

ER-Inf Case Discussion

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Jul. 20th, 2013

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Case

- 61 y/o Male
- ER visit: day1 23:39
- Chief complaint:
 - Hiccups and general weakness for 2 days
- Vital signs:
 - T 36.9 / P 47 / R 18 BP 164 / 84 mmHg
 - E4 V5 M6
- Triage: I

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Case

- Present illness
 - Hiccups, general weakness and soreness for 2 days
 - Fever (up to 39 degree) once 2 days ago
 - Drowsy appearance, fatigue
 - Abdominal pain (-)
- Past history
 - Hepatitis B with cirrhosis, regular Viread use
 - CKD (-) ; DM (-) ; HTN (-)
 - Travel history (?)

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Case

- Physical examination
 - Clear consciousness
 - Chest: clear breath sounds
 - Abdomen: soft without tenderness or guarding
 - Limbs: warm

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Case

- Tentative diagnosis
 - Hiccups : r/o GERD
 - Weakness: r/o electrolytes imbalance
 - Bradycardia: r/o encephalopathy

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day1 23:43

- [EKG](#)
- On monitor
- F/S (94)
- [Lab study](#):
 - WBC/DC, Hb, Plt
 - AST, Crea, CK/CK-MB/TnI, Ammonia
 - Vein gas
- [CXR](#)
- KUB
- Primperan 1 Amp iv st

day2 01:50

- Consult [Neuro](#)
- Brain CT

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- day2
- 02:48
 - Check [CRP](#), Anti-HBc IgM
 - Abdominal [echo](#) [progress note](#)
 - Consult Hematologist
 - 05:46
 - B/C
 - [U/A](#), U/C
 - Cravit 500mg iv qd
 - 14:17
 - Hematologist visit
 - Infection related leukopenia
 - Influenza A/B (negative)
 - Consult infection man

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- day2
- Infection man visit
 - Travel history: [Vietnam](#) (8-16天前)
- 19:40
- 通報 Dengue fever
 - Admission, isolation

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Hospitalization Course

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- day2
- Admission, isolation
- day3
- WBC (1000) , Plt (31 k) [G-CSF](#)
- day4
- WBC (7600) , Plt (22 k)
- day5
- **Skin rash** over bilateral legs
 - WBC (5100) , Plt (17 K) [Apheresis platelet 12u](#)
 - **Virus of dengue fever (+)**
- day6
- Skin rash over bilateral legs and abdomen
 - WBC (5000) , Plt (49 k)
- day7
- Improved skin rash
 - WBC (3400) , Plt (44 k) [Discharge](#)

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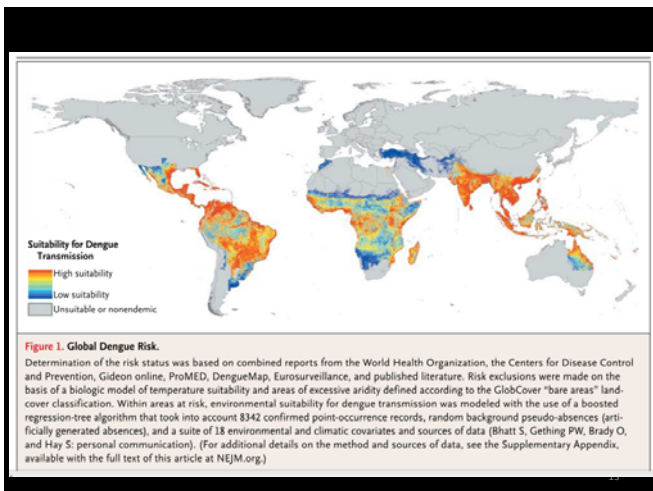
OPD follow-up

