

# Clinical Practice Guidelines for Nurses

## Introduction

Dengue is the most important vector-borne diseases worldwide. All ASEAN countries except Brunei Darussalam and Singapore have faced with dengue problems for more than 50 years. Besides worldwide increasing trend of dengue cases, there is also increasing cases report in both Brunei Darussalam and Singapore. Role of nurses in the management of dengue in endemic or newly outbreak countries are very important especially in countries, where there are not adequate number of doctors. Besides nurses have more time to communicate and observe patients than doctors. Experience in Thailand has shown that teamwork between doctors and nurses has markedly reduced in dengue case fatality rate (CFR) to minimum. Capacity building and empowering nurses in the management and care of dengue patients are important in successful reduction and complications of dengue /DHF/DSS patients.

Nurses' role in dengue management may be divided into 2 parts: at Out Patient Department (OPD) and In Patient Department (IPD) management.

**Roles of nurses at OPD** (including clinics, health centers, primary care units)  
(These roles may be done by other trained health care personnel)

1. Screening for suspected dengue cases
2. Standard nursing care
3. Give advice to patients and families
4. Mental and psychological support

## 1. Screening for suspected dengue cases

- Ask history of high fever and other common signs and symptoms of dengue infections: headache, retro-orbital pain, myalgia, arthralgia, rash and any sources of bleeding; petechiae, epistaxis, gum bleeding, coffee-ground vomiting, hematemesis, melena, hematochezia and also include menstruation, urine color. Try to estimate the amount of bleeding if necessary.

- Look for possible warning signs: abdominal pain, severe vomiting, lethargy, restlessness, behavior change, cold & clammy skin,...

- Check vital signs for possible impending shock/ shock, e.g.

- o narrowing of pulse pressure  $\leq 20$  mmHg, or

- o hypotension; systolic pressure  $< [70 + (\text{age in years})]$  in children or  $< 80$  mmHg in adults,

- o Postural hypotension or fainting

- o Rapid and/ or weak pulse

- Look for petechiae, bleeding. If active bleeding, send for appropriate procedure to stop bleeding (if possible, e.g. anterior nasal packing).

- Look for signs of dehydration, if moderate to severe dehydration, send for rapid evaluation by doctors

- Perform Tourniquet test and record the result.

- Look for leukopenia (WBC  $\leq 5,000$  cells/cumm.) and/or thrombocytopenia (platelet count  $\leq 100,000$  cells/cumm.) if the CBC is available. If present, send for rapid evaluation by doctors.

- Special attention to high risk patients: obese, infants, elderly, pregnancy, bleeding, profound shock, change of consciousness and those with underlying diseases.

## 2. Standard nursing care at OPD

- In patients with impending shock/ shock, notify doctors ASAP or send to appropriate place for emergency resuscitation. If doctors are not

available at that time, nurses can open vein and give IV fluid resuscitation in some places with isotonic salt solution (0.9% NSS) at rate 10 ml/kg/hr in children and 500 ml/hr in adults. Check Hct and blood sugar before IV fluid resuscitation are recommended to confirm diagnosis of DSS and guide for further management. In cases with profound shock, IV fluid free flow is recommended for the first 15–30 mins. If cannot access IV line, provide oral ORS and have the patients drink small amount at a time. Try to give at least 10 ml/kg/hr in children or 300–500 ml for adults. Detail management is in the IPD part.

- In cases with high fever, do tepid sponge and at the same time teaching/ demonstrating this procedure to parents and families or care-takers. Give paracetamol for appropriate dose if  $T > 39$  Celsius.

- Promote drinking ORS in cases with signs of moderate to severe dehydration.

- In case with active bleeding, stop bleeding if possible, e.g. anterior nasal packing. In cases with massive bleeding, blood loss  $> 3-8$  ml/kg, notify doctors for immediate grouping and matching.

- In cases with warning signs, leukopenia and/or thrombocytopenia especially those high risk patients, consult doctors rapidly.

**3. Give advice/ health education to patients and families** about the following topics:

- Simple natural course of dengue illness. Not all dengue patients have severe diseases. If follow the recommendation, regular come for follow up and carefully watch for warning signs to come back immediately, usually the patients will recover completely.

- How to take care of the patients at home, e.g. when and how to give paracetamol, to do the sponging, soft diet or fruit juice or ORS,

- Warning signs to bring the patients back to the hospital immediately, especially when the fever is coming down without clinical improve-

ment.

- The importance of coming back for follow up with CBC test.
- How to get rid of adult mosquitoes, mosquitoes' larva and pupa

including the eggs.

#### **4. Mental and psychological support**

- Pay special attention to parents/ care-takers who express their concern very much or in a stressful situation. Explain about the clinical course and the process of dengue management. If they still do not satisfy, consult with doctors or other experience personnel.

Most suspected dengue patients need no hospitalization during febrile phase. They can be taken care at home by their families or care-takers. Advise about home management and emphasize on warning signs to come back to the hospital ASAP and provide hand-out to families of suspected dengue patients. Follow up visits to the clinics/ hospitals with blood tests are important. The follow up process has to be until no fever for at least 24 hours without using any antipyretics. The transition time from high fever to no fever is concurrent with the critical period of plasma leakage in dengue hemorrhagic fever (DHF) patients. DHF patients can develop shock anytime during 24 hours period of defervescence, depends on the rate of plasma leakage. So it is important to take care of these patients during this period to detect shock, which is usually missed by family members or inexperienced health care personnel.

DF patients who have no plasma leakage will recover spontaneously immediately after no fever. They will return to normal activities as before their illnesses. Majority of dengue patients have mild illnesses and they need no hospitalization.

