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Guidelines on Clinical Management of Dengue Fever / Dengue Haemorrhagic Fever



**Epidemiological Unit,
Ministry of Health.
2005
Updated in JUNE 2009**

Guidelines on Clinical Management of Dengue / Dengue Haemorrhagic Fever

**Prepared by
the Sub-Committee of Technical Experts
on Clinical Management of DF/DHF**



**Epidemiological Unit,
Ministry of Health.**

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Foreword

In the recent past we have witnessed a dramatic increase in the incidence of Dengue Fever and its severe manifestations such as Dengue Haemorrhagic Fever and Dengue Shock Syndrome globally as well as in Sri Lanka. As a result it has become a major public health challenge. The case fatality rate due to DF/DHF remains low in the country basically due to increase in the number of cases. However the number of deaths shows an increase. It is felt that improvement in the clinical management could further reduce the mortality due to this disease.

I hope that the guidelines on clinical management of Dengue/ Dengue Haemorrhagic Fever prepared by the Epidemiological Unit with the contribution of experts in this field will prove useful to clinicians for better case management and reduction of mortality due to this disease.

Dr. H.A.P. Kahandaliyanage

Director General of Health Services

Preface

Dengue Fever has now become the most important communicable disease in Sri Lanka. Since the first reported outbreak of Dengue fever in 1965, there had been outbreaks on and off until the recent past affecting some densely populated areas. Since 1989 progressively large epidemics have been occurring more frequently involving a greater extent of the country so that it has become a major public health issue. Incidence of severe forms of the disease, namely Dengue Haemorrhagic Fever and Dengue Shock Syndrome is also on the rise leading to increase in mortality.

Sri Lanka experienced the largest outbreak of Dengue Fever in 2004 with the highest recorded mortality in the recent past. Consequently dengue prevention and control activities were strengthened. Further to a Consultative Meeting of technical experts held at BMICH, Colombo on 14th August 2004 chaired by the Hon. Minister of Health, Nutrition and Uva Wellassa Development, several sub-committees were formulated to address the key issues with regard to Dengue control.

This document was prepared by the sub-committee of technical experts on clinical management of DF/DHF with a view to assist clinicians in proper management of patients with the ultimate goal of preventing mortality due to this dreaded disease.

I sincerely hope that this will be a very useful reference material among all other publications on this subject as it was prepared basically to address the issues currently faced by the dedicated Sri Lankan medical staff taking into consideration the immense difficulties they come across in patient management.

I greatly appreciate the efforts of the experts who contributed for this document and I wish to thank the staff of the Epidemiological Unit specially Dr. Devika Mendis for the assistance extended in preparation of this document.

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1. DENGUE ILLNESS

An Overview

Dengue illness is caused by any one of the four serotypes of Dengue virus – DEN 1-4. This is considered to be the most important mosquito-borne disease of humans, especially in the tropics.

Dengue Fever (DF), when due to primary dengue virus infection, is usually a mild nonfatal disease. Clinical features are age dependant. Infants and young children infected for the first time (primary infection) usually develop an undifferentiated fever with or without a maculopapular rash. Older children and adults have either a mild febrile illness or the classical incapacitating disease with high fever of abrupt onset (40°C - 41°C / 103°F – 105°F) sometimes biphasic with two or more of the following features – severe headache (frontal), retro orbital pain, myalgia, bone / joint pain and rash (diffuse, erythematous, maculopapular). Rarely haemorrhagic manifestations may occur.

The diagnosis of DF is likely if the above presentation occurs at the same location / time as other confirmed DF cases.

The differential diagnosis includes other viral, bacterial and rickettsial diseases prevailing in the area.

Virus isolation, serology, or PCR are needed for confirmation of the diagnosis.

Unlike DF, clinical features of **Dengue Haemorrhagic Fever (DHF)** which usually follows a secondary infection are rather distinctive. Typically DHF is characterised by four major clinical manifestations as follows;

1. High continuous fever for 2 – 7 days
2. Haemorrhagic tendency (positive tourniquet test, skin petechiae, easy bruising, epistaxis, gingival bleeding and GI bleeding – haematemesis / melaena)
3. Hepatomegaly, usually soft and tender
4. Circulatory disturbance (shock in severe cases)

Thrombocytopenia ($\leq 100,000/\text{mm}^3$) and **Haemoconcentration** (rising HCT of 20% or more) which represent the **pathophysiologic changes** of abnormal haemostasis and plasma leakage are constant findings.

The **clinical course of DHF** is rather stereotypic. The incubation period is 5 – 8 days (range 3 – 14 days). The illness usually begins abruptly and has three phases, namely **Febrile, Critical** and **Convalescent**.

In the acute **febrile phase** typically the patient has sudden rise in temperature accompanied by facial flushing, skin erythema, headache and muscle pain. Febrile convulsions may occur particularly in infants, as the temperature may be as high as 41°C . Mild conjunctival injection and injected pharynx are common. Sore throat, rhinitis and cough are unusual. Anorexia, vomiting, abdominal pain are common and diarrhoea may occur. This phase resembles DF in many respects. Haemorrhagic manifestations are usually present. Massive GI bleeding may occur later as a result of prolonged shock leading to DIC. Haematuria is extremely rare. Tender hepatomegaly is often present but jaundice is not a feature.

Critical phase, which lasts about 24 – 48 hours during which plasma leakage occurs, coincides or follows defervescence (becoming afebrile). Varying degrees of circulatory disturbances may develop and very close monitoring of the patient is necessary at this stage.

In mild DHF patients, changes in vital signs are minimal and transient, and recover spontaneously or after a brief period of treatment. In severe DHF patients the disease progresses rapidly into a stage of shock. Onset of shock is acute, generally occurring at the time of defervescence, which is usually on or after the 3rd day of illness (the shortest duration of fever is 2 days). In the early stages of shock patient often complains of acute right sided abdominal pain, becomes restless with subnormal temperature, sweating and cold clammy extremities. Rapid thready pulse, prolonged capillary refill time (over 2 seconds) and narrow pulse pressure ($\leq 20\text{mmHg}$) with characteristic high diastolic pressure (eg. 100/90, 110/90) are noted at this time. Hypotension is seen in late stages of shock. Right-sided pleural effusion and ascitis will occur. Despite being in shock, consciousness remains even if the patient is terminally ill. However, rarely neurological disturbances have been described.

The course of shock is short but life threatening. If proper treatment is not given the patient deteriorates rapidly in to a stage of profound shock with undetectable pulse and unrecordable blood pressure. Circumoral and peripheral cyanosis is noted and the skin becomes blotchy, mottled and purplish. Without treatment the patient succumbs. Prolonged shock is often complicated with metabolic acidosis and/or DIC and massive bleeding. Severe bleeding most commonly occurs in the GI tract. Occasionally the bleeding may be concealed. The most fatal haemorrhagic manifestation is intracranial bleeding which leads to convulsions and coma. The critical period of plasma leakage and shock rarely lasts longer than 48 hours. Even the patients with shock have a favourable outcome if they receive proper treatment before reaching the irreversible stage of shock. Rapid and often dramatic recovery is the rule with appropriate and timely intervention.

