Case Study

16 year old / male

- Referred from klinik kesihatan
- Fever x 5 days, diarrhoea and epigastric pain x 2 days
- Weight: 90 kg, Height: 169 cm, BMI: 31.5
- BP 100/58 in KK, HCT: 47, PLT: 61
  - given 2 pints NS bolus / 1 hour, then sent to ED
- Repeat BP in ED: 110/70 mmHg
- HR 78, good pulse volume, CRT 3 secs
- Coolish peripheries

Pitfalls…

Obese patients (BMI ≥27.5 kg/m²)*

Maintenance fluid can be calculated based on adjusted body weight

- **Adjusted bodyweight (ABW) can be calculated using the formula.**
  - ABW = IBW + 0.4 (actual weight - IBW)**
  - **Ideal bodyweight (IBW) can be estimated based on the following formula.** [72, level III]
    - Female: 45.5 kg + 0.91(height in cm -152)
    - Male: 50.0 kg + 0.91(height in cm -152)

Adapted :

* Malaysian Society for the Study of Obesity. Clinical Practice Guidelines: Management of Obesity. Ministry of Health, Malaysia;2004

** GlobalRPH 2015, calculator adjusted body weight (available at http://www.globalrph.com/ibw_calc.htm)

- Lungs: Clear
- CVS: DRNM
- P/A: Soft, tender at epigastrium, no ascites
- Bloods in ED:
  - Hb 15.2, Hct 48, Plt 55, WCC 4.9,
  - Lactate 2.6

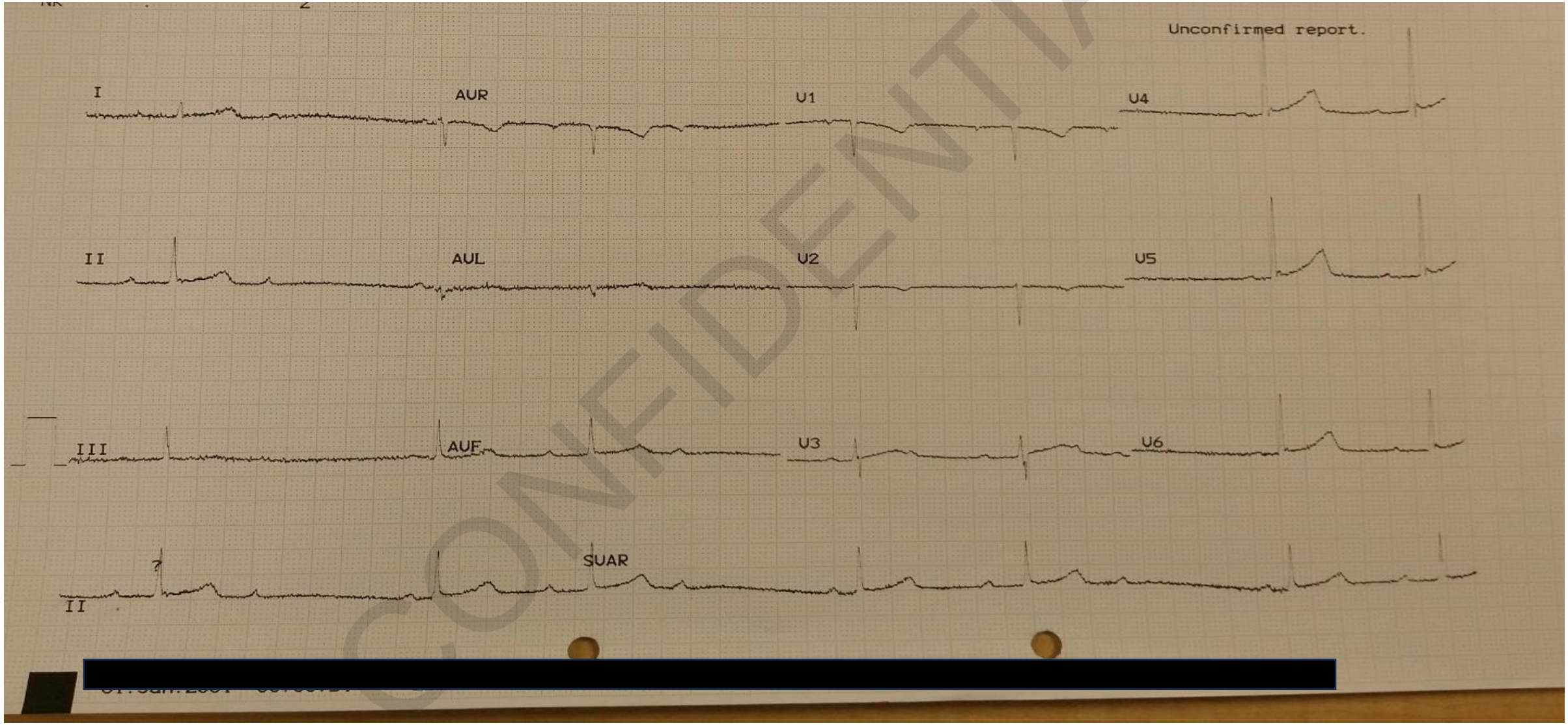
- Given 20ml/kg/hr NS → BP: 112/60 mmHg
- HR: 64, good PV
- CRT: 2s but coolish peripheries

