoma).

If **NO** bleeding seen, give colloids (10–20 ml/kg)

*REASSESS

If patient improves after colloids, reduce to 7–10 ml/kg/hr for 1–2 hours. Continue step-wise reduction of crystalloids.

If patient has not improved, HCT would have decreased. Transfuse blood urgently.



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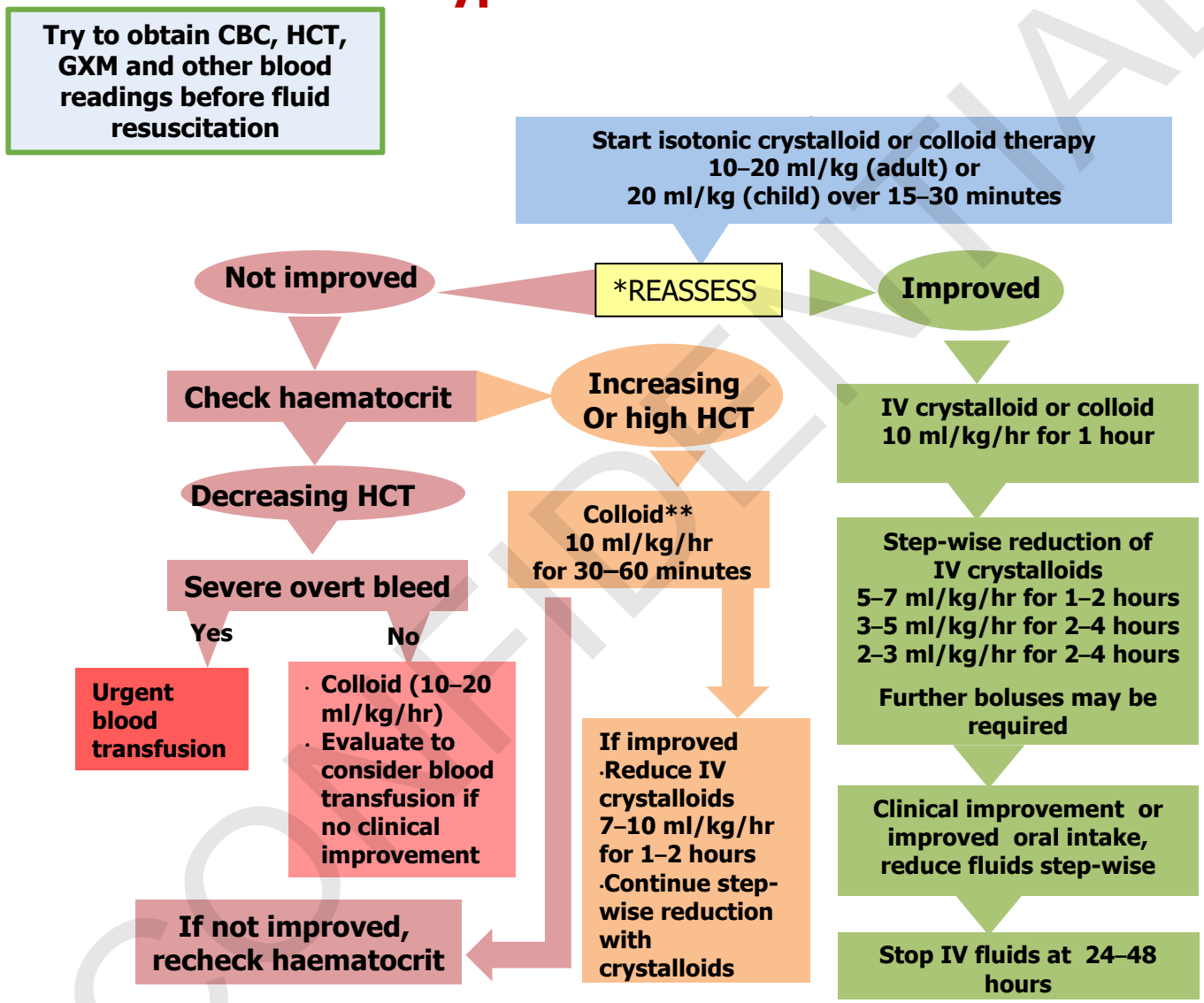
Group C: Emergency treatment – Summary