Infrequently unusual encephalitic signs are associated with electrolyte and metabolic disturbances (hyponatraemia, hypocalcaemia and hypoglycaemia), intracranial haemorrhage or hepatic failure (Reye or Reye like syndrome) and can give rise to a more complicated course with a grave prognosis. Kidneys are rarely affected in dengue shock syndrome and mostly associated with late stage of acute liver failure. Use of nephrotoxic drugs, intravascular haemolysis due to G6PD deficiency and abnormal haemoglobinopathies are some of the risk factors for developing acute renal failure. Dual infections with other organisms present in the area have been reported as unusual manifestations (eg; DHF and Leptospirosis, DHF and common respiratory and gastrointestinal infections).

The Convalescent phase is usually short and uneventful even in those with shock. Diuresis ensues as shock resolves and the patient rapidly regains appetite. Some may have a confluent petechial rash with characteristic scattered round areas of pale skin on the extremities, which may be itchy. Bradycardia is a common finding.

The major **pathophysiological hallmarks of DHF** are the plasma leakage as a result of increased vascular permeability and abnormal haemostasis. Hypovolaemic shock occurs as a consequence of, and subsequent to a critical plasma volume loss. Abnormal haemostasis including increased capillary fragility (positive tourniquet test and tendency to bruise), impaired platelet function, thrombocytopenia and in most severe form,

disseminated intravascular coagulation contribute to varying degrees of haemorrhagic diathesis. All available data strongly suggest the involvement of both immune systems (cell mediated and humoral) and almost all haematological components in the pathogenesis of DHF. The association of DHF with secondary dengue infection in older children and primary infection in infants with passive dengue antibody from their mothers led to propose the 'two infection theory', and the concept of antibody – dependent immune enhancement (ADE). It was suggested that during the second infection with a heterotypic dengue infection that failed to neutralise would instead enhance viral uptake and replication in the mononuclear phagocytes. Such infected cells may then become a target of an immune elimination mechanism, which can trigger the production of mediators and activation of complement and coagulation cascade and eventually produce DHF.

The following are risk factors for developing DHF / DSS

- Children are more prone to develop DHF / DSS than adults.
- DHF / DSS is associated more with well nourished than with under nourished children.
- Primary infection in infants born to dengue immune mothers.
- Presence of underlying chronic illnesses (eg: heart disease, anaemia, chronic liver disease)

The disease severity of DHF has been arbitrarily classified into four grades according to the clinical hallmarks of bleeding and plasma leakage.

- | | | |
|-------------|---|---------------------|
| • Grade I | - Only positive tourniquet test | } Non-shock
DHF |
| • Grade II | - Positive tourniquet test with spontaneous
superficial bleeding | |
| • Grade III | - Shock | } DHF with
shock |
| • Grade IV | - Profound shock with unrecordable
blood pressure and / or pulse | |

N.B. Every DHF patient must have evidence of plasma leakage and thrombocytopenia.

Final grading can be given only after the patient is afebrile for 2 days.

Occasionally DF cases, particularly those with unusual haemorrhage or thrombocytopenia are misclassified as DHF Grade I or II. It should be emphasised that thrombocytopenia **with** evidence of concurrent plasma leakage(rising Hct) are the two essential findings in DHF that differentiate non – shock cases of DHF from DF.

Some significant laboratory findings occur in DHF and being aware of them is critical for clinical diagnosis and management.

- In the peripheral blood, normal white cell count or leucopenia with predominant neutrophils is common initially and majority of them are immature forms. Towards the end of the febrile phase there is a further reduction in the number of white cells with simultaneous increase of lymphocytes with about 15-20% atypical lymphocytes. This is usually observed one to two days before defervescence. The white cell count helps to differentiate DF / DHF from bacterial infections and predict the critical phase in DHF.
- Moderate to marked thrombocytopenia is a constant finding in DHF. The platelet count drops rapidly to very low levels ($\leq 100,000/\text{mm}^3$) shortly before or simultaneously with the rise in haematocrit.
- Haematocrit determinations should be made more frequently after the platelet count has fallen. The changes in the haematocrit are important for clinical diagnosis of DHF.
- Evidence of plasma leakage includes a sudden rise in haematocrit(Hct) leading to haemoconcentration (20% rise in Hct.). Hct levels correlate well with plasma volume loss and disease severity. The level of haemoconcentration may be equivocal when there is frank haemorrhage or early and excessive volume replacement. **For determination of Hct, it is important to draw blood from a vein at a distant site, away from the drip site in order to prevent haemodilution.** At the peak of plasma leakage, right sided or bilateral pleural effusions are seen on chest X ray. In the case of a mild leakage, pleural effusion can be determined by right decubitus chest X ray.
- Elevation of aspartate amino transferase (SGOT),to a level which is about 2-3 times the level of alanine amino transferase (SGPT). However the values of both these enzymes are usually less than 200 units. If the SGPT is over 200 units,

hepatic involvement is likely and changes in level of consciousness should be monitored. **Every patient with altered consciousness, especially those with restlessness, confusion and irritability should have his/her liver functions monitored.**

- Clotting abnormalities are common in shock cases and the laboratory evidence of DIC appears to be correlated with disease severity.
- The ESR is normal in DHF ($\leq 20\text{mm}$) together with normal CRP.

Differential diagnosis of DHF during the early febrile phase includes a wide spectrum of viral, bacterial and parasitic infections, e.g. Typhoid fever, malaria, leptospirosis, viral gastritis, acute gastroenteritis and acute tonsillitis. In a child presenting with acute onset of high fever of 1 – 2 days, the finding of flushed face without coryza or any other respiratory symptom should suggest the possibility of Dengue infection. A positive tourniquet test increases the probability. As the disease progresses, enlargement of liver which is usually soft and tender provide more support for a clinical diagnosis of DHF. The diagnosis becomes certain when the platelet count drops shortly before or simultaneously with a rise in Hct, which is unique to DHF. The presence of pleural effusion and/or ascitis supports the diagnosis of DHF in a patient whose level of Hct is equivocal. Leucopenia with a high proportion of atypical lymphocytes and a normal ESR helps to differentiate DHF from bacterial infection and septic shock.

The major **causes of death** in DHF are,

- Prolonged shock leading to DIC and multi organ failure
- Massive bleeding
- Fluid overload leading to cardiac failure / pulmonary oedema
- Acute liver failure with encephalopathy
- Encephalitis
- Myocarditis

With good clinical care, **case fatality rate** (CFR) should be around 0.5 – 1.0%, but otherwise may vary up to 5%.

2. DENGUE FEVER -

OUTPATIENT AND FIRST CONTACT MANAGEMENT

Assessment of patient on the 1st day of a fever during a dengue epidemic

The early manifestations of dengue infection are high fever with significant myalgia and arthralgia, possibly some erythema of the skin better noticed in the palms soles and around the neck. Coryza and cough are not usually found. The practising physician should exclude other common causes of fever. If another cause for fever is established, act accordingly. Even if dengue fever is suspected, the patient need not be admitted at this stage. If the patient or the guardians request admission, the physician should try to convince them that admission is not necessary. A FBC at this stage will not help to rule out or suspect dengue infection. Management consist of extra fluids, normal diet, rest and the correct dose of paracetamol (60mg per kg per 24 hours). **NSAIDS are contraindicated.** The patient should be reviewed on the 3rd day of fever.

A leaflet explaining the danger signs of dengue, which can be given to the patient(Annexure i), and similar posters in the waiting room, are recommended.

Assessment of the patient on the 2nd day of fever.