- day9
 - Easy appearance
 - WBC 3500, Plt 84k

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Discussion

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Clinical Manifestation

- Incubation period
- Febrile phase
- Critical phase
- Recovery phase

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Clinical Manifestation

- Incubation period : 3-7 days
- Febrile phase
- Critical phase
- Recovery phase

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Clinical Manifestation

- Febrile phase** 3-7 days
- **High fever** (> 38.5 degree)
 - Headache, vomiting, myalgia, joint pain
 - Transient macular rash
 - Mild hemorrhagic manifestations :
 - Petechiae, bruising (venipuncture sites)
 - Lab: Plt ↓, WBC ↓, AST/ALT ↑
 - **Spontaneous recovery** in most cases

Circulation. 2002;105:2115-2126

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Clinical Manifestation

- Critical phase** 2-3 days
- **Vascular leakage**
 - Vomiting, abdominal pain, tender hepatomegaly, serosal effusions, mucosal bleeding, lethargy
 - Lab: Hematocrit ↑, Plt ↓ (rapid decrease and severe)
 - **Pulse pressure decrease** (< 20 mmHg)

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Circulation. 2002;105:2115-2126

Clinical Manifestation

- Recovery phase**
- **Rapid improvement**
 - Skin rash: 2-3 weeks
 - Mild maculopapular rash to a severe, itchy lesion suggesting leukocytoclastic vasculitis
 - Extremely fatigue for weeks

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Circulation. 2002;105:2115-2126

The Early Clinical Features of Dengue in Adults: Challenges for Early Clinical Diagnosis

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- Prospective study in adults
- Acute febrile illness within 72 hrs
- Symptoms ; age groups ; dengue fever
- April 2005 to August 2010

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WHO 1997	Used in this study	WHO 2009	Used in this study
Defined in [10]	Used in this study	Defined in [11]	Used in this study
Fever and 2 or more of the following:	Fever and 2 or more of the following:	Fever and 2 or more of the following:	Fever and 2 or more of the following:
Headache	Headache	Anorexia	Loss of appetite
Retro-orbital pain	Retro-orbital pain	Nausea	Nausea
Myalgia	Myalgia	Rash	Rash
Arthralgia	Arthralgia	Aches and pains	Myalgia
Rash	Rash	Leukopenia	Leukopenia
Bleeding	Bleeding	Leukopenia	Leukopenia
Leukopenia	Leukopenia	Positive tourniquet test	Positive tourniquet test
		Warning signs:	Warning signs:
		Abdominal pain or tenderness	Abdominal pain
		Mucosal bleed	Mucosal bleed
		Lethargy or restlessness	Drowsiness
		Persistent vomiting	Other warning signs were not used as they require repeated monitoring or are late clinical signs. See text for explanation.
		Clinical fluid accumulation	
		Liver enlargement >2 cm	
		Laboratory: increase in hematocrit concurrent with a rapid decrease in platelet count	

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Early clinical features (1-3 days)

Table 3. The early clinical features and outcomes of dengue, OFI and influenza.