- Repeated FBC post bolus:
  - Hb 12.5, WCC 4.3, Plt 19, Hct 44, Lactate 1.3
- IVD cut down to 10 ml/kg/hr x 1h, then 7 ml/kg/hr x 3h, then 5 ml/kg/hr
- Good urine output

- Despite all the fluids given, BP still remained labile (SBP 90-100 mmHg / DBP 60-70 mmHg)
- Latest BP 90/60 mmHg
- HR 48 bpm
- CVS/lungs: NAD

Any thought ?

ECG



- AST 62
- LDH 598
- CK 98
- Trop T 0.5 ng/mL

- *Impression:* ***Severe dengue, D5 illness, critical phase, compensated shock, possible myocarditis in special population (obesity)***

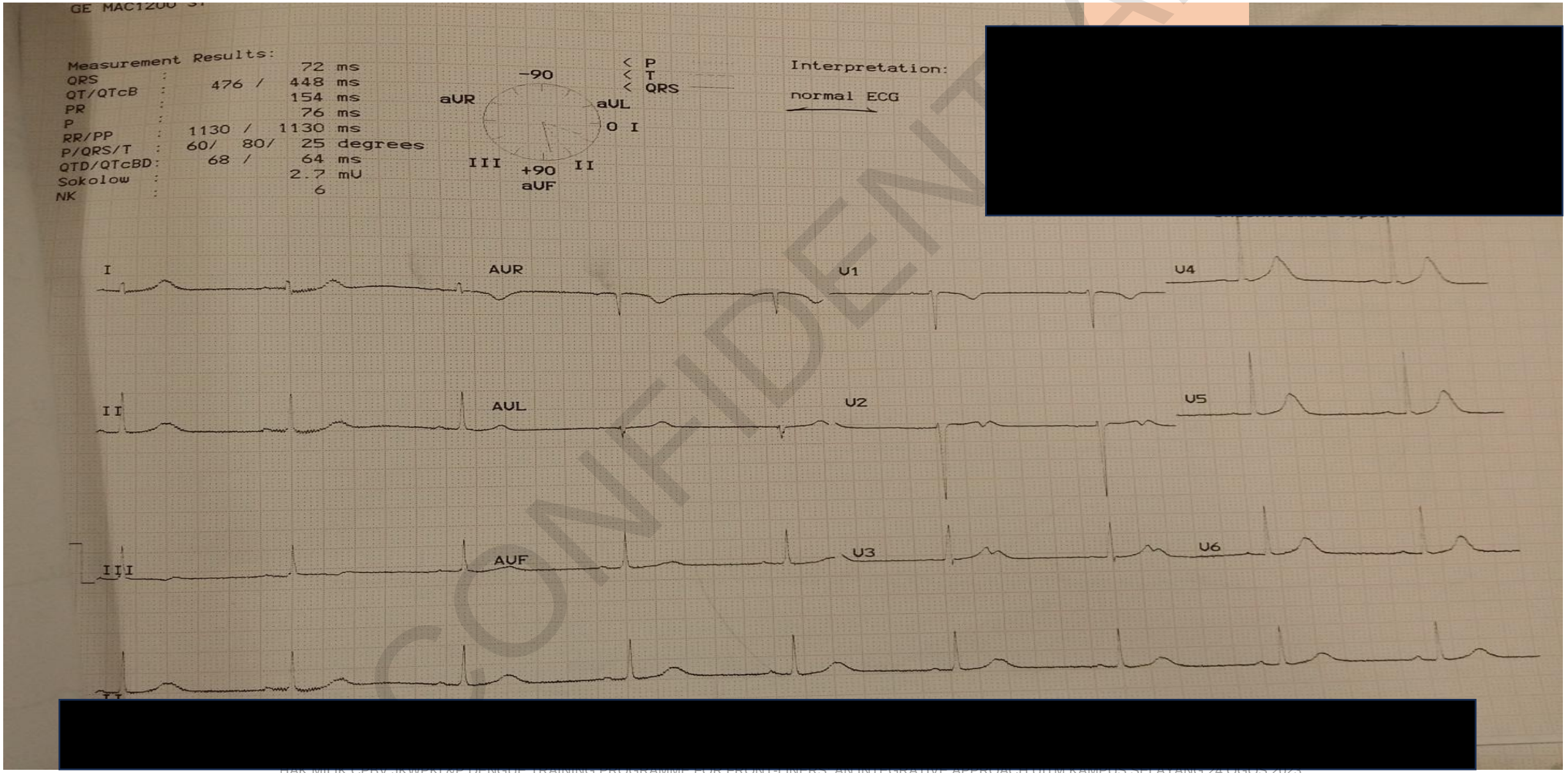
Progress in ICU…

ECHO:

- IVC 1.8 cm fixed
- EF: 40%
- No pericardial effusion
- Ultrasound – no free fluid in the abdomen

- HR became more bradycardic at 38 – 40 bpm, but no further hypotension
- Started on IVI dobutamine low dose, HR picked up to 70-80 bpm
- Maintenance IVD NS 1cc/kg/H

ECG before discharge



Cardiac complications in dengue

i. **Investigations :**

- *Cardiac biomarkers*
  - Cardiac biomarkers (CK/CKMB or Troponin) have limited sensitivity and could be normal.[120,level III]

- *ECG*
  - ECG alterations reported in dengue infection are often transient. ECG changes might be the only sign of cardiac involvement with normal biomarker levels and echocardiograms.[121,level II-2] Common ECG changes reported are :