The assessment and the management is the same as on the 1st day. But the patient should be reviewed in 24 hours.

Assessment of the patient on the 3rd day of fever

The following should be actively looked for.

- Enlarged tender liver (essential to examine in the horizontal position)
- Check capillary filling time and the pulse. If the capillary filling time is > 2 seconds or the pulse is rapid or is of low volume check the blood pressure. (measuring the BP is recommended in children over 5 years)

For children, normal values for vital signs are as follows.

Age	Heart rate	Blood pressure Systolic / Diastolic
0-3 months	100-150	65-85 / 45-55
3-6 months	90-120	70-90 / 50-65
6-12 months	80-100	80-100 / 55-65
1-4 years	70-110	90-105 / 55-70
4-6 years	65-110	95-110 / 60-75
6-12 years	60-95	100-120 / 60-75
> 12 years	55-85	110-135 / 65-85

- Examine for bleeding manifestations.
- Examine for cold extremities.
- Check for diminished air entry at the lung bases.
- Tourniquet test is not routinely recommended because of the time factor and low yield rate. It can be done depending on the workload.

FBC is mandatory, if not, Hct and platelet count should be done.

It is recommended that MOO/OPD be trained to do the Hct and the facility is made available at least in the large hospitals in areas where dengue fever is endemic.

The normal Hct can be taken as 45 for adults, 40 for children and 35 below 1 year.

A platelet count between 100,000 to 150,000 per cu.mm should alert the physician.

A patient with a platelet count below 100,000 per cu. mm should be admitted.

If the above findings are within normal limits and the patient is clinically well, the patient may be sent home with the following warning messages. The patient should report back immediately if any of the following findings are noticed.

- Significant abdominal pain
- Black or Red coloured stool
- Persistent vomiting
- Coffee ground or Red coloured vomitus
- Any other bleeding tendency
- Cold extremities
- Restlessness or drowsiness

If any of these finding are present the patient should be admitted.

In the absence of any of the above findings,

Review the patient in 24 hours and repeat PCV and platelet count.

If patient is well and there is no fever, paracetamol should be stopped.

If fever continues review daily till the 6th or 7th day with PCV and platelet counts.

Serological tests for dengue are not essential for the clinical management except in a minority of cases where the diagnosis is in doubt. It is indicated to establish the diagnosis for epidemiological information.

Management on day 4 and 5

As long as the patient remains well with reasonably normal blood counts, they need not be admitted. If any of the findings mentioned under day 3 as indications for admission are found the patient should be admitted.

Even if one decided to admit the patient it is essential that the first contact doctor should stabilise the patient at primary care before sending out for indoor care. This applies even to the MOO/OPD at the major hospitals. The immediate treatment for stabilisation is Hartman's solution or N – Saline bolus of 10ml per kg over 20 minutes. Establishment of an ETU in the out patient department for this purpose is a useful step at least in the major hospitals.

Good relationship between the ward staff and the OPD medical officer is essential. The services of the registrar on call to the medical/paediatric casualty ward should be available to the OPD officers when required. The OPD or the first contact doctor should in turn communicate with the house officer on call to the ward prior to sending the patient to the ward.

3. MANAGEMENT OF DENGUE HAEMORRHAGIC FEVER IN THE HOSPITALIZED PATIENT

Management of Dengue Haemorrhagic Fever is divided into three phases according to the clinical course of the illness, with the durations as indicated.

- Febrile phase: 2-7 days
- Critical / Leakage phase: 1-2 days
- Convalescent phase: 1–5 days

FEBRILE PHASE

Antipyretics for fever

- Paracetamol 60mg/kg/day in 4 divided doses. (1g every 6hrs in adults)
- All NSAID's through any route (oral, rectal, intramuscular) are contraindicated as they may precipitate/aggravate gastrointestinal bleeding or Reye syndrome.
- Tepid sponging if temperature remains high after a dose of Paracetamol.

Mosquito net or repellants may be used for the patient during day and night, to prevent nosocomial spread.

Nutritional support

- A balanced diet with adequate fluids.
- If solids are refused, milk, fruit juices and ORS are recommended.
- Plain water alone is inadequate as it may cause electrolyte imbalance.
- Black or red coloured food or drink should be avoided as it may be mistaken for haematemesis in the event of vomiting.

Other supportive / symptomatic treatment

- Vomiting: Domperidone IV 1mg/kg per day in 3 divided doses.(10mg/kg iv tds in adults)
- Febrile convulsions: Diazepam 0.5mg/kg rectally
- Upper Gastro-intestinal bleeding: Ranitidine IV 1mg/kg/8hourly (50mg IV tds in adults) or proton pump inhibitors - Pantoprazole.

Do not use antibiotics even in the presence of severe leucopenia.

Corticosteroids are ineffective in preventing shock in DHF and may even be harmful by causing GI bleeding.

Daily haematocrit (Hct) estimation is mandatory. Twenty percent (20%) rise in Hct reflects a significant plasma loss.

Oral Rehydration Solution should be given if the patient can take fluids orally.

I.V. fluid administration is considered only in those with dehydration due to severe or persistent vomiting and refusal of all food and drink. It should be discontinued as soon as the dehydration is corrected and when the oral intake is adequate. If IV fluids are to be given more than a day, the amount should be the minimum required. Excessive IV fluids given during this phase may cause fluid overload later in the illness.

All suspected dengue fever patients should be examined for following clinical changes at least daily, beginning on the 3rd day of the illness until afebrile for at least 24 – 48 hrs without the use of antipyretics.

Symptoms:

- History of bleeding into skin, nose, gums or passage of tarry stools.
- Vomiting / refusal of food or drink / extreme thirst.
- Less fluid intake and poor urine output.
- Right sided upper abdominal pain.
- Poor appetite.
- Cold extremities - hands and feet.
- Refusal to sit up / postural giddiness.

Signs

- Clinical deterioration with settling of fever
- Unexplained tachycardia.
- Tender enlarged liver.
- Cold clammy skin.
- Drowsiness / sleepiness.
- Behavioural changes / confusion

Record: Vital signs. Fluid intake and output.

Check: Platelet count and heamatocrit (Hct) daily from the 3rd day of illness. Hct will rise before changes in pulse rate and blood pressure are noted.

A rise in Hct of 20% or more reflects a significant plasma loss.

Presence of leucopenia (WBC less than 5000/cumm) with 10 – 20% atypical lymphocytes, usually predicts progression to critical phase within the next 24 hrs.

A platelet count less than 100,000/cumm also predicts that progression to critical phase is imminent.

A platelet count less than 100,000/cumm **with** a rise in Hct over 20% indicates that patient is in the critical phase.

DHF I & II CRITICAL/LEAKAGE PHASE (1 – 2 DAYS) – *DHF without shock*

- Establish IV access
- Monitor vital signs (pulse rate and BP) every 2- 4 hrs.
- Monitor Hct at least twice daily
- Measure urine output every 2-4 hrs and record intake accurately
- Encourage oral fluid intake
- I.V. fluids are not mandatory if oral intake is adequate.
- If patient refuses oral fluids or there is severe vomiting, IV fluids are to be given.

The total volume of IV fluids to be given for 24 hrs during this phase is as follows;

For children – Maintenance (M) + 5% deficit

For adults - Maintenance x 2

The Maintenance (M) fluid needed for 24 hrs is calculated either using the following formula or calculated using available tables. (**annexure ii**).