Hypotensive shock

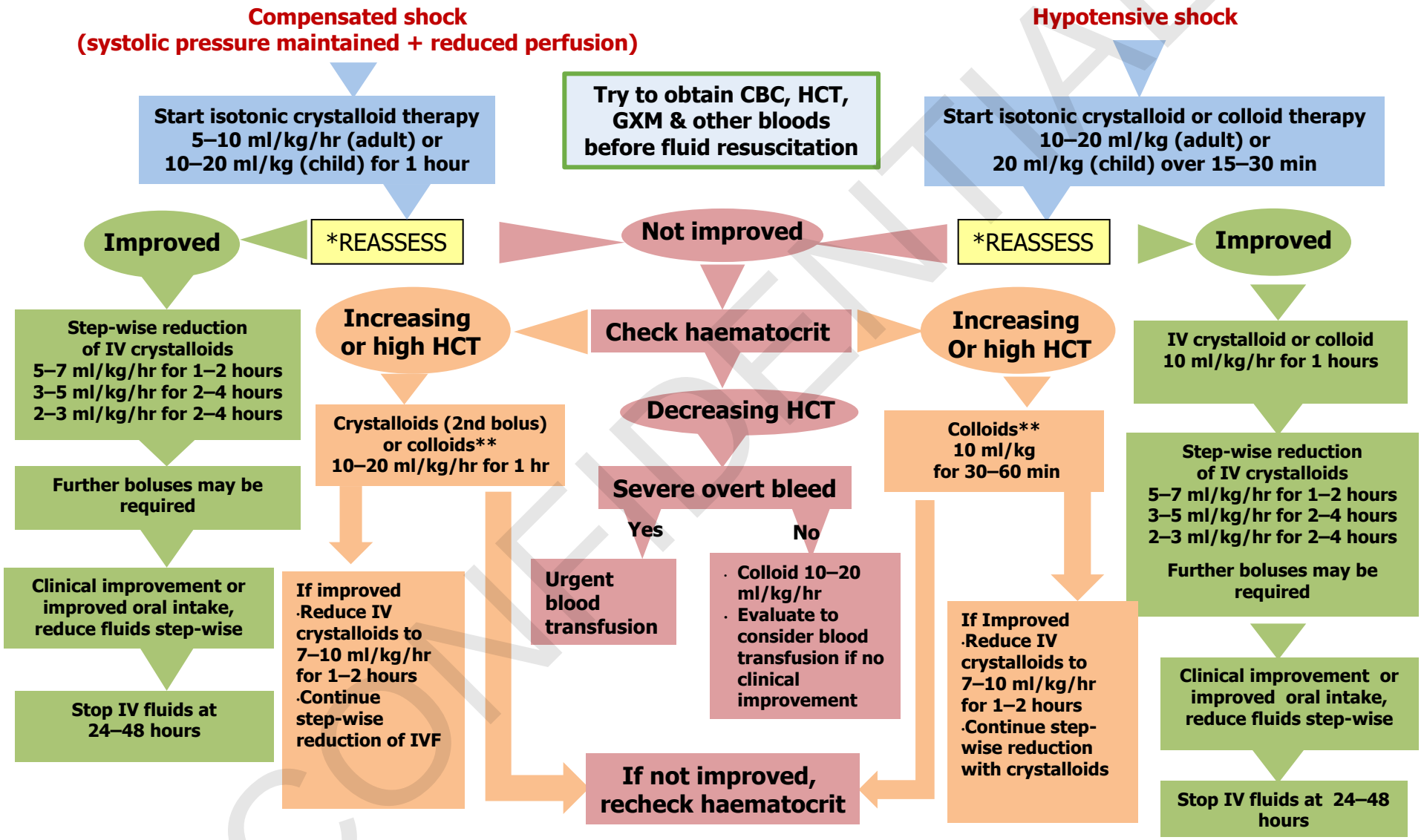


* Reassess the patient's clinical condition: vital signs, peripheral perfusion (CCTV-R) & urine output and decide on the situation.