    - Sinus bradycardia
    - Atrioventricular block
    - Atrial fibrillation
    - T-wave and ST-segment abnormalities

Management of dengue infection should be focused on **cautious fluid resuscitation**, to give just sufficient IV fluid therapy to maintain adequate tissue perfusion

Case Study

25/2/19 @ ED

41/female

- UL DM/HPT and ESRD on HD via left BCF at private HD centre
- Referred from HD centre for bleeding from fistula after 3 hours of HD
- Upon further history, had fever x 2/7
- Associated with vomiting x 2/7, twice yesterday and 3x today
- Myalgia +
- Also has non-productive cough x 2/7, no SOB
- Neighbour had dengue about 2 weeks ago

PMH: Rt big toe amputation 2 months ago

- Also claims blood oozing from old wound today

O/E

- Alert
- Warm peripheries, CRT <2s, good PV
- T: afebrile
- BP: 200/120, HR 64, RR 20bpm
- Spo2 97% on RA
- Lungs: fine bibasal crepts
- PA soft, non tender

Impression:

- Bleeding BCF TRO coagulopathy
- URTI TRO CAP

Plan (d/w MO)

- FBC stat/ coagulation/ DXT/ CXR /ECG
- Nurse in Yellow zone
- Trace FBC urgent
- Refer surgical after rv bloods

DF with warning signs should be one of the differential diagnosis!!