Body weight (kgs)	Maintenance volume (ml) Administered over 24 hrs
< 10	100/Kg
10 – 20	1000 + 50 for each kg in excess of 10
> 20	1500 + 20 for each kg in excess of 20

Use the ideal body weight (weight for age) to calculate the IV fluid requirement in obese/ over weight children.

The maximum weight for IV fluid calculation is 50 kg in adults and all overweight patients.

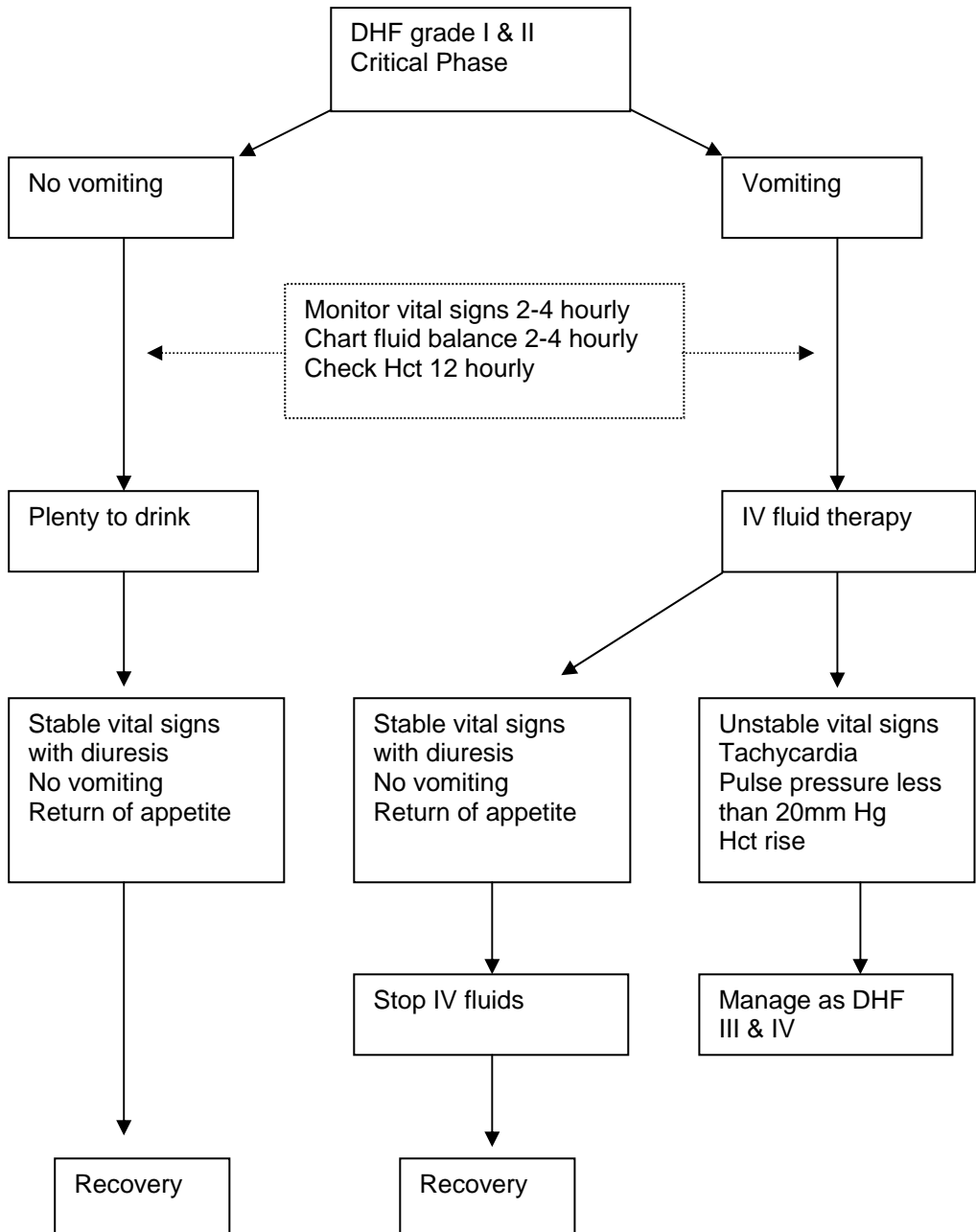
If the patient is taking orally, IV fluids should be omitted as early as possible.

As the rate of leakage of plasma is rapid during the first 6 – 12 hrs after its onset the IV/ oral fluid replacement should parallel this rate and be guided by regular measurement of Pulse rate, Blood pressure, Urine output and Hct.

CONVALESCENT PHASE (1 – 5 DAYS)

- IV Fluid therapy can be stopped when Hct drops to 45% in adults, 40% in children and 35% in infants.
- Return of appetite and diuresis are signs of recovery.

Summary of Management of DHF Grade I & II



MANAGEMENT OF DHF III & IV CRITICAL / LEAKAGE PHASE (1 TO 2 DAYS) – *DHF with shock*

In this phase there is rapid leakage of plasma leading to shock. Hence IV fluid replacement is mandatory. The volume used for replacement should be just sufficient to maintain effective circulation during this critical period. As the rate of leakage of plasma is not uniform (being more rapid during the first 6 – 12 hrs) the rate and volume of fluid replacement should be adjusted according to the rate of plasma leakage. This should be guided by the general condition, vital signs, urine output and Hct.

The type of fluid used should be isotonic with plasma. E.g. Crystalloid such as Hartmann solution, normal Saline, N/2 saline + 5% Dextrose. In the case of massive leakage a colloidal solution should be used in addition to crystalloids.

The recommended total volume of fluid needed by an adult in this phase is Maintenance x 2 for 24 hrs. The maximum fluids needed by children for 24 hrs is approximately maintenance plus 5% body weight deficit (50ml / Kg / 24 hrs).

When leakage stops (by the end of 1 to 2 days) the IV fluid must be discontinued. Stable vital signs (good volume pulse with wide pulse pressure, diuresis and stable Hct) are good indicators to stop Intra Venous fluids.

Following management regimen is recommended in managing DHF III & IV. (Leakage Phase)

- A Medical Officer should be in attendance all the time until the patient is stable.
- Ideally a specific area in the ward should be reserved for dengue patients.
- Monitor vital signs frequently, every 1 – 2 hrs during critical period / every 15min during state of shock.
- Monitor Hct at least twice a day in the presence of overt shock.
- Special form for recording vital signs, Hct, intake / output and clinical findings should be available at the bedside (important for adjusting the rate of IV fluids).