Dengue shock syndrome (DSS) patients are difficult to detect because patients still have good consciousness. They can walk and talk but

looked very weak, drowsy and often complain of tiredness or shortness of breath. Those patients beyond day 3 of fever with warning signs: anorexia, vomiting, abdominal pain, bleeding, not pass urine for 4–6 hours, together with CBC results of leukopenia (WBC  $\leq$  5,000 cell/cumm.) and/ or thrombocytopenia (platelet count  $\leq$  100,000 cells/cumm.) are likely to have severe diseases (DHF), if they do not have adequate intake. They need close observation or admission to the hospital for early detection and proper management of shock. With good monitoring in the hospital, shock can be prevented in DHF patients.

## **Roles of nurses at IPD**

Most patients admitted to the hospital are those who have warning signs and/ or are in or close to the critical period without enough intakes. Few are during febrile phase. Most of them present with poor appetite, nausea/ vomiting or abdominal pain. Some patients admitted early are those with family concern too much or from VIP families.

Team work between doctors and nurses in the management of dengue/ DHF/DSS/ EDS patients in the hospital is most important. Good and reliable close monitoring of all clinical and laboratory parameters of suspected dengue/ DHF/ DSS/ EDS patients are necessary and critical for doctors to make decision regarding further management. In addition, timely notifications to attending clinicians about the abnormalities detected by nurses are part of the successful treatment with the best outcomes.

The roles of nurses (other health care personnel may participate these following roles instead of nurses) in management of dengue/ DHF/ DSS/ EDS patients include;

1. General measures for dengue patients' care in the hospital.
2. Health education including mental and psychological support for the patients and families.

3. Follow and complete doctors' orders.
4. Monitor and record important parameters.
5. Notifying doctors about the clinical and/ or laboratory abnormalities in timely manner.
6. Act as a good and effective coordinators
7. Standard nursing care.

### **1. General measures for dengue patients' care in the hospital**

1. Manage to have dengue corner/ ward with mosquito-free environment to prevent nosocomial dengue transmission in the hospital and for close monitoring like a semi- intensive care unit.

2. Prepare necessary medicines, solutions, equipments, supplies including blood and blood component for dengue case management:

#### *Medicines and solutions:*

- o Paracetamol, both syrup and tablet forms
- o 20-50% glucose
- o 10% Calcium gluconate
- o Vitamin K1
- o NaHCO<sub>3</sub>
- o Furosemide
- o Anti- convulsants: diazepam, Dilantin, Phenobarbital
- o Anti-emetic, H<sub>2</sub>-blocker, Antacid,
- o Antihistamines, Calamine lotion
- o Antibiotics : systemic and local
- o Steroid, Lactulose, etc
- o Inotropic drugs: Dopamine, Dobutamine
- o Oral electrolyte solution (ORS)
- o IV fluid, both crystalloid (Isotonic salt solution: NSS, 5% D/ NSS, 5% DAR, 5% DLR, except 5% D/N/2 in infants < 6 months) and *colloidal solutions (plasma expander - 10% Dextran-40 in NSS)* includ-

ing IV set, both micro and macro-drip, scalp veins, Medicuts.

*Equipments and supplies:*

- o **Sphygmomanometers** for measuring BP with 3 different size of cuffs for different age groups
- o Syringes, needles, lancet, micro capillary tubes, alcohol for blood drawing and Hct determination
- o Infusion pump, syringe pump
- o Digital vital signs monitor (Dynamapp)
- o Necessary equipments for oxygen therapy: mask, nasal catheter, ambu bags
- o Pulse oxymeter
- o General set for resuscitation
- o Endotracheal tubes
- o Ventilators
- o Suction tubes
- o Nasogastric tubes
- o Glucometer or Dextrostix
- o **Micro-centrifuge for Hct determination**
- o Set for blood and blood components transfusion

*Blood and blood components*

**2. Health education including mental and psychological support for the patients and families**

- Explain the course of DHF illnesses and emphasize on the important and process of frequent monitoring of vital signs, intake/output and serial Hct determinations.
- Listen and willing to answer every question to relive their anxiety.
- Comfort and express sympathy, tender, love and care especially in severe/ complicated cases or cases with family with extreme concerned.
- Advise how to do the preventive measures at home and in the

community. In severe/ complicated cases, may delay explain this until the patients and family can adjust to the situation.

### **3. Follow and complete doctors' orders:**

- Give medications according to the orders.
- Administer the IV fluid; type, rate and amount according to the treatment plan. Frequently check that the type and amount is accurately infused.
  - Check that all investigations (blood test, x-ray, ultrasound,...) are done as requested in the orders and plan. Ask and report to doctors when the results are ready.
  - Follow and manage to have things done according to the treatment plan, e.g. blood grouping and matching,...
  - Routine dengue monitoring or do according to the special requested

### **4. Monitor and record important parameters**

- *Clinical:* consciousness, abdominal pain, appetite, nausea/ vomiting, bleeding, other abnormal signs and symptoms. Degree of severity of signs and symptoms and estimated amount of bleeding should be included.
- *Vital signs:*
  - Temperature (T), every 4–6 hours
  - Blood pressure (BP), every 2–3 hours in critical period, every 1 hour for shock, every 15 mins. until stable in cases with profound shock
  - Pulse rate (PR), every 2–3 hours in critical period, every 1 hours in severe/ complicated cases
  - Respiratory rate (RR), every 2–3 hours in critical period, every 1 hour in cases with respiratory distress or fluid overload
- *Hematocrit (Hct)*, 1–2 times a day in febrile phase, every 4–6 hours during critical period in uncomplicated cases, every 1–2 hours or



more frequent in cases with massive bleeding or suspected bleeding.

- *Urine output*, every 8 hours in uncomplicated cases, the proper amount require is 0.5 ml/kg/hr and 25–30 ml/hr in adults, every 1 hr in cases with fluid overload (need insertion of urinary catheter).