Given Amlodipine 5mg stat at ED in view of the high BP

Later noted HCT 28.1 Plt 18, WCC 3, Hb 9.1

Dengue RCT stat: **Ns1/ IgM +ve**

VBG: lactate 3.1, HCO3 23,

DXT 10

Bedside scan done: IVC 1.8cm, hyperdynamic and well filled ventricle

Was referred to medical and ICU team urgently

Plan:

In view that IVC is well distended, not for fluids and encourage orally

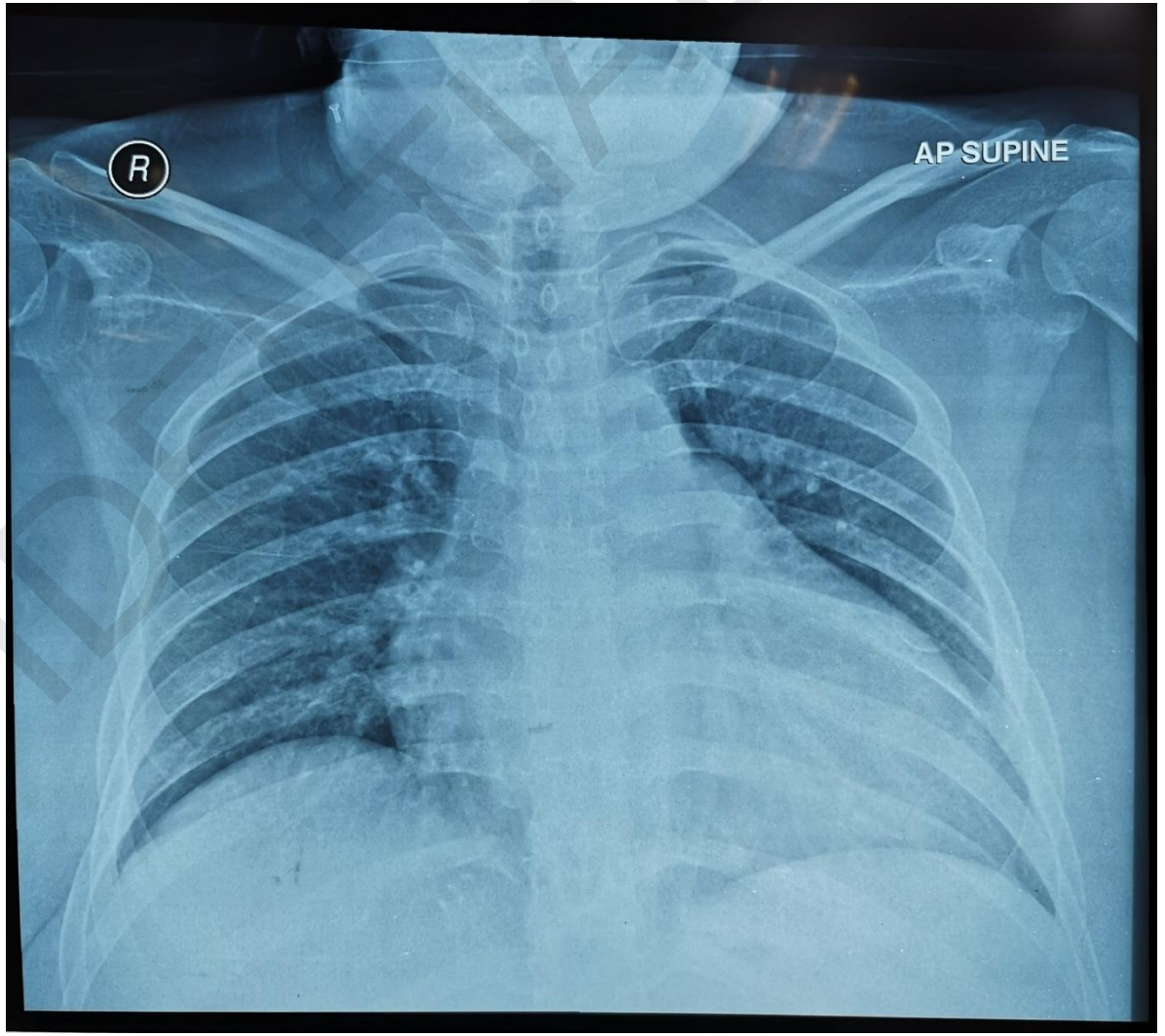
IV Pantoprazole 40mg OD

Transfer to ICU

KIV blood transfusion in ICU

Medication:

Metoprolol 100mg BD
Felodipine 10mg BD
Prazosin 6mg TDS
Calcium Carbonate 1g TDS
Ferrous Fumarate 200mg OD
Vitamin B Co 1/1 OD
Folate 5 mg OD
Vitamin C 100 mg OD
S/C Actrapid 6 u TDS
S/C Insulatard 14 u ON



In summary:

HD was deferred till 48 H later (27/2/19) when platelet counts were uptrend to >70K

- Primed with albumin
- UF 1L

Total blood products received in a period of 2 days :

- 12 u platelets
- 16 u cryo
- 5 pints PC
- 6 bottles PCC

Regular ECHO and IVC scans were done to guide blood transfusion

No IV fluids given throughout ICU stay

Was transferred out from ICU on day 4 admission

Anti-hypertensive agents: *when and what to start ?*

- May be indicated if SBP>180 in patients with low platelet → risk of ICB if BP not controlled
- Careful evaluation while giving anti-hypertensive drugs during critical phase
  - The BP lowering effects may worsen the hypovolemic state due to plasma leakage or bleeding during critical phase ***(WHO Handbook for clinical management of dengue, 2012)***
  - IVC and cardiac scans are often use as an adjunct to clinical examination and blood parameters to determine volume status in these situations
- Avoid beta blocker as it masks the tachycardia response
  - This patient did not mount a tachycardia as she was on a beta blocker at home
  - If on beta blockers, HR cannot be used as assessment for perfusion
- CCB e.g. Amlodipine may be used

Table 7. Challenges when managing dengue patients with pre-existing hypertension