	Dengue N = 250	OFI N = 1879	RR (95% C.I.)	P value	Influenza N = 228	RR (95% C.I.)	P value
Drowsiness (%)	148 (59.2)	971 (51.7)	1.1 (1.0–1.3)	0.03	126 (55.3)	1.1 (0.9–1.3)	NS
Headache (%)	200 (80.0)	1290 (68.7)	1.2 (1.1–1.3)	0.0003	176 (77.2)	1.0 (0.9–1.1)	NS
Myalgia (%)	173 (69.2)	1197 (63.7)	1.1 (1.0–1.2)	NS	149 (65.4)	1.1 (0.9–1.2)	NS
Arthralgia (%)	152 (60.8)	800 (42.6)	1.4 (1.3–1.6)	<0.0001	82 (36.0)	1.7 (1.4–2.0)	<0.0001
Loss of appetite (%)	203 (81.2)	1126 (59.9)	1.4 (1.3–1.5)	<0.0001	146 (64.0)	1.3 (1.1–1.4)	<0.0001
Abdominal pain (%)	29 (11.6)	276 (14.7)	0.8 (0.5–1.1)	NS	34 (14.9)	0.8 (0.5–1.2)	NS
Diarrhea (%)	37 (14.8)	175 (9.3)	1.6 (1.1–2.2)	0.0091	12 (5.3)	2.8 (1.5–5.3)	0.0008
Nausea (%)	125 (50.0)	543 (28.9)	1.7 (1.5–2.0)	<0.0001	75 (32.9)	1.5 (1.2–1.9)	0.0002
Vomiting (%)	41 (16.4)	158 (8.4)	2.0 (1.4–2.7)	<0.0001	17 (7.5)	2.2 (1.3–3.8)	0.0031
Altered taste (%)	203 (81.2)	1070 (56.9)	1.4 (1.3–1.5)	<0.0001	143 (62.7)	1.3 (1.2–1.5)	<0.0001
Retro-orbital pain (%)	65 (26.0)	298 (15.9)	1.6 (1.3–2.1)	<0.0001	50 (21.9)	1.2 (0.9–1.6)	NS
Rashes (%)	24 (9.6)	67 (3.6)	2.7 (1.7–4.2)	<0.0001	0	Infinity	<0.0001
Bleeding (%)	13 (5.2)	33 (1.76)	3.0 (1.6–5.6)	0.0010	6 (2.6)	2.0 (0.8–5.1)	NS
Aural temp °C ^a	38.3 (37.7–39.0)	38.0 (37.3–38.5)	-	<0.000*	38.4 (38.0–38.9)	-	NS*
Total days of illness ^a	10 (7–14)	5 (3–7)	-	<0.0001*	6 (4–7)	-	<0.0001*
Hospitalized (%)	116 (46.4)	26 (1.4)	33.5 (22.4–50.2)	<0.0001	2 (0.9)	52.9 (13.2–211.6)	<0.0001

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Early clinical features (1-3 days)

Table 4. The early laboratory parameters of dengue, OFI and influenza infection.

	Dengue N = 250	OFI N = 1879	RR (95% C.I.)	P value	Influenza N = 228	RR (95% C.I.)	P value
Hb g/dL ^a	14.9 (13.3–16.1)	14.6 (13.1–15.9)	-	NS*	14.9 (13.3–16.3)	-	NS*
HCT% ^a	44.0 (39.5–47.5)	44.0 (39.9–47.5)	-	NS*	45.1 (41.1–49.0)	-	0.0160*
Platelet count × 10 ³ /μL ^a	163.5 (119.0–212.0)	239.0 (191.0–291.0)	-	<0.0001*	219.0 (163.0–261.0)	-	<0.0001*
WBC × 10 ³ /μL ^a	3.8 (2.7–5.1)	7.3 (5.6–9.8)	-	<0.0001*	6.6 (4.8–8.2)	-	<0.0001*
Lymphocyte count × 10 ³ /μL ^a	0.5 (0.4–0.8)	1.2 (0.8–1.7)	-	<0.0001*	1.0 (0.7–1.3)	-	<0.0001*
Neutrophil count × 10 ³ /μL ^a	3.0 (2.0–4.3)	5.5 (3.9–7.8)	-	<0.0001*	5.2 (3.5–6.7)	-	<0.0001*

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Early clinical features (1-3 days)

Table 5. Laboratory parameters in dengue patients who received hospitalized or ambulatory care only.

	Hospitalized (n = 116)	Ambulatory (n = 134)	P value	RR
Age (years)	42 (30–52)	36 (27–47)	0.0276*	-
Cp ^a values	18.27 (15.25–21.78)	21.77 (18.53–26.81)	<0.0001*	-
Platelet count × 10 ³ /μL	131.5 (104.3–176.0)	188.5 (143.8–225.5)	<0.0001*	-
WBC × 10 ³ /μL	3.1 (2.4–4.4)	4.1 (3.1–6.0)	<0.0001*	-
Lymphocyte count × 10 ³ /μL	0.5 (0.3–0.6)	0.6 (0.4–0.9)	<0.0001*	-
Neutrophil count × 10 ³ /μL	2.7 (1.7–3.7)	3.4 (2.5–4.9)	0.0012*	-
IgG seropositivity ^b (%)	68 (58.6)	53 (39.6)	0.0035	1.5 (1.1–1.9)