## 5. Notifying doctors about problems of the patients:

### Urgent notifications

#### ***Signs and symptoms that need notification to the doctors immediately:***

- Changes of consciousness e.g. restlessness, confusion, speak fowl language, stupor or unconscious
- Shock/ impending shock
  - Cold, clammy skin, cyanosis, mottling skin
  - Rapid and/ or weak pulse
  - Narrowing of pulse pressure  $\leq 20$  mmHg
  - Hypotension : systolic pressure  $< 80$  mmHg in children  $> 5$  years and adults, and systolic pressure  $< [70 + (\text{age in years} \times 2)]$  mmHg in children  $< 5$  years of age
  - Capillary refill time  $> 2$  seconds
  - Oxygen saturation  $< 95\%$
- Massive bleeding or bleed  $> 5-10\%$  of the total blood volume (3 – 8 ml/kg): epistaxis, hematemesis, melena, hematuria, hemoglobinuria, menstruation
  - Convulsions
  - Excessive vomiting
  - Severe abdominal pain
  - IV fluid leaked and cannot open the vein during critical period
  - Abnormal lab/ investigations, e.g. thrombocytopenia, rising or dropping Hct  $> 10-15\%$ , hypoglycemia (blood sugar  $< 60$  mg% or DTX  $< 100$  mg%), acidosis (pH  $< 7.35$  and  $\text{HCO}_3 < 15$  mEq/L), elevation of AST/ALT  $> 1,000$  u, prolonged PTT and TT ratio  $> 2$ , INR  $> 1.3$ .

## **Non-urgent notifications**

### ***Signs and symptoms that need notification to the doctors within 1-8 hours (visible clinical stable and not distress):***

- Vomiting/ abdominal pain, poor appetite (1-2 hrs)
- Moderate to severe dehydration: dry lips and fair/ poor skin turgor (1-2 hrs)
  - Dyspnea/ tachypnea (2-4 hrs)
  - Diarrhea
  - Some bleeding (if consider minimal, if significant or massive need notification immediately): epistaxis, gum bleeding, coffee ground vomiting, hematemesis, melena, menstruation
    - No urine in the past 8 hrs or urine output < 0.5 ml/kg/hr or >1 ml/kg/hr
    - Platelet count <100,000 cells / cumm. and / or rising Hct > 10-20%
    - Elevation of AST/ALT > 200 u
    - Puffy eyelids, distended abdomen (2-4 hrs)
    - Anxiety / psychological problems of either the patients or families

### ***Good signs and symptoms that need also notification to the doctors:***

- Return of appetite
- Develop rash with or without itching symptoms
- Itching of the extremities
- Diuresis: urine output > 3-4 ml/kg/hr

## **6. Act as good coordinators**

Nurses are important coordinators between doctors, patients, families, care-takers, health care personnel and every unit, in and outside the ward/ hospital. The necessary coordination that nurses need to coordinate includes:

- Doctors
- Patients and families
- Laboratory personnel
- Blood Bank personnel
- ICU personnel, if transfer to ICU is necessary
- Medical equipments units, if the patients need special equipment, e. g. ventilator, ECG monitor etc...
- Other hospitals, both to refer and to accept the referred cases
- Other Units, e.g. Social Welfare Unit, Community Medicines Unit, Communicable Diseases Control Unit (probably other Units outside the hospital). Mostly for reporting, prevention and control.

### **7. Nursing care for dengue/ DHF/DSS patients in different phases of dengue illness**

Nurses need to have basic knowledge of the natural courses of DHF/ DSS. They have to identify the correct phase of DHF/ DSS patients so that appropriate and proper monitoring is provided for individual patients. Febrile phase is easily identified by the high fever. Critical phase is defined accurately by thrombocytopenia (platelet counts  $\leq 100,000$  cells/cu.mm.). Majority of DHF patients have no fever when they enter critical period or when they develop shock. But severe/ complicated/ EDS cases usually present with high fever in spite of being in critical phase with thrombocytopenia. Inexperience doctors/ nurses/ health care personnel may wrongly identify critical period and their management may not be proper for the phase of patients. Convalescence phase is practically detected by counting the hours after shock > 24 hours or >48 hours after thrombocytopenia.

Nursing cares are aimed to relieve and improve the complaints / problems of the patients during those 3 phases of DHF illnesses as follow:

#### *Febrile phase*

Major complaints / problems in febrile phase are:

- High fever
- Headache / retro-orbital pain / myalgia / arthralgia
- Anorexia / nausea / vomiting
- Abdominal pain
- Bleeding
- Thrombocytopenia / rising Hct
- Early signs and symptoms of shock

### **High fever**

#### *Nursing objectives:*

- Reduce the height of fever, at least temporarily.
- Prevent febrile convulsion.
- Patients feel comfortable.

#### *Nursing activities:*

- Assess the body temperature and monitor every 4–6 hrs or more frequently if fever is persistently high > 38.5 Celsius.

- Tepid sponge using warm or tap water. Avoid using cold water for it causes vasoconstriction and reduces heat evaporation from the body surface and sometimes results in shivering. Do not scrub vigorously for the patients have capillary fragility that it may cause multiple minute skin hemorrhage, petechii or sometimes ecchymoses.

- The recommend technique is to use a few semi-wet towels, scrub softly over the extremities in the same direction toward center of the body, and then spread the towels over the forehead, neck, axilla, anterior chest wall and the back. Use as many small towels to cover the areas or great vessels. The average time of tepid sponge is 15 minutes. If the patient is shivering, stop sponging and cover the patients with warm blanket.

- Give paracetamol 10 mg/kg/dose per oral or suppository in children, or 325 or 500 mg single tablet for adults when the temperature is ≥ 39°C according to the plan of treatment every 4–6 hours. Intramuscular

route is contraindicated. Those patients with headache and myalgia/ arthralgia will have some benefit from paracetamol. Warm shower is recommended in older children, adolescence or adults instead of sponging.