- Keep the patient flat in bed (strict bed rest should be advised) and give Oxygen via face mask / nasal prongs.
- Arrest bleeding with appropriate technique. e.g. anterior nasal packing for massive epistaxis.
- Avoid invasive procedures as much as possible. e.g. Nasogastric tube insertion and deep neck vein cannulation.
- Vital signs specially Blood Pressure (BP), Pulse Pressure (PP) Capillary Refill Time (CRT) have to be measured every 10 to 15 minutes until they are stable.
- An Intra Venous bolus of Hartmann solution or normal saline (10ml/Kg) should be given immediately on detection of shock. The duration of bolus should not exceed 20 minutes.
- While the fluid bolus is being infused, another Intra venous cannula should be inserted simultaneously into another limb.
- Blood should be withdrawn for grouping / cross-matching, Hct and platelet counts in uncomplicated DHF cases. In high risk or complicated DHF patients other investigations such as liver function test, blood electrolyte (Na, Ca, K), blood sugar, renal function tests, blood gas and coagulation screen (APPT, PT, TT), an ECG and a Chest X-ray (Right decubitus view) should be done.
- Total amount of intra venous fluid needed for children during the leakage phase is Maintenance + 50 ml/Kg/24hrs, for adults it is Maintenance x 2.
- I.V. boluses of Hartmann solution or normal saline (10ml/Kg) could be repeated whenever pulse pressure is < 20mm. A maximum of three I.V. boluses can be given.
- If there are no signs of improvement, I.V. boluses of colloid solution (plasma or dextran 40) should be given, (10ml/Kg) up to a maximum of two I.V. boluses.
- When vital signs improve, as indicated by a fall in Hct and an increase in Urine output, the rate of I.V. fluid replacement should be reduced by 25% of maintenance (25% blocks) (*annexure iii*). The vital signs should be re-assessed every hour with further reduction of the hourly rate by blocks of 25%. I.V. Fluid therapy may be discontinued when the vital signs are stable and Hct drops to 40%.

- Settling of tachycardia, good perfusion, return of appetite and diuresis indicate recovery.
- In general, with early recognition and appropriate management of shock, rapid and dramatic recovery is the rule.
- Refractory shock despite adequate volume replacement and a drop in Hct. (e.g. from 50% to 40%) indicate significant internal bleeding and a need for blood transfusion. Give fresh whole blood transfusion (10ml/Kg) or packed red cells (5ml/Kg) and occasionally platelet-rich plasma in cases with significant bleeding associated with thrombocytopenia.
- Correct metabolic and electrolyte disturbances. Metabolic acidosis can be corrected with sodium bicarbonate. Electrolyte imbalances are usually found during this phase particularly hyponatraemia and hypocalcaemia. Hypokalaemia may occur during the convalescent phase. Hyponatraemia results from inadequate intake of isotonic fluids and receiving hypotonic solutions e.g. N/2 or N/5. If the patient has no convulsions, there is no need to give hypertonic saline (3% sodium chloride) and Normal saline is sufficient. Hypocalcaemia – results from leakage of Ca that follows albumin into the pleural or peritoneal cavity. 10% Ca gluconate 1 ml /Kg/dose (maximum 10ml) IV slowly is recommended only in complicated patients e.g. grade IV patients with fluid overload.

Summary of management of this phase is given in ***annexure iv***

Indications for administration of colloidal solutions

- Patients who receive adequate volume of crystalloid solution as recommended (2 – 3 boluses) and still have unstable vital signs with high Hct value.
- Patients who have signs of continued massive leakage of plasma e.g. periorbital oedema, respiratory discomfort from massive pleural effusion and / or very tense abdomen but yet the patient needs I.V. fluids as vital signs are not stable and high Hct.

Indications for blood transfusion

Blood transfusion is indicated in the presence of blood loss, which can either be obvious or concealed.

- Significant obvious blood loss > 10% of total blood volume (6 – 8ml/Kg). Replace estimated loss with equal volume of blood (e.g. in a 20 Kg patient, blood transfusion is indicated if he has lost 120 – 160 ml of blood). The total amount of blood transfusion is equal to the volume of estimated blood loss.
- Concealed internal bleeding, usually found in patients with **prolonged shock** i.e. patients who received adequate amount of IV fluids but still have unstable vital signs despite fall in Hct. (E.g. Hct drop from 53% - 45% with unstable vital signs.)

Or

- Patient is in shock and treated for 6 hrs, but at the end of 6 hrs the rate of IV fluid administration cannot be reduced.

Fresh whole blood 10 ml / Kg / dose or Packed red cells 5 ml / Kg / dose is given.

Indication for platelet transfusion

Platelets are given only if significant bleeding occurs. (more than 6 – 8 ml /Kg)

There is no place for prophylactic platelet even with a count below 10,000 per cu mm if there is no evidence of bleeding. If platelets are not available, fresh whole blood or packed red cells transfusion is sufficient in patients with bleeding. When giving platelets, be aware of large volume of platelet concentrate. Patients may get fluid overload from rapid platelet transfusion. Platelet concentrates are used in only 0.4% of DHF patients in specialized centres.

Convalescent Phase of DHF

About 48 hrs after defervescence most DHF patients enter the convalescent phase and recover spontaneously with appropriate management. In adults recovery may be prolonged with fatigue lasting 2 – 4 weeks. But in children, it is only about 5 days.

The following features indicate that the patient is in convalescent phase.

- Improved general condition and return of appetite
- Stable vital signs, strong slow pulse with wide pulse pressure
- Hct reduces to normal or sometimes below normal
- Diuresis
- Convalescent rash in around 20% of the DF & DHF cases
- Bradycardia

Management

- Discontinue IV fluids.
- Allow patient to rest. Traumatic or invasive procedures should not be carried out e.g. intra-muscular injection.
- If patient still has no appetite check serum electrolyte as hypokalaemia may lead to paralytic ileus. More potassium is lost during diuresis. Fruits or fruit juices are recommended. KCl solution may be indicated if patients refuse to eat or drink any fruits.
- Some patients who receive large amounts of IV fluids during the critical periods may have fluid overload when re-absorption of extravasated plasma occurs in the convalescent phase. Frusemide 1 – 2 ml / kg is helpful in this situation.

Indication for Discharge

All following criteria should be fulfilled before discharge.

- No fever for at least 24 hrs without the use of antipyretics
- At least 2 days have lapsed after recovery from shock.
- Good general condition and improving appetite.
- Normal Hct at baseline level or around 38% - 40% when baseline value is not known.
- Diuresis
- No distress from pleural effusion or ascites.
- Platelet count over 50,000 / cu mm
- No other complications

4. CO-ORDINATION OF LABORATORY INVESTIGATIONS FOR MANAGEMENT OF DF/ DHF

The following recommendations are made with regard to improvement of laboratory services for better case management at various levels of health care delivery.

Teaching and provincial hospitals

- Fully automated blood counters to be provided to all the teaching and provincial hospitals. (If these are available during the day, doing FBC will not be a problem even for OPD patients.)
- After working hours, the existing semi-automated machines could be used. (As only a few MLTT would be allowed to handle the fully automated machines)
- Strengthening the night lab staff during the epidemics of dengue fever. One extra person would be required to handle the specimens from dengue patients using the semi-automated machines.
- When night lab support is not available or day lab support inadequate, microhaematocrits to be made available round the clock. Each medical and paediatric unit to be given one each or if there are financial constraints, one microhaematocrit should be kept in a place, which is accessible to all the units (for example, the ETU).

Base hospitals

- Fully automated blood counters to be provided to large base hospitals. Until such time, at least semi-automated machines to be made available.
- Strengthening the night lab staff during the epidemics of dengue fever. (One extra person would be required to handle the specimens from dengue patients using the semi-automated machines or manually)
- When night lab support is not available or day lab support is inadequate, microhaematocrits to be made available round the clock. Medical and paediatric units to be given one each or if there are financial constraints, one microhaematocrits should be kept in a place, which is accessible to all the units. (For example, the ETU)

District Hospital and Peripheral Units

- To make use of existing facilities.