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Early clinical features (1-3 days)

	18–25 (n = 49)	26–35 (n = 60)	36–45 (n = 60)	46–55 (n = 43)	56+ (n = 38)	P value
Drowsiness (%)	33 (67.3)	38 (63.3)	31 (51.7)	27 (62.8)	19 (50.0)	NS
Headache (%)	41 (83.7)	50 (83.3)	51 (85.0)	34 (79.1)	24 (63.2)	NS
Myalgia (%)	35 (71.4)	43 (71.7)	50 (83.3)	25 (58.1)	20 (52.6)	0.0128
Arthralgia (%)	32 (65.3)	44 (73.3)	39 (65.0)	20 (46.5)	17 (44.7)	0.0002
Loss of appetite (%)	42 (85.7)	48 (80.0)	50 (83.3)	37 (86.0)	26 (68.4)	NS
Abdominal pain (%)	7 (14.2)	7 (11.7)	8 (13.3)	5 (11.6)	2 (5.2)	NS
Diarrhea (%)	9 (18.4)	5 (8.3)	13 (21.7)	5 (11.6)	5 (13.2)	NS
Nausea (%)	24 (48.9)	30 (50.0)	33 (55.0)	22 (51.1)	16 (42.1)	NS
Vomiting (%)	5 (10.2)	11 (18.3)	9 (15.0)	9 (20.9)	7 (18.4)	NS
Altered taste (%)	42 (85.7)	48 (80.0)	51 (85.0)	34 (79.1)	28 (73.6)	NS
Rashes (%)	7 (14.3)	7 (11.7)	2 (3.3)	6 (13.9)	2 (5.3)	NS
Retro-orbital pain (%)	22 (44.9)	23 (38.3)	10 (16.7)	6 (13.9)	4 (10.5)	<0.0001
Bleeding (%)	4 (8.2)	2 (3.3)	1 (1.7)	1 (2.3)	0	0.0292
All co-morbidities (%)	1 (2.0)	6 (10.0)	4 (6.7)	9 (20.9)	21 (55.3)	<0.0001
Hypertension (%)	0	1* (1.7)	1 (1.7)	6* (14.0)	12* (31.6)	<0.0001
Positive IgG (%)	18 (36.7)	16 (26.7)	31 (51.7)	31 (72.1)	27 (71.1)	<0.0001
Hospitalized (%)	22 (44.9)	20 (33.3)	28 (46.7)	23 (53.5)	23 (60.5)	NS
Median days hospitalized (25th–75th percentiles)	5 (5–6)	6 (4–7)	5 (4–6)	5 (4–6)	5 (5–6)	NS*
Severe dengue (%)	3 (6.1)	5 (8.3)	4 (6.7)	4 (9.3)	4 (10.5)	NS
Severe plasma leakage	1	3	3	2	2	NS
Major bleeding	1	1	0	1	2	NS
Organ impairment	1	1	1	1	0	NS

Early clinical features (1-3 days)

Table 8. Age-specific features of probable dengue diagnosis using the WHO 1997 or 2009 classification schemes.