- Force oral feeding with milk, fruit juice, boiled rice water or electrolyte solution (ORS). Avoid plain water for it may cause electrolyte imbalance (hyponatremia).

- Provide quiet environment with mosquitoes free so that the patients can have a peaceful rest.

#### *Assessment*

- The patients' temperature reduces below 39° C.
- No febrile convulsion
- The patients feel better with a good sleep/ rest.

### **Headache/ retro-orbital pain/ myalgia/ arthralgia**

#### *Nursing objective:*

- Relieve the bodyache and pain

#### *Nursing activities*

- Pain assessment depends mainly on subjective data, ask the patients about the nature of the pain, including areas of pain, onset, site, character, severity, duration, aggregating factors, relieving factors and other associated features.

- Give medications according to the doctor order.
- Advise the care-takers to help them understand pain control and patients response in order for them to improve their ability to provide comfort and emotional support to the patients.

- Cold compress is effective in some cases.
- Let's the patients have adequate rest.

#### *Assessment*

- The patients have less pain

**Anorexia/ nausea/ vomiting** that may lead to calories deficit, dehydration and electrolyte imbalance

*Nursing objective:*

- The patients have adequate calories, no signs of dehydration and no electrolyte imbalance

*Nursing activities:*

- Provide and encourage the patients to have soft, balanced and nutritious diet. Give choice of food for the patients' preference if possible.

- If the patients can eat less than half of normal, encourage oral ORS 3–5 ml/kg/hr or 200 ml for older children and adults.

- Avoid red, black or brown-colored drinks/ food for they may be misinterpreted as blood, if the patients throw up

- In cases with severe vomiting, look for signs of dehydration e.g. dry lips, crying without tears, sunken eyeballs, fair/ poor skin turgor, rapid pulse. Notify doctors if there are signs of moderate to severe dehydration. They may need intravenous fluid.

- Provide clean containers for vomitus. Record number of vomiting including the amount, color of the content. Clean, warm water for gargling the mouth after vomiting.

- Give anti-emetic according to the doctors' order

*Assessment*

- The patients have no signs of dehydration.

- The patients can take some food.

- Adequate fluid intake according to the nursing plan.

**Abdominal Pain**

*Nursing objective*

- The patients feel more comfortable and relieve or improvement of pain.

### *Nursing activities*

- Help the patients to lie down in the most comfortable position, preferably in semi-Fowler's position.
- Avoid contact with the painful abdomen. Soft touch with every nursing procedures e.g. tepid sponge, bed bath. Transportation with extreme care.
  - Provide soft, clean, dry and comfortable wears for patients.
  - Give medications according to the doctors' plan to relieve pain.
- Peptic ulcer is common in adolescence and adults. Aware of possible associated GI bleeding.
  - Abdominal pain may be the early sign of shock i.e. inadequate perfusion of the GI tract. Some patients may have severe abdominal pain that mimics acute abdomen, i.e. surgical emergency such as acute appendicitis. CBC will clearly show high Hct and thrombocytopenia.
    - Some patients, pain may be relieved by cold compress.
    - Psychological support from family members, especially from mother has been reported to be very effective in some patients.

### *Assessment*

- The patients can have less pain and can have some rest

## **Bleeding**

Bleeding is usually not severe in this phase. The most common bleeding found are petechiae, epistaxis, hematemesis, bleeding per gum and less common hyper-menorrhea in adolescence or women. Serious and massive bleeding may be seen in cases that aspirin, NSAID or steroids are taken. Adolescence or adult patients may have massive bleeding due to their underlying peptic ulcer.

Strictly apply universal precaution when manage patients with blood and blood products.

### *Nursing objectives*

- Stop bleeding or minimize bleeding if possible, e.g. anterior nasal packing in cases with epistaxis
- Reduce factors or activities or procedure that may contribute to bleeding.
- Prevent complications from bleeding such as superimposed bacterial infections.
- Prevent prolonged shock from massive blood loss.

### *Nursing activities*

- Notify doctors. Estimate and record the amount of blood loss. If there is significant blood loss, i.e. > 5–10% of total blood volume (3–8 ml/kg), urgently notify doctors and prepare for blood grouping and cross matching for possible blood transfusion.
- Avoid traumatic procedure. Inserting of naso-gastric tube and gastric lavage are contra-indicated.
- Intramuscular injection is contra-indicated.
- After pinprick on finger tip for Hct determination, pressure the site with sterile gauze for long enough time to make sure that there will be no oozing/ bleeding.
- Keep skin clean and dry. Do not let the patients scratch and make sure that their nails are short and clean.
- Always observe or ask about the color and content of vomitus, stool for possible GI bleeding and melena.
- Help doctors in blood drawing for grouping and cross matching.
- Give blood transfusion according to the treatment plan.

### ***Special precautions for blood transfusion include:***

- o Observation vital signs (T, PR, RR and BP), O<sub>2</sub> satd and consciousness before, 15 minutes after the start of each unit and during blood transfusion every 30 mins.–1 hr.
- o Check blood group, amount and identification card to make



sure that this blood is exactly for this patient. If there is gas in the bag, this unit of blood is not qualified to give to that patient because it may have bacterial contamination. Also if there is change in color of the blood, this is due to hemolysis and this blood unit cannot be given to the patient.

- o Warm the blood in tap water container at room temperature for 15 minutes before transfuse to the patient. Blood should be given within 30 minutes after getting from the blood bank. If the transfusion is delayed for more than 30 minutes, return the blood to the blood bank and get it back at the time of transfusion.

- o Hygienic hand washing in handling with blood.

- o Choose the bigger vein for blood transfusion. Transfuse the blood at the rate ordered by the doctors.