** Colloid is preferable if the patient has already received several boluses of crystalloid

IV: intravenous, HCT: hematocrit, IVF: intravenous fluids

Group C: Emergency treatment – Summary

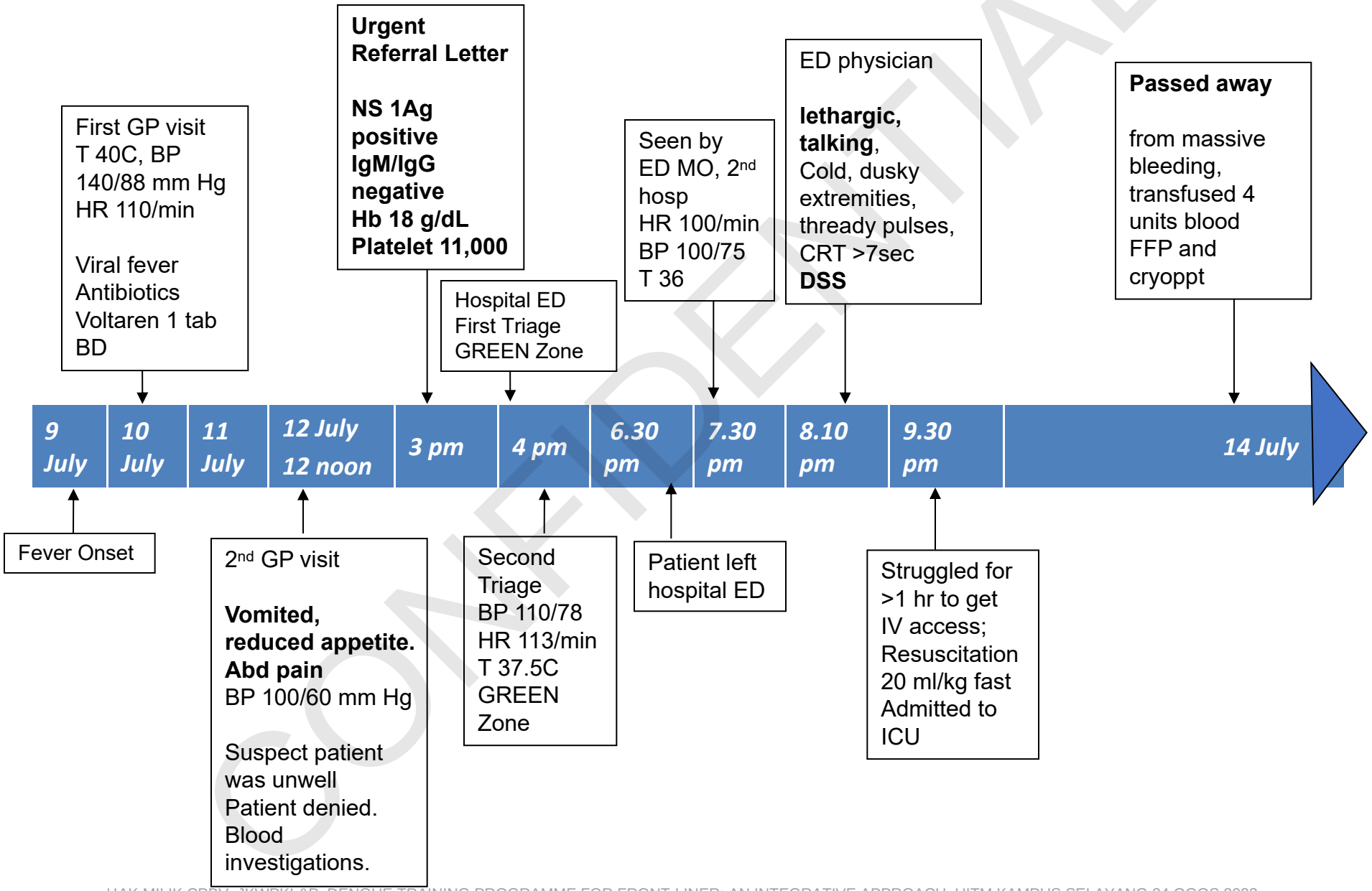


* Reassess the patient's clinical condition: vital signs, pulse volume, capillary refill time and temperature of extremities; decide on the situation.

** Colloids are preferable if the patient has already received several boluses of crystalloid.

Case discussion 1

Case Timeline



Case Timeline

First GP visit
T 40C, BP 140/88 mm Hg
HR 110/min

Viral fever
Antibiotics
Voltaren 1 tab BD

Urgent Referral Letter

NS 1Ag positive
IgM/IgG negative

Hb 18 g/dL
Platelet 11,000

Fever Onset

2nd GP visit (same),
still febrile,
Vomited,
reduced appetite.
Abd pain
BP 100/60 mm Hg

Suspected patient was unwell
Patient denied.

Blood investigations.

What should the GP do during the 2nd visit at 12 noon, 12 July?

- ✓ Call for Ambulance of nearest hospital
- ✓ Telephone ED physician to expect patient

Why do you think GP recognized patient was unwell While the ED Triage persons did not think so?

What else should GP do while waiting for ambulance to arrive?