WHO 1997	18-25 (dengue n=49; OFI n=553)	26-35 (dengue n=60; OFI n=499)	36-45 (dengue n=60; OFI n=327)	46-55 (dengue n=43; OFI n=287)	56+ (dengue n=38; OFI n=212)
Sensitivity %	95.9 (86.0-99.5)	98.3 (91.1-99.9)	95.0 (86.1-99.0)	95.4 (84.2-99.4)	73.7 (56.9-86.6)
Specificity %	32.0 (28.1-36.1)	29.1 (25.1-33.3)	26.3 (21.6-31.4)	35.2 (29.7-41.0)	44.8 (38.0-51.8)
PPV %	11.1 (8.3-14.5)	14.3 (11.1-18.0)	19.1 (14.8-24.1)	18.1 (13.3-23.7)	19.3 (13.2-26.7)
NPV %	98.9 (96.0-99.9)	99.3 (96.3-99.9)	96.6 (90.5-99.3)	98.0 (93.2-99.8)	90.5 (83.2-95.3)
WHO 2009					
Sensitivity %	95.9 (86.0-99.5)	96.7 (88.5-99.6)	96.7 (88.5-99.6)	100 (91.6-100)	81.6 (65.7-92.3)
Specificity %	23.0 (19.5-26.7)	19.9 (16.5-23.7)	19.0 (14.9-23.6)	22.7 (17.9-27.8)	34.9 (28.5-41.7)
PPV %	9.9 (7.4-13.0)	12.7 (9.8-16.1)	18.0 (13.9-22.6)	16.2 (12.0-21.2)	18.3 (12.8-25.0)
NPV %	98.5 (94.5-99.8)	98.0 (93.0-99.8)	96.7 (89.2-99.6)	100 (94.5-100)	91.4 (83.0-96.5)

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Early clinical features (1-3 days)

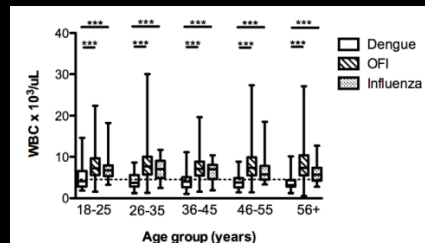


Figure 1. Age-group specific WBC in patients with dengue, OFI and influenza in the first 72 hours of illness. Box and whiskers (maximum and minimum) indicate the mean and spread of WBC in the different groups of patients. Dotted line indicates threshold for leukopenia (WBC<4,500 cells/ μ L). ***indicates $p<0.0001$ as determined using the Mann Whitney U test.
doi:10.1371/journal.pntd.0001191.g001

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Early clinical features (1-3 days)

Table 9. Age-specific features of using fever and leukopenia for probable dengue diagnosis.

	18-25 (dengue n=49; OFI n=553)	26-35 (dengue n=60; OFI n=499)	36-45 (dengue n=60; OFI n=327)	46-55 (dengue n=43; OFI n=287)	56+ (dengue n=38; OFI n=212)
Receiver operating characteristic AUC ^a	0.78 (0.71-0.86)	0.87 (0.83-0.91)	0.85 (0.79-0.90)	0.87 (0.81-0.92)	0.91 (0.86-0.96)
Sensitivity %	53.1 (38.3-67.5)	71.7 (58.6-82.6)	63.3 (49.9-75.4)	65.1 (49.1-79.0)	81.6 (65.7-92.3)
Specificity %	89.3 (86.5-91.8)	87.6 (84.3-90.3)	85.1 (80.7-88.7)	88.8 (84.6-92.3)	86.7 (81.6-91.3)
PPV %	30.6 (21.1-41.5)	41.0 (31.5-51.0)	43.7 (33.1-54.7)	46.7 (33.7-60.0)	52.5 (39.1-65.7)
NPV %	95.6 (93.4-97.2)	96.3 (94.1-97.8)	92.7 (89.1-95.4)	94.4 (91.0-96.9)	96.4 (92.6-98.5)

Leukopenia is defined as WBC<4,500 cells/ μ L.
AUC indicates area under the curve.
PPV and NPV denote positive and negative predictive values, respectively.
Values in parentheses are the 95% confidence intervals.
doi:10.1371/journal.pntd.0001191.t009

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Original article

Comparison of clinical and laboratory characteristics between children and adults with dengue