- o Transfusion set should have filter and has to change the set after every unit of blood if necessary, but routinely, change after 2-4 units after blood transfusion. Each unit of the blood has to be transfused not more than 4 hours.

- o The initial 50 ml of blood or less, except in young infants, should be transfused slowly to observe if there is any transfusion reaction: rash, headache, vertigo, restless, nausea / vomiting, chill and chest discomfort. Severe reactions can occur during the first 5 minutes of transfusion.

- o Do not infuse other medications through the vein that the blood is being transfused. If necessary, have to flush the line with NSS before and after infusion.

- o If there are any transfusion reactions, immediately stop the transfusion, record the vital signs and urgently report to doctors. Prepare IV medication i.e. adrenalin, antihistamine, dexamethazone and emergency resuscitation kits.

- Hct before and after each blood transfusion is necessary for assessment the degree of blood loss

- Other blood components are used less frequently.

- Platelet transfusion is indicated only in case with significant bleeding. Platelets have to be transfused in 15–30 minutes. One unit of platelet concentrate = 50–60 ml, so be careful that complication of fluid overload may occur immediately after many units of platelets concentrate are given, especially in those patients who have signs and symptoms of fluid overload. Consult with the doctors before platelet transfusion if the patients have signs and symptoms of fluid overload for the transfusion may precipitate acute pulmonary edema/ heart failure and the patients may have sudden respiratory arrest with pink, frothy sputum.

- Plasma, fresh frozen plasma (FFP) is not recommended in the management of DHF/DSS, for it cannot correct the abnormal coagulation found in DHF/DSS patients with the dose of 10 ml/kg. In addition, FFP is not effective in holding the intravascular volume in cases with massive plasma leakage because the osmolarity is almost the same as the patients'.

#### *Assessment*

- The bleeding is stopped or lessened.
- Hct is stable with no further drop.
- No superimposed bacterial infections at the bleeding sites i.e. veni-puncture or Hct puncture sites, skin or mouth.
- No transfusion reactions or the reactions are managed early and properly

#### **Thrombocytopenia / rising Hct > 10%**

##### *Nursing objective*

- Early detection of plasma leakage or critical period

##### *Nursing activities*

- Notify doctors when the platelet count is  $\leq 100,000$  cells/ cumm. and/ or rising Hct  $\geq 10\%$  compare to the previous value.
- Help doctors in drawing blood or Hct determination. The pre-

ferred sites for Hct determination are at the mid area of the tip of middle or ring fingers.

- Motivate the patients to drink fruit juice or ORS 5 ml/kg/hr or 200 ml/hr in adults.
- Start IV fluid and control the rate according to the doctors' treatment plan.

#### *Assessment*

- The patients receive good care and receive proper type, amount and rate of IV fluid.

### **Early signs and symptoms of shock**

#### *Nursing objective*

- Prevention of shock in severe cases

#### *Nursing activities*

- Careful watch for the following early signs and symptoms of shock and notify doctors as soon as possible:
  - o No clinical improvement when defervescence (no fever or lower height of fever)
  - o Rapid pulse without fever
  - o Bleeding
  - o Severe vomiting/ abdominal pain
  - o Very thirsty
  - o Drowsy, sleeping all the time
  - o Refuse to eat or drink
  - o Shock / impending shock :
    - Cold, clammy skin and extremities
    - Restless, irritable in young infants
    - Skin mottling
    - Delay capillary refill time > 2 seconds
    - Decrease urine output or no urine for 4–6 hours

- Behavior changes e.g. confusion, speak fowl language

#### *Assessment*

● Shock is prevented in most DHF cases. Successful early resuscitation of shock/ impending shock if shock does develop.

#### **Critical Phase**

Major problems in this phase are:

- Plasma leakage
- Shock / impending shock
- Bleeding
- Abdominal pain
- Hypoxia
- Decrease urine output
- Unusual cases and complications:
  - Fluid overload
  - Encephalopathy
  - Hepatic failure
  - Respiratory failure

#### **Plasma Leakage**

##### *Nursing objectives*

- To replace circulatory volume from plasma leakage.
- To maintain adequate intravascular volume.

##### *Nursing activities*

● Check vital signs every 2-4 hours. If there is rapid pulse without fever, notify doctors

Normal pulse rate are:

- o Newborn            120/ min.
- o 1 year                110/ min.
- o 5 years                95/ min.

- o Adolescence 85/ min.
- o Adult 75/ min.
- Assess the patients' circulatory status.
- Help doctors in doing Hct determination every 4–6 hours or more frequently.

- Encourage oral intake (milk, electrolyte solution, fruit juice, boiled rice water) about 5 ml/kg/hr if nausea, vomiting are not so severe. Notify doctors if the patients cannot have adequate oral intake.

- Check the rate, amount and type of IV fluid frequently, so that IV fluid is exactly equal to the treatment plan. Too much or too little amount of IV fluid may result in fluid overload or prolonged shock in DHF patients.

- Macro drip sets (15 drops/1 ml) are used in patients older than 2 years old. Micro drip sets (60 micro-drops/ 1 ml) are used for younger infants.

- Medicut is preferred for the site is maintained longer. Change IV site if IV fluid is maintain > 3 days, to prevent nosocomial phlebitis. Avoid giving IV fluid in the kinking, traumatic vein, and vein at wrist or elbow joints.

- Sterile technique is emphasized during changing the bottle of IV fluid

- Record urine output, every 8-hour of nurse shift. Optimum amount of urine is 0.5 – 1 ml/kg/hr or 200 – 400 ml/ 8 hours for adults.

*Assessment*

- The patients have adequate circulation as shown by stable vital signs, Hct and pass adequate volume of urine.