5. DENGUE FEVER – SURVEILLANCE

Passive Surveillance; Notification

DF/DHF is a notifiable disease in Sri Lanka and therefore along with the other notifiable diseases, it should be notified to the respective MOH using the form H 544. It is of utmost importance that notification should be done on clinical diagnosis and that it should not be delayed until confirmation of the diagnosis, as early action has to be taken by the MOH for prevention and control. Therefore, recording of the correct address of the patient in the notification form is of paramount importance for field investigation.

Special Surveillance

Since the severity of the disease and mortality due to DF/DHF varies during epidemics over the years, a special surveillance mechanism is useful to obtain the information on clinical presentation, severity and outcome of the cases. Furthermore it provides epidemiological information on confirmed cases, as data obtained by the routine surveillance comprises of suspected cases of DF/DHF.

Special surveillance has been carried out in the field by the MOH/PHI of the area utilizing a special format- form Epid/DF/2004 (**Annexure v**). However this arrangement has not yielded expected results due to lack of data (clinical and laboratory) with the patient/patient's family. To overcome this problem, it has been decided to delegate this activity to the Medical Officer/Public Health or Infection Control Nursing Officer, to be carried out in the hospital.

Sentinel Surveillance

A sentinel reporting system has been established for DF/DHF, which gives an indication of the trend of the disease in the areas concerned and acts as an early warning system. Surveillance is carried out to obtain the number of fever cases reporting to OPD of selected hospitals and number of suspected DF/DHF cases admitted to these institutions.

Recommended guidelines for strengthening of surveillance of dengue fever are as follows;

- Suspected dengue patients should be notified to the MOH of the patient's area of residence with minimum delay by the medical practitioners. Emphasis should be placed on providing the correct address of the patient.

The importance of this activity needs to be discussed with the relevant officers working at the admission counter, nursing officers maintaining the admission register in the ward and the medical officers in the wards to overcome the present shortcomings.

- Surveillance case definitions for 'suspected dengue fever' in the document on Surveillance case definitions for notifiable diseases in Sri Lanka on dengue fever is further clarified as follows.

An acute febrile illness of 3-7 days duration without a definitive / alternative diagnosis with two or more of the following ;

<i>headache,</i>	<i>retro-orbital pain,</i>
<i>myalgia,</i>	<i>arthralgia,</i>
<i>flushed extremities,</i>	<i>tender hepatomegaly,</i>
<i>rash,</i>	<i>haemorrhagic manifestations,</i>
<i>leucopenia,</i>	<i>thrombocytopenia</i>
<i>elevated Hct.</i>	

Surveillance case definition of DHF is as follows;

A probable or confirmed case of dengue fever and haemorrhagic tendencies evidenced by one or more of the following:

- *positive tourniquet test*
- *petechiae, ecchymoses or purpura*
- *bleeding; mucosa, gastrointestinal tract, injection sites or others*
- *haematemesis or melaena*

And

- *thrombocytopenia (100,000 cells per cu.mm)*

And

- *evidence of plasma leakage due to increased vascular permeability manifested by one or more of the following*
 - *≥ 20% rise in average haematocrit for age and sex*

- *≥ 20% drop in the haematocrit following volume replacement treatment compared to baseline*
- *signs of plasma leakage (pleural effusion, ascitis, hypoproteinaemia)*

Surveillance case definition of Dengue Shock Syndrome;

All the above criteria plus evidence of circulatory failure manifested by rapid and weak pulse, narrow pulse pressure (≤ 20 mm Hg) or hypotension for age, cold clammy extremities and restlessness.

- Patients diagnosed as cases of DF / DHF should be provided with a diagnosis card by the clinicians where all significant findings are recorded.

Mortality Review

With the objective of preventing deaths due to DF / DHF and improvement of case management, mortality reviews need to be carried out at institutional level during each quarter for deaths due to DF / DHF. **(Annexure vi)**

To facilitate the timely surveillance activities, all deaths due to DF / DHF should be notified to the MOH and Regional Epidemiologist of the area by telephone, fax or telegram.

To obtain relevant data for the mortality review from the medical institutions and field, the special formats (A & B) should be utilised respectively. **(Annexure vii & viii)**

The convenor of this meeting should be the Director of the relevant hospital and the participants should be as follows.

From the institution

- All clinicians (Paediatricians/Physicians)
- Senior grade medical officers (SHO/Registrar)
- Relevant house officers
- JMO
- Microbiologist/Histopathologist
- Hospital Matron
- Ward Sister in charge
- Infection Control Nursing Officer

Other participants

- Primary care Medical Officer/GP (if possible) who treated the patient before admission
- MOH of the area
- Regional Epidemiologist

Information to be presented at the review are as follows ;

1. Clinical history, hospital course and laboratory investigations
2. Relevant haematological or pathological reports
3. Autopsy (pathological post-mortem) findings when cause of death is not confirmed
4. Report on field investigation
5. Observations of the primary care level doctor

Recommendations and comments of the participants with regard to remedial measures should be summarised in the final report.

Strict confidentiality should be maintained with regard to the report.

Copies of the final report should be sent to the Epidemiologist.

References

1. Guidelines for Treatment of Dengue Fever/Dengue Haemorrhagic Fever in Small Hospitals, World Health Organization Regional Office for South-East Asia Region, New Delhi, 1999.
2. Guidelines for Management of Dengue Haemorrhagic Fever, Sri Lanka College of Paediatricians
3. Workshop on Case Management of Dengue Haemorrhagic Fever, June 2002, Bangkok, Thailand.
4. Studies / Collaborative Studies on Dengue Infection/ Dengue Haemorrhagic Fever, at Queen Sirikit National Institute of Child Health, Bangkok, Thailand.

Annexure (i)

Leaflet to be given to suspected Dengue Patients at OPD.

Your child/family member probably has dengue fever.

He/she can develop serious complications of the disease, which if recognized early, will help to save his/her life.

What should be done?

- Patient needs bed rest.
- Give plenty of fluids (water, rice cunjee, soup, fruit juices, etc)
- Give paracetamol (correct dosage) 6 hourly, to bring down temperature (maximum of 04 doses per day)
- Do tepid sponging to control fever, when it is high despite he/she has been given paracetamol.
- If possible, make the patient rest under a bednet even during day time to prevent mosquito bites.

What should be avoided?

- Do not give aspirin or aspirin containing drugs
- Do not give red or black coloured food or drink (e.g. coffee, coca cola, etc.)

Fever might suddenly settle but he/she may develop the following danger signs.

- Red spots or patches on the skin
- Bleeding from nose or gums
- Frequent vomiting
- Vomiting blood
- Black coloured stools
- Drowsiness
- Irritability
- Severe abdominal pain
- Pale, cold or clammy skin
- Difficulty in breathing

If any of these are observed, take the patient immediately to the nearest hospital.