Case Timeline

First GP visit
T 40C, BP 140/88 mm Hg
HR 110/min

Viral fever
Antibiotics
Voltaren 1 tab BD

Urgent Referral Letter

NS 1Ag positive
IgM/IgG negative

Hb 18 g/dL
Platelet 11,000

Fever Onset

2nd GP visit (same), 12 noon still febrile, **Vomited, reduced appetite. Abd pain**

BP 100/60 mm Hg

Suspected patient was unwell
Patient denied.

Blood investigations.

What should the GP do during the 2nd visit at 12 noon/3pm, 12 July?

- ✓ Call for Ambulance of nearest hospital
- ✓ Telephone ED physician to expect patient

- ✓ Set an IV line and start fluid resuscitation: 5-10 ml/kg/hour

What should you do if you cannot obtain IV access or you do not have IV therapy facilities?


Case discussion 2

Case study – 33-year-old, male

- No co-morbid conditions
- First GP visit:

  Fever x 3 days
- Abdominal pain started that morning, recurrent vomiting, unable to tolerate orally

- Alert but lethargic
- Temp 38.5^{o}C
- BP 110/70 mmHg
- HR 90/min

- Dehydration status: mild
- Lungs normal.
- Abd soft. Non tender. Hyperactive BS

- Provisional diagnosis:
- AGE with dehydration
- Dengue

- Management – IV Fluids
- FBC
- Referral letter
- **HCT 58, PLT ~120**

Case study – 33 year old, male, Day 4 of fever

- Brought in by brother next day – NO Referral letter
- Not responsive to call/stimulus
- Rapid shallow breathing
- CRT prolonged ~4 secs, cold peripheries, very poor pulse volume
- Radial pulse rate ~120 beats per minute manually
- CVS: S1+S2 no murmur
- Lungs: Clear
- Abdomen: soft non tender, no organomegaly
- No bleeding noted
- Pupils 4 mm bilaterally and reactive

Initial vital signs

- 1530H:
  - Temp: 36.5^{o}C
  - HR : 115 bpm
  - BP on monitor not recordable
- 1545H:
  - HR: 115 bpm
  - BP: 68/44 mmHg
  - Sat 100% (15 L/min non-re-breathable mask)
  - RR 40/min

Severe dengue in decompensated shock

Immediate Management (1530H – 1545H)

- Placed patient on 15 L/min oxygen via HFM
- 2 large bore IV access (difficulty getting 2nd IV access)
  - VBG
  - Reflo
  - **FBC/**INR/RP/LFT/CE
  - **GXM whole blood**
  - **Dengue NS1**
- **20 ml/kg bolus of NS 15-30 minutes (est weight: 80 kg)**
- Insert CBD with strict IO charting
- Continuous vital monitoring
- **Rpt FBC/VBG/lactate after the first bolus**

Bedside Investigation (1530- 1545H)

- Reflo: 8.8
- Bedside ultrasound:
  - Echo on subcostal 4 chamber view: hyperdynamic,
  - **small LV – walls kissing with contraction**
  - **IVC: fully collapsed (kissing)**
  - Lung: no pleural effusion
  - Abdomen: no free fluid

- ECG: sinus tachycardia
- VBG (pre-bolus):
  - **pH 7.02 pCO_2 32.9 pO_2 43.9 HCO_3 8.6 BE -20.4**
  - **Hb 18.7 Hct 58**

TIME	1545	1600	1615	1630	1645	1700	1715	1730
BP	68/44	86/46	95/69	83/42	93/47	113/57	109/52	91/50
HR	115	115	110	108	106	102	102	110
RR	40				25			
Sat	100				100			
Fluids:	**20 ml/kg bolus NS (total 1.5L)**			**20 ml/kg bolus - 2 NS + 1 gelafundin (1.5L)**				
Urine output (total)	-	-	-	-	-	-	-	100 ml

Reassessment (1630H -retrospective entry at 1645H)

- Patient progressively becoming more alert
  - E3 V2 M5 -→ E4 V4 M5
  - CRT ~ 2 secs, less cold peripheries but still very poor pulse volume
  - Lungs were clear
  - Abdomen was soft non tender
  - BP 93/47 HR 105
  - Urine output: NIL

Repeated ABG after the first bolus:

- pH 7.07 pCO_2 12 pO_2 247 HCO_3 7.6 BE -24.5
- **Hb 15.3 (decr from 18) Hct 46.8 (decr from 57.7)**
- **Lactate decreased from 20 to 17 mmol/L**

Impression:

- After 20 ml/kg x 1 bolus, **HCT decreased from 58 to 46,** but still poor perfusion; Clinically cap refill time still prolonged, cold peripheries, thready poor pulse volume