Interpretation of BP	Hypotension is a late sign of shock. However, in patients with uncontrolled hypertension a BP reading that is considered normal for age may, in reality, be low for patients with uncontrolled hypertension. Similarly, what is considered as "mild" hypotension may in fact be profound. Patients with chronic hypertension should be considered to be hypotensive when the mean arterial pressure (MAP) declines by 40 mmHg from the baseline, even if it still exceeds 60 mmHg. (For example, if the baseline MAP is 110 mmHg, a MAP reading of 65 mmHg should be considered as significant hypotension.) Look for other manifestations of shock (see Section 2.2.3.1).
The heart rate response:	It is essential to know the specific antihypertensive agent a patient is taking for the following reasons
Bradycardia: Tachycardia:	ß-blockers, a common antihypertensive medication, cause bradycardia and may block the tachycardic response in shock. The heart rate should not be used as an assessment of perfusion in patients on ß-blockers. Antihypertensive agents such as calcium channel blockers may cause tachycardia. Tachycardia in these patients may not indicate hypovolemia. Knowing the baseline heart rate before the dengue illness is helpful in the haemodynamic assessment.
The impact on hypotension:	The continuation of antihypertensive agents during the acute dengue illness should be evaluated carefully during the plasma leaking phase. The BP lowering effects of these agents and diuretic therapy may exacerbate the hypotension and hypoperfusion of intravascular volume depletion.
End-organ damage from chronic hypertension:	Heart failure and renal failure are common complications of chronic uncontrolled hypertension. Clinicians should be aware if there is pre-existing or new onset of end-organ damage. Interpretation of urine output as a marker of renal perfusion has to be revoked in these situations.