**Shock/ impending shock**

*Nursing objective*

- Early detection and resuscitation of shock

*Nursing activities*

- Monitor vital signs every 1–2 hours during critical period, ev-

ery 15–30 minutes during shock and every hour when BP can be restored

- Notify doctors immediately:

- When there is evidence of shock: narrowing of pulse pressure  $\leq 20$  mmHg. e.g. 100/80 mmHg or hypotension. Systolic BP  $< 80$  in children  $> 5$  years or adults or  $< [70 + (\text{age in years} \times 2)]$  mmHg in younger children

- Rapid pulse

- If doctors are not available at that time, administer IV fluid (5% Dextrose in isotonic salt solution) at the rate of 10ml/kg/hr and try to call for doctors again

- If IV fluid not available at that time, force ORS, small amount at a time, for shock may be improved if the patient can take ORS up to 5–10 ml/kg/hr

- Help doctors in Hct determination
- Record the time of shock

#### *Assessment*

- The patients have no prolonged shock and are out of shock quickly

Bleeding (see management in febrile phase)

Bleeding in this phase is likely to be more severe in patients with prolonged shock

## **Abdominal pain (see management in febrile phase)**

### **Hypoxia (found in shock patients)**

#### *Nursing objective*

- The patients have adequate tissue perfusion.

#### *Nursing activities*

- Observe vital signs and oxygen saturation (if available).
- Administer oxygen via proper size facemask (5 L/min) or nasal

catheter (2–3 L/min). Avoid nasal catheter in uncooperative patients for it may induce trauma and bleeding per nose.

- Check oxygen delivery system for the following:
  - There is no oxygen leak into the eyes for it may cause irritation and serious eyes injury.
  - Adequate sterile water in sterile container for humidification.
  - No water in oxygen delivery system.
  - Change the oxygen delivery set every day, including the face mask.
- Check level of oxygen in the tank frequently and prepare a new one if oxygen content is  $< 1/3$ .
- Notify doctors when the labs. result are come back, e.g. blood gas, electrolyte, LFT, BUN, Cr

#### *Assessment*

- The patients have good peripheral circulation, good vital signs and clinical signs no dyspnea or tachypnea and blood gas, blood electrolyte, blood chemistry return to normal values.

### **Decrease urine output**

#### *Nursing objective*

- The patients have adequate urine output i.e. 1–2 times/ 8 hours nurse shift in non– shock cases and 0.5 ml/kg/hour in shock cases.

#### *Nursing activities*

- Record urine output; in non–shock case, may be record as times of voiding but in shock cases need record in ml every 8 hours. In male infants, strap around the genital are with plastic or urine bags for record urine. In female infants, sometimes it is very difficult to record. Measure the weight of pamper before and after each voiding help recording urine output in infants. One gram increase in weight is estimated as 1 ml of urine. Check if the pamper is mixed with stool, if yes the volume is overestimated.

- Check amount and rate of IV fluid whether the patients receive according to the treatment plan or not.

- If yes, notify doctors for possible increase rate of IV fluid or look for other complications. Try to increase more oral fluid intake.

- If not, adjust to the proper rate and amount and also notify doctors.

- In more severe/ complicated cases, with the urinary catheter, record in ml/hr.

Special care on urinary catheter:

- Gentle insertion of urinary catheter without any force and good strapping technique to avoid trauma.

- Close and sterile system. Change the urinary bag if there is leakage and every 1–2 days.

- Make sure that the catheter is not kinking and the urinary bag is lower than the patient's bladder, so that the flow is good

- Empty the bag when it is full with sterile technique (using 70% alcohol or 2.5% Tincture Iodine)

- Clean the perineum area at least twice a day and keep the area dry and clean all the time.

*Assessment*

- Patients have passed adequate amount of urine, and other complications have been notified to doctors and correct on time.

## **Unusual cases and complications**

### **Fluid Overload**

*Nursing objectives*

- The patients have no signs of respiratory distress, e.g.
  - Puffy eyelids
  - Marked abdominal distention



- o Tachypnea
- o Dyspnea
- o Cough
- o Abnormal lung signs (crepitation, rhonchi, wheezing)

#### *Nursing Activities*

- Observe vital signs: will present with rapid and strong pulse, rapid respiratory rate and narrow pulse pressure,
  - Check capillary refill time and oxygen saturation (if available).
  - Check the total amount and type of IV fluid that the patients received.
  - Check the current rate of IV fluid that it is correct according to the treatment plan.
    - Check the time after shock or plasma leakage, e.g. 8 hours after shock, 34 hours after plasma leakage.
    - Check the urine output in the last 8-hour and monitor of urine pass out if  $> 2\text{ml/kg/hr}$  need to notify to doctor and observe signs of electrolyte imbalance.
    - Notify doctors immediately when the patients have the above signs of
      - respiratory distress, including reporting the above total amount and type of IV fluid, the time of their illness and the urine output.
      - The patient should lie down in Fowler's position or lie down on the right side to reduce the chest and abdominal discomfort.
      - Administer oxygen via facemask or nasal catheter, keep  $\text{O}_2$  satd.  $> 95\%$
      - Help doctors in Hct determination
      - Prepare colloidal solution and diuretic (furosemide) for possible usage.

In case of received diuretic (furosemide), the vital signs should be monitored every 15 min for 1 hour for its effects and monitored urine

output in 1 hr. If no urine, notify doctor immediately.

- Prepare for pleural and/or abdominal tapping.