- Severe Dengue in decompensated shock with plasma leakage
- **PLUS OCCULT BLEEDING**

- Bedside Ultrasound:
  - Echo – LV wall still kissing with contraction
  - IVC – still fully collapsed – kissing walls

- Called lab – request for NS1 to be read urgently
- **Called blood bank** – GXM 4 pints blood – get 2 pints - available in 30 mins

- Referral to medical team (1610H)
- Referral anaesthesia team (1630H)

TIME	1753	1800	1815	1830
BP	**91/50**	105/66	110/71	**126/68**
HR	114	115	117	114
RR	20			20
Sat	100%			100
Fluids:	**Completed blood transfusion @ 1830H (504 ml + 411 ml)**			
Urine output (total)	400 ml			1100 ml

@1837H

- Reassessed patient – **just completed blood transfusion**
  - Alert
  - CRT =2 , less cool peripheries **Pulse volume improved but still thready**
  - Lungs clear
  - Abdomen Soft non tender

MEDICAL REVIEW:

To **consider Septicemic shock** and reduce IVF normal saline to 5 ml/kg, then 3 ml/Kg

Informed by staff nurse patient can be sent up to ICU → to send now

Impression @ ICU @19:30 pm

- Severe dengue D4 of illness with decompensated shock
- AKI with severe lactic acidosis
- **Suspected occult bleeding**

Examination in ICU @ 7.30 pm

- GCS Full
- HR 123 pulse volume low, peripheries coolish, CRT 3s
- **BP 86/61 (NIBP) unsupported**
- Lungs clear RR 20-24 on NPO2 3L/min
- Abdomen: soft non tender
- Bedside ECHO: IVC collapsing, LV under-filled with good contractility, no pleural effusion
- **MX:**
- Increase IVD normal saline 7cc/kg/hr for 2 hours—BP 103/82
- IVD NS 5cc/kg/hr
- Cont IV ceftriaxone 2g OD

Patient improved after blood transfusion (ended at 6:30 pm) and that after reducing IV fluids, hemodynamics became unstable which means this is on-going plasma leakage ± severe bleeding

Blood gases in ICU

malena Post intubation

	2025	2325	0210	0407	0430	0513
pH	7.37	7.39	7.36	7.08	7.15	7.13
pCO_2	21	16	20	36	38	47
pO_2	101	77	265	184	176	98
HCO_3	16.1	14.7	15.0	10.8	13.1	14.4
BE	-12.3	-14.5	-13.2	-17.5	-14.2	-12.2
Lact	3.6	4.3	4.9	9.7	9.1	9.3
Glu	6.7	9.1				
Hb	16.7	14.5	11.9	7.1	6.5	7.0
Hct	**51**	**44**	**36**	**22**	**20**	**21**

Dengue mortality – Lessons learnt

- Wide spectrum of clinical manifestation – Dengue shock a dynamic phenomenon
- Dengue Shock: Minute-to-minute evaluation and decision-making to achieve and then maintain hemodynamic equilibrium
- **Handover from one team to another, across departments: Gaps in continuity of care** - Change of work shift, on-call team
- Instructions have to be clear – that bleeding is suspected, how much blood left in blood bank, etc; when is next review, etc

Step-wise Clinical Evaluation

1. Other illnesses such as Diabetes mellitus, Hypertension, etc?
2. Phase of dengue (viremic / plasma leakage / reabsorption)?
3. How much was he able to drink, what fluid? Urine volume, colour?
4. Warning signs resolved?
5. Haemodynamic response to IV fluid therapy? Urine output in the last few hours?
6. Still stable after step-wise reduction in IVF? – Urine output?
7. Cumulative fluid balance: Size of pleural effusion/ascites? Effect on breathing?
8. Liver size?
9. Check Electrolytes – sodium and potassium
10. When is next review – clinical review or review of hematocrit?

Thank you

End of Training Discussion

Now that you have completed today's training, in your groups of 5-10 people, please list down the following:

- What are the measures that you think you would be able to practice in your workplace to improve management of dengue patients at the frontline?
- We will now go round the room and get each group to present 1 suggestion at a time

List of actionable things that you would like to do:

- From this list, rank the top 3 items

For the top 3 items

- Let’s discuss the barriers of carrying this out. Are there any?
- How do we overcome these barriers?

Case Studies

- first slide – introduction – demographic, and past history and history of present illness

- slide 2 – physical findings, investigation results

- Slide 3 – 5 – Discuss management – Home or Referral or Emergency

- Last one or two slides – summary and learning points.