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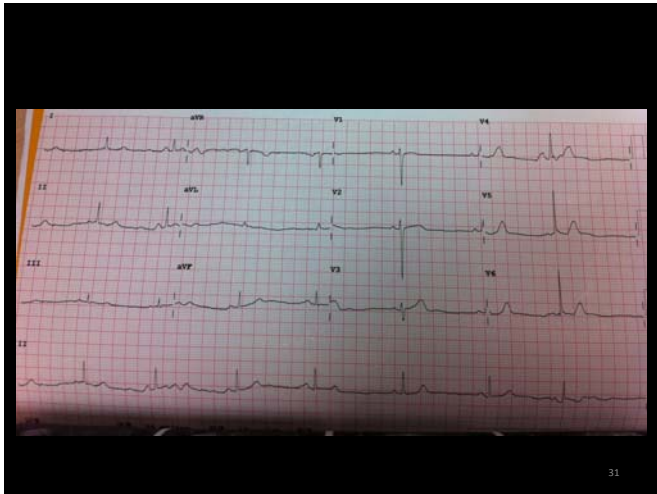
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Table 1 – Univariate and multivariate comparative analysis of initial symptoms/signs, laboratory data and dengue severity in adults and children with dengue.

Characteristics	Adults n=4817	Children n=869	Univariate			Multivariate		
			OR	CI 95%	p	OR	CI 95%	p
Demographic data								
Male [n (%)]	1977 (41.0)	440 (50.6)						
Age (years) (mean $\pm$ SD)	37.2 $\pm$ 15.4	9.2 $\pm$ 3.6						
Initial symptoms/signs [n (%)]								
Fever	4494 (93.3)	815 (93.8)	0.92	0.69-1.24	0.592	–	–	NS
Headache	4283 (88.9)	697 (80.2)	1.98	1.64-2.39	<0.001 ^a	–	–	NS
Myalgia	4254 (88.3)	620 (71.3)	3.04	2.56-3.61	<0.001 ^a	2.58	2.08-3.18	<0.001
Retro-orbital pain	2531 (52.5)	353 (40.6)	1.62	1.40-1.88	<0.001 ^a	1.36	1.15-1.62	0.001
Prostration	2277 (47.3)	378 (43.5)	1.17	1.01-1.35	0.040 ^a	–	–	NS
Nausea	2187 (45.4)	216 (24.9)	2.52	2.14-2.96	<0.001 ^a	1.92	1.60-2.30	<0.001
Vomiting	2052 (42.6)	445 (51.2)	0.71	0.61-0.82	<0.001 ^a	0.52	0.43-0.61	<0.001
Anorexia	1428 (29.6)	152 (17.5)	1.99	1.65-2.39	<0.001 ^a	–	–	NS
Arthralgia	1205 (25.0)	58 (6.7)	4.67	3.55-6.14	<0.001 ^a	3.64	2.72-4.89	<0.001
Rash	724 (15.0)	127 (14.6)	1.03	0.84-1.27	0.750	–	–	NS
Abdominal pain	491 (10.2)	59 (6.8)	1.56	1.18-2.06	0.002 ^a	–	–	NS
Bleeding	134 (2.8)	9 (1.0)	2.74	1.39-5.39	0.004 ^a	–	–	NS
Itch	75 (1.6)	15 (1.7)	0.90	0.52-1.58	0.713	–	–	NS
Petechiae	74 (1.5)	22 (2.5)	0.60	0.37-0.97	0.038 ^a	0.46	0.25-0.85	0.013
Hypotension	47 (1.0)	9 (1.0)	0.94	0.46-1.93	0.870	–	–	NS
Diarrhea	33 (0.7)	11 (1.3)	0.54	0.27-1.07	0.077	–	–	NS
Plasma leakage	22 (0.5)	5 (0.6)	0.79	0.30-2.10	0.640	–	–	NS
Initial laboratory data [n (%)]								
Hemoglobin ^a	2350 (48.8)	206 (23.7)	3.07	2.60-3.62	<0.001 ^a	3.04	2.53-3.65	<0.001
Thrombocytopenia ^b	2507 (52.0)	283 (32.6)	2.25	1.93-2.62	<0.001 ^a	2.17	1.80-2.60	<0.001
Leucopenia ^c	2498 (51.9)	412 (47.4)	1.19	1.03-1.38	0.016 ^a	–	–	NS
High ESR ^d	1610 (33.4)	188 (21.6)	1.82	1.15-1.54	<0.001 ^a	1.81	1.53-2.14	<0.001
High AST ^e	1915 (39.8)	306 (35.2)	1.22	1.05-1.42	0.010 ^a	–	–	NS
High ALT ^f	1638 (34.0)	147 (16.9)	2.54	2.11-3.07	<0.001 ^a	3.13	2.44-4.02	<0.001
Severity [n (%)]								
Severe dengue	366 (7.6)	30 (3.5)	2.29	1.57-3.35	<0.001 ^a	1.74	1.12-2.72	<0.001
Hospitalization	696 (14.4)	55 (6.3)	2.50	1.88-3.32	<0.001 ^a	2.21	1.59-3.06	<0.001