#### *Assessment*

- The patients have no or less respiratory distress. Oxygen saturation is > 95%
- The patients receive appropriate treatment

### **Encephalopathy/ hepatic failure/ respiratory failure**

#### *Nursing objectives*

- Early detection of encephalopathy/ hepatic failure / respiratory failure
- The patients receive appropriate management

#### *Nursing activities*

- Notify doctors immediately for DHF patients who have changed of consciousness; especially those who are restlessness, very irritable, combative, speak foul language, stuporous, coma or patients with respiratory distress
- Prepare set for intubation and oxygen delivery system, including ventilator and medicines for sedation, if the patients cannot have adequate ventilation. Check oxygen saturation if available
- Prepare emergency resuscitation set
- Record neurological signs every 1 hour, including watching for convulsion attack. Prepare anti-convulsant drugs
- Restrain the patients with cloth or towel if indicated to avoid trauma
- Help doctors in blood drawing for lab. investigations, cross matching and report as early as possible when the results are available
- Give IV fluid and medications exactly as in the treatment plan
- Lactulose for induction of osmotic diarrhea. It is not needed in case with loose stool, so notification to doctors is necessary.
- Monitor blood sugar and keep > 60 mg/dl by checking with

Dextrostix or rapid blood sugar test (glucometer) and notify doctors if blood sugar is < 60 mg%

- Reduce the height of fever by using cooling blanket or sponging.

Avoid using paracetamol because it may aggravate more of liver injury

- Prepare sterile set for venous cut down, exchange transfusion, hemodialysis, peritoneal dialysis or other renal replacement therapy

- Contact ICU if the patients required mechanical ventilation. Gentle suction the secretions when necessary. No aggressive postural drainage procedure to prevent massive bleeding.

#### *Assessment*

- The patients receive immediate and proper management without any trauma or other complications

### **Hemoglobinuria/ hematuria**

#### *Nursing objective*

- Early detection of Hemoglobinuria/ hematuria.

#### *Nursing activities*

- Ask / observe the character of urine output. If it is dark-colored, coke or red-colored, notify doctors as soon as possible.

- Record the amount, character and send for urinary examination.

Keep samples for the doctors.

- Record both intake and urine output in ml/ 8 hours.

- Help doctors in Hct determination and blood drawing for cross matching.

- Give IV fluid and blood transfusion according to the treatment plan.

#### *Assessment*

- The patients receive appropriate management with IV fluid and/ or blood Otransfusion without complication of renal failure

## **Convalescence Phase**

Most children recover spontaneously after 24–48 hours of plasma leakage. They usually have good appetite and diuresis with proper management.

### **Signs and symptoms that indicate convalescence phase include:**

- Improve general conditions
- Return of appetite
- Stable vital signs with wide PP (pulse pressure), slow and strong pulse.
- Stable Hct at baseline level according to their age group (35–40%)
- Increase urine output, usually > 1–2 ml/kg/hr
- About 20–30% of DHF patients have convalescence rash.

Some children and adults may have the following complaints and problems:

- Itching with or without convalescence rash
- No appetite/ fatigue/ weakness
- Abdominal pain
- Hypervolemia/ hypertension / dyspnea / tachypnea
- Sinus bradycardia

### **Itching with or without convalescence rash**

#### *Nursing objectives*

- Decrease itching symptom
- Relieve anxiety

#### *Nursing activities*

- Explain that the rash and/or itching symptom indicates that the patients are in convalescence stage
- Advise the patients not to scratch for it may induce trauma/ bleed–

ing and possible skin infections

- Complete bed bath or let the patients take a bath by themselves in order that they will have clean and dry skin
- Use talc powder or calamine lotion over the rash or area of itching
- Notify doctors if severe itching that may need anti-histamines (hydroxyzine) if necessary.

*Assessment*

- Itching is relieved
- No families' anxiety

**No Appetite/ fatigue/ weakness**

Electrolyte imbalance; hyponatremia and hypokalemia may result in drowsiness and bowel ileus, so that the patients have poor appetite. Prolonged fatigue and weakness is usually found in adult patients.

*Nursing objectives*

- Return of appetite and have adequate food intake.

*Nursing activities*

- Check that the patients have clean teeth and oral cavities.
- Provide balanced diet according to the patients' preference (if possible).
- If the patients are drowsy with abdominal distension, encourage fruit juice or fruits. They may have bowel ileus from loss of potassium through diuresis.
- Reassure the patients that they are out of the critical phase and are in the stage of recovery.
- Notify the abnormal labs. results to the doctors for hypokalemia and elevation of AST/ ALT may be the causes of poor appetite, weakness and tiredness.
- Give medications according to the treatment plan.

### *Assessment*

- The patients have good appetite, no weakness and can take some food.

**Abdominal pain:** The management is the same as in febrile phase. It is more likely due to large amount of ascites.

## **Hyper-volemia/ hypertension/ dyspnea/ tachypnea**

### *Nursing objectives*

- Early detection and notify doctors of possible complication of fluid overload (congestive heart failure or acute pulmonary edema).
- Early and proper management of fluid overload.

### *Nursing activity*

- Monitor vital signs, notify doctors when
  - High BP, narrowing of pulse pressure may be observed in obese patients
  - Dyspnea/ tachypnea/ respiratory distress
  - Monitor intake including oral intake/ output accurately.
  - Observe physical signs of fluid overload e.g. puffy eyelids, abdominal distension/ very tense abdomen, edema of the extremities.
- Put the patients on Fowler's position or the most comfortable position for them.
- Administer oxygen via face mask (5 L/min) or nasal catheter (2-3 L/min) keep O<sub>2</sub> sat > 95%
- Notify to doctor for possible reduction or discontinuation of IV fluid. Use technique of saline lock/heparin lock if still needs to keep the vein open.
- Give furosemide IV or other medications according to the treatment plan.

### *Assessment*

- The patients recover uneventfully or have less respiratory distress with a large amount of urine pass.