"Dengue fever is spread by mosquitoes. Look for mosquito breeding places in and around your home/workplace/school and eliminate them"

Annexure ii

Maintenance fluids for different body weights

Weight	Total (ml / 24 hrs)
3.0	300
3.5	350
4.0	400
4.5	450
5.0	500
5.5	550
6.0	600
6.5	650
7.0	700
7.5	750
8.0	800
8.5	850
9.0	900
9.5	950
10	1000
11	1050
12	1100
13	1150
14	1200
15	1250
16	1300
17	1350
18	1400
19	1450
20	1500
21	1525
22	1550
23	1575
24	1600
25	1625
26	1650
27	1675
28	1700
29	1725
30	1750
35	1875
40	2000
45	2125
50	2250

Annexure iii

Reduction of Hourly Maintenance Rate by 25% Blocks

Weight (kg)	M (ml/24 hrs)	M (ml/hr)	75% M (ml/hr)	50% M (ml/hr)	25% M (ml/hr)
3.0	300	12.5	9.5	6.0	3.0
3.5	350	14.5	11.0	7.0	3.5
4.0	400	16.5	12.5	8.0	4.0
4.5	450	19.0	14.0	9.5	4.5
5.0	500	21.0	16.0	10.5	5.0
5.5	550	23.0	17.0	11.5	5.5
6.0	600	25.0	19.0	12.5	6.0
6.5	650	27.0	20.0	13.5	7.0
7.0	700	29.0	22.0	14.5	7.5
7.5	750	31.0	23.0	15.5	8.0
8.0	800	33.5	25.0	16.5	8.5
8.5	850	35.5	26.5	17.5	9.0
9.0	900	37.5	28.0	19.0	9.5
9.5	950	39.5	29.5	20.0	10.0
10	1000	41.5	31.0	21.0	10.5
11	1050	44.0	33.0	22.0	11.0
12	1100	46.0	34.5	23.0	11.5
13	1150	48.0	36.0	24.0	12.0
14	1200	50.0	37.5	25.0	12.5
15	1250	52.0	39.0	26.0	13.0
16	1300	54.0	40.5	27.0	13.5
17	1350	56.0	42.0	28.0	14.0
18	1400	58.5	44.0	29.0	14.5
19	1450	60.5	45.5	30.0	15.0
20	1500	62.5	47.0	31.0	15.5
21	1525	63.5	47.5	32.0	16.0
22	1550	64.5	48.5	32.0	16.0
23	1575	65.5	49.0	33.0	16.5
24	1600	66.5	50.0	33.0	16.5
25	1625	67.5	50.5	34.0	17.0
26	1650	69.0	52.0	34.5	17.0
27	1675	70.0	52.5	35.0	17.5
28	1700	71.0	53.0	35.5	18.0
29	1725	72.0	54.0	36.0	18.0
30	1750	73.0	55.0	36.5	18.0
35	1875	78.0	58.5	39.0	19.5
40	2000	83.5	62.5	42.0	21.0
45	2125	88.5	66.5	44.0	22.0
50	2250	94.5	70.5	47.0	23.5

Annexure (iv)

DHF Grade III & IV Critical Phase

Call for help, Oxygen, keep flat / Head low, Monitor Vital Signs ¼ Hourly (BP, PP, PR, CRT)

1st IV line

2nd IV cannula in situ (optional) Take blood for investigation and Cross matching.

IV bolus Hartman / N Saline
10ml/kg within 20 minutes – once
(free flow in Grade IV)

Unstable

Stable

Continue maintenance (M)

Repeat 2 more IV boluses
with Hartmans or N saline

Unstable/ Exclude myocarditis

Dextran 40 or FFP 10ml / kg Maximum
of 2 boluses

Unstable Vital Signs with
rise in Hct

Stable Vital Signs / improving
Hct

Unstable Vital Signs / Hct low

Internal bleeding

Vital signs stable with falling Haematocrit

Decrease M by 25% every 2 – 3
hours or discontinue
Encourage oral fluid intake every
2 – 3 hours

Correct metabolic / electrolyte disturbances

ICU care

Blood Transfusion

	Yes	No	Don't know
22. Thrombocytopenia (100,000 mm ³ or less)			
23. Plasma leakage due to increased capillary permeability as manifested by commonly associated signs of plasma leakage			
(a) pleural effusion			
(b) ascites			
(c) hypoproteinemia			
24. Liver enlarged (Specify):			
25. Evidence of circulatory failure manifested by			
(a) rapid and weak pulse			
(b) narrow pulse pressure (20mmHg or less) or hypotension for age			
(c) cold, clammy skin and altered mental status.			

D. LABORATORY DATA

26. W.B.C./D.C. :	27. Platelet count (Initial):
28. Haematocrit :	29. Platelet count (Lowest):
30. Hb: %	

BLOOD FOR SEROLOGY (DENGUE FEVER/DENGUE HAEMORRHAGIC FEVER)

	Yes	No	Don't know		Yes	No	Don't Know
31. 1 st sample : Sent				Results +ve +ve			
32. 2 nd sample: Sent							

Specify the test:

E. DIAGNOSIS

33. Initial clinical diagnosis:	FOR OFFICE USE ONLY COMPATIBLE WITH THE CASE DEFINITION <input type="checkbox"/> Yes <input type="checkbox"/> No
34. Final diagnosis:	

F. TREATMENT

G. ANY OTHER INFORMATION

Signature : Name :
Date: Designation :

Please return to –

Epidemiologist, Epidemiological Unit, 231, De Saram Place, Colombo 10.
e-mail : epidunit@sltnet.lk Tel: 011-2695112 Fax: 011-2696583

For office use only

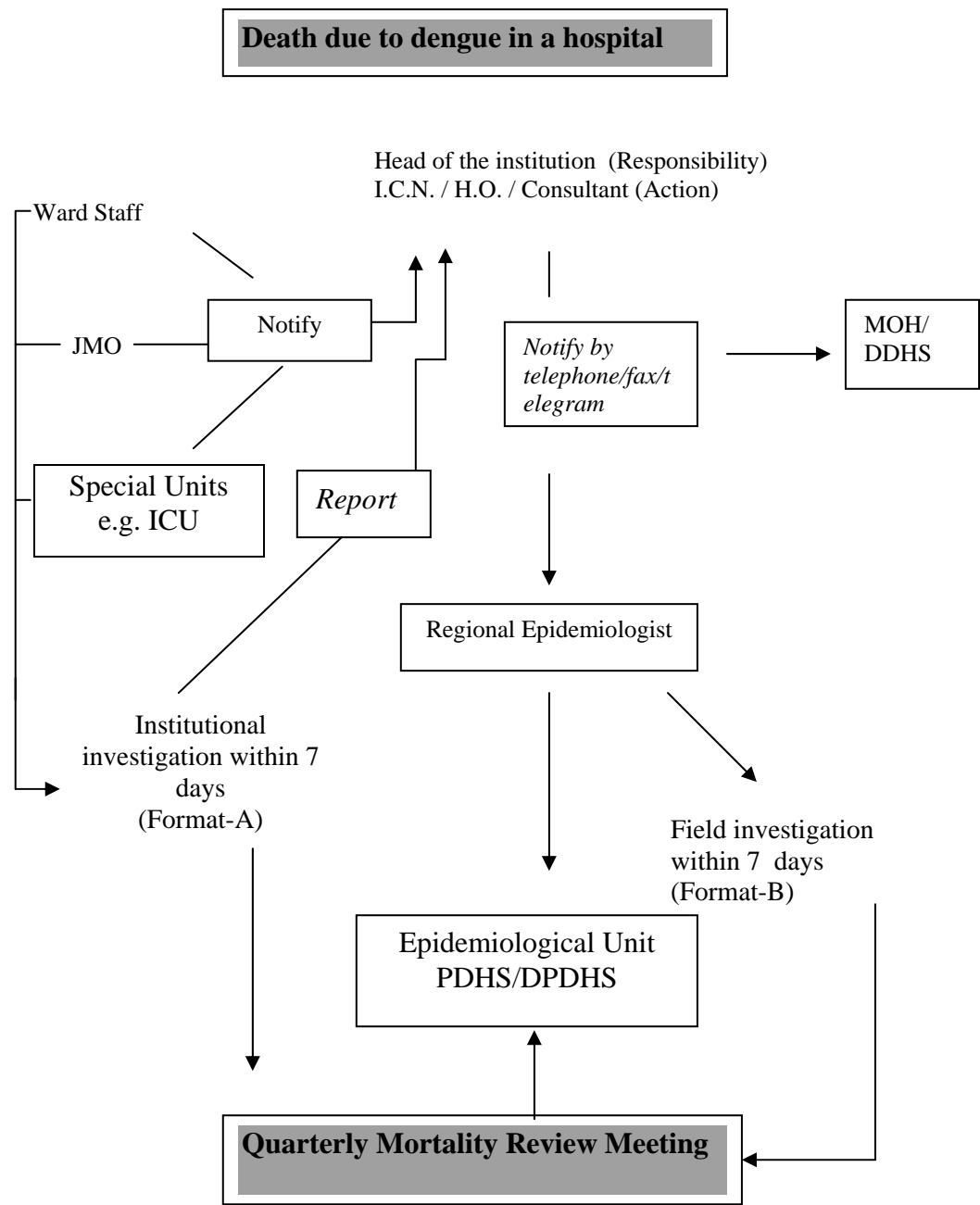
Date notified to the MOH/DDHS:

Date the form was received from the MOH/DDHS

d	d	m	m	y

Dengue Mortality Review

Procedure



Annexure (vii)

Format A

Report on Death due to DF/DHF – Institutional format

(To be completed by the Specialist or Senior Medical Officer in the ward)

Name of the hospital

Part I - Basic Information of the Patient

- 1) Name:
- 2) Age :
- 3) Sex :
- 4) Address :
- 5) DPDHS area :
- 6) MOH area:
- 7) Name / Address of the guardian :

PART II

- 8) Date and time of admission to the hospital

YY		MM		DD	
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Weekday		Weekend		Public holiday	

Yes No

- 9) Whether transferred? ☐ ☐ If yes from-

- 10) BHT No

- 11) Condition of the patient on admission

DHF Grade I	<input type="text"/>
DHF Grade II	<input type="text"/>
DHF Grade III & IV	<input type="text"/>

Grade I – No shock only positive tourniquet test

Grade II – No shock with spontaneous superficial bleeding plus positive tourniquet test

Grade III & IV – Shock/Profound shock with unrecordable blood pressure and/or pulse

12) Whether the BHT is stamped ys No
☐ ☐

13) Place of Admission – Ward ☐ ETU ☐

If admitted to ETU

14) Time of Admission

15) Details of Treatment given

i.v. drip ☐
 Oxygen ☐
 Drugs (specify) ☐

Admission to Ward

16) Ward No:

17) Time of admission to the ward :

18) Time of examination by the MO :

19) History

a) Date of onset of fever YY MM DD

b) Haemorrhagic tendencies

c) History of a second spike of fever

d) Presence of excessive vomiting

e) Details of treatment (antipyretics/analgesics) obtained prior to admission

.....

f) Relevant Past History

g) History of any chronic diseases

PART III - Findings on clinical examination/Laboratory Investigation

21) General Examination

	yes	No
a) Fever	<input type="checkbox"/>	<input type="checkbox"/>
b) Pallor	<input type="checkbox"/>	<input type="checkbox"/>
c) Dyspnoea	<input type="checkbox"/>	<input type="checkbox"/>
e) Bleeding tendencies	<input type="checkbox"/>	<input type="checkbox"/>
f) Evidence of plasma leakage manifested by		
	yes	No
(i) pleural effusion	<input type="checkbox"/>	<input type="checkbox"/>
(ii) ascitis	<input type="checkbox"/>	<input type="checkbox"/>
	yes	No
g) Liver enlargement	<input type="checkbox"/>	<input type="checkbox"/>
h) Body weight: (kg)		

22) Results of Laboratory investigations

Investigation	Highest value		Lowest value	
	Date	Value	Date	Value
Total WBC count				
Platelet count				
Hb%				
PCV				
Blood urea				
S. electrolytes				
SGPT/SGOT				

23) Results of serological Investigations

Test	Date of collection of blood	How many days after onset of the illness	Result	
			Positive	Negative
Ig M				
Ig G				

PART IV - Treatment

24) Type and amount of i.v. therapy given

Type of i.v. therapy	Amount given (ml/day)				
	Day 1	Day 2	Day 3	Day 4	Day 5

25) Nursing care

Maintenance of	Satisfactory	Unsatisfactory
1. Temperature chart		
2. Fluid balance chart		
3. Chart of vital signs		

26) Date/ Time of death:

27) Cause of death:.....

28) Autopsy findings

.....

.....

29) Brief statement of events leading to death

.....
.....
.....

30) View of the investigating Officers on factors contributing to the death(This question should only be answered by the consultant of the particular unit) Mark (x) where relevant

Delay in seeking treatment by the patient	
Inadequacy of health personnel	
Lack of or nonavailability of services – laboratory investigations/ blood transfusion/ transport	
Clinical management/ judgement related factors	
Any avoidable factors identified at field level	
Any avoidable factors identified at referring/transferring institution	
Any other factors identified (specify).....	

31) List the actions already taken /proposed to be taken to overcome the deficiencies identified

.....
.....
.....

.....

Name / Designation of the investigating officer

Signature

Date-

Annexure (viii)

Format B

Field Investigation Report on Death due to DF/DHF

To be completed by Regional Epidemiologist following a visit to the patients residence

Case No.

Name:
Age: Sex :
Address:
Name /address of guardian:
.....
MOH area: DPDHS area:
Hospital where the death occurred:
Date of death:
Cause of death:

1. Pre-hospital course of the illness

- (a) Date of onset of the illness
- (b) Signs/symptoms:
.....
- (c) Evidence of bleeding manifestations (describe)
.....
- (d) Details of treatment obtained (from hospital/GPP/others)
.....
- (e) Management of the patient at home:
.....
- (f) Past history of similar disease episodes:
.....

2. Family history

Occurrence of similar disease episodes among the family members:

3. Social/Environmental history

- (a) Educational status:
- (b) Occupation:.....
- (c) Nature and place of work:.....
- (d) Presence of vector breeding in and around the premises:.....
- (e) If so action taken:.....

4. For patients transferred to a specialized institution from a non-specialized institution

(to obtain information from the institution from where the patient was transferred)

- (a) Name of the institution:
- (b) Duration of stay - Days/hours:.....
- (c) Was the patient seen by a MO /RMP after admission:.....
- (d) If so how long after admission:.....
- (e) Main findings:.....
- (f) Reasons for transfer:.....
- (g) Was there undue delay in transferring the patient:.....
- (h) Reasons for the delay:.....

5. Deficiencies identified (Describe the contributing factors)

- (a) Delay / Deficiency in seeking medical care by the patient:.....
- (b) Delay / Deficiency in reaching health facility with adequate care:.....
- (c) Delay / Deficiency in the service provided by the first contact physician
(e.g. MO/OPD, GP):.....

6. Comments on how this death could have been prevented:

.....
.....
.....

Signature/ Name:.....

Date/Time:.....