- Thanks for your attention -

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Lab study day1

檢驗項目名稱	檢驗值	檢驗值單位
GOT(AST)	63	U/L
CPK	272	U/L
Creatinine	1.08	mg/dL
eGFR	69.51	
Troponin I	0.02	ug/L
CK-MB	0.8	ng/mL

檢驗項目名稱	檢驗值
Hb	14.1
WBC	1.6
Differential count	*****
Segmented Neutro.	66.0
Lymphocyte	27.0
Monocyte	6.0
Eosinophil	0.0
Basophil	0.0
Atypical lymphocyte	0.0
Band	1.0
Platelet	39k

Baseline: WBC 3000-5000
Platelet 70-90k

Neurologist Visit

- NE : No neurologic focal sign
 - Cranial nerve : intact
 - F-N-F / H-N-S : no dysmetria or dysidiadochokinesia
 - Motor / Sensory system: intact and symmetric
 - Romberg test: (-) Tandem gait: good
- Plan
 - [Brain CT](#) to r/o silent stroke

Lab study day2

- Abdominal Echo
 - Liver : liver cirrhosis
 - Gallbladder : polyp
 - Spleen : splenomegaly
 - Kidney : Right kidney cyst

Lab study day2

U/A data

檢驗項目名稱	檢驗值
Sediment	*****
RBC	0-1
WBC	0-1
Epithelial cell	0-1
Cast	Not Found
.cast-amount	-
Crystal	Not Found
.Cry-amount	-
Bacteria	-
Other	Not Found

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Lab study day2

- CRP 0.353
- Anti-HBc IgM (-)

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國際重要疫情資訊

越南 Vietnam

- 即時疫情
- 境外移入病例
- 旅遊前的準備
- 當地其他相關疾病
- 旅遊中之健康照護
- 返國後注意事項

即時疫情

越南—登革熱 (2013-07-10)

越南—新型環狀病毒 (2013-06-28)

越南—登革熱 (2013-06-03)

越南—登革熱 (2013-05-08)

境外移入病例

越南輸入台灣病例 2012 vs. 2013-(07/15) (2013-07-16)



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國際重要疫情資訊

越南—登革熱 (2013-07-10)

資料來源：中央社，2013-07-08

越南中部爆發登革熱疫情，其中以慶和 (Khanh Hoa) 省疫情最為嚴重，該省上半年約3,500例登革熱病例，為去年同期的3.5倍；疫情發生原因可能與當地居民不當蓄水有關；該國去年全國共通報超過8萬7千例(含79例死亡)，較前年增加25%。

相關疾病：登革熱

相關國家與地區：

越南 Vietnam

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Handwritten notes on lined paper:

WBC 1600
 PLT 39K
 Hepatitis B 2.2C
 Use Tamiflu 14 days
 (Leukopenia + thrombocytopenia)
 *HIV LC related
 R/o BW suppress
 β = abd exam
 Answer: Homa (H)

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Handwritten notes on graph paper:

Graph showing a curve on a grid. The curve starts at the origin, rises to a peak, and then falls. The peak is labeled with '1.5' and '1.5'.

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