### ***Assessment before discharge:***

- The patients have resumed normal activity and good appetite.
- No fever at least 24 hours without using any antipyretics.
- Normal Hct at baseline level or 38–40% in those older children and adults with no known baseline Hct level.
- At least 2 days after shock.
- No dyspnea, tachypnea or respiratory distress with clinically without pleural effusion and ascites
- Platelet count > 50,000 cumm.
- No other complications

### ***Caution before discharge DHF patients***

- Some cases may have low platelet count even in the convalescence phase. Platelets usually rise spontaneously within one week after critical period in > 90% of DHF/DSS patients. They have to avoid activities that are prone to trauma, e.g. sports, riding motorcycles or other aggressive behavior for 2 weeks after discharge. If they do need to have more invasive/ traumatic procedures, e.g. dental extraction, immunization, sport competition,.. Recommend to send for CBC, If platelet > 100,000 cells/cumm., they are able to do those invasive or traumatic procedures.

- There is no risk for spread of dengue virus, and the patients can go to school or work. The viremia period is only during the febrile phase.

- If people in the same house or in the neighborhood get sick with high fever, they are likely to have dengue infections. They should be taken to the hospital for proper diagnosis and management

- *Aedes aegypti* mosquitoes are the vector of dengue viruses. Ad-

vise how to get rid of both the adult mosquitoes and the larvae, both at home, work place and/or at school

- Prevent mosquito bite especially during daytime.
- Get rid of adult mosquitoes.
- Get rid of the containers which are the breeding places of Aedes mosquitoes.

### ***Indication for referral of dengue/ DHF/ DSS patients to the hospital***

Indications to refer suspected dengue patients from community health centers/ Health posts/ Clinics with limited human resources and facilities to the nearest referral hospitals for proper diagnosis and management including blood test for CBC

- Patients with high fever > 2 days with or without positive tourniquet test.

- Evidence of bleeding.
- Severe vomiting/ abdominal pain.
- Shock/ impending shock
- Hct > 45% or rising >10% from baseline level.
- High risk patients
  - Age < 1 year, elderly, obesity, pregnancy
  - Patients with underlying diseases e.g.G-6-PD deficiency,

Thalassemia, heart diseases.

- DHF grade IV or patients with prolonged shock
- Significant bleeding (in case no blood bank)
- Unusual manifestation e.g. consciousness change, convulsion,

restlessness, stupor, coma

- Family concern



## ***Indications for referral of DHF/ DSS/ EDS patients to referral/ tertiary care hospitals***

- All high risk patients
- Significant bleeding and no Blood Bank available
- DHF grade IV patients
- DHF grade III in which
  - Cannot reduce the rate of IV fluid from 10 cc/kg/hr after 2-3 hours of shock (in case that there is no Dextran-40).
  - After one dose of colloidal solution and the patients still has high Hct.
  - Repeated shock.
  - Patients with signs of fluid overload: massive plural effusion, very tense and distended abdomen with respiratory distress
- Parental concern, not adequate personnel

## **Necessary process before referring the DHF/DSS patients**

- Discuss with the family for the reasons to refer the patients. Explain clearly the process, further management in the referral hospital and finally the prognosis, especially in severe/ complicated cases.
- Contact doctors/ nurses or responsible person at the referral hospitals is necessary, for information/ discussion about the patients' conditions, management to stabilize the vital signs and possible corrections of any complications before refer. The contact person need to be notified/ identified for immediate management when arrival at the referral hospital. Good records of the history, physical examination, dengue or vital signs monitoring charts including the laboratory results of the patients are very important information to be handed to them.
- Referred form should be filled before transfer the patients, preferably by attending clinician. The contents in the referred form should in-

clude vital signs, time of shock, type and amount or rate of IV fluid and the time of administration, Hct (with baseline Hct if available), result of CBC especially platelet counts, blood sugar and the treatment or medications given.

- If the patients need blood transfusion and blood is readily available, transfuse the blood while transfer the patients to shorten the period of hypoxia due to not enough red cells.

- The patients should be stabilized and corrections of complications were done. Stable vital signs if possible are preferred before transfer for the best outcome. In severe/ complicated cases, doctors may have to accompany with unstable patients for possible emergency management during transportation.

- Medical personnel, at least nurses should accompany the patients while transportation.

### **Nursing care during transportation:**

- Monitor BP, PR, RR and capillary refill time
- Observe consciousness
- Give Oxygen and monitor O2 saturation
- Monitor rate of IV infusion according to the plan of management.

If the IV fluid is leaked, try to encourage oral ORS, if the patients are in good consciousness. Do not stop the ambulance to open the new line (if it is not really necessary).

- Record urine output while transfer.
- Contact the referral hospitals and notify if abnormal signs and symptoms are detected.

**Notification form for DHF/DSS patients:**

Name.....age.....sex.....  
Bed number .....body weight.....kgs IBW.....Kgs  
Date.....time.....filled by .....

1. Vital Signs Day of fever..... T.....°C  
Time after leakage/ shock.....hrs  
Pulse...../ min  full  moderate  weak  not palpable  
 Digital ...../ min  Manual  
BP..... mmHg by  Manual.....  Digital.....  
RR..... /min  Normal  Abnormal Dyspnea  Yes  No
2. CBC Date.....Hct.....% WBC.....Plt.....  
Date.....Hct.....% WBC.....Plt.....
3. Abnormal symptoms:  
 Nausea  vomiting .....times .....  
 Severe abdominal pain  
 Refuse to eat and drink, very thirsty  
 Very weak, drowsy, no fever  
 Restless, irritable  
 Cold clammy, mottling skin, capillary refill .....sec  
 Site of bleeding.....Amount of bleeding.....ml
4. Hct Base line..... % On admission .....% Hct before shock.....%  
Hct at shock.....% Hct at present time.....%  
Hct Increase ..... points Decrease .....points
5. Urine:  Urine pass this nurse shift.....ml  No urine  
 Urine pass in the past nurse shift.....ml equal to .....ml/kg/hr
6. IV Transfusion:  
 No IV  
 Rate.....ml/hr.  M.....ml/kg  M+5 .....ml/Kg  
 Hypotonic type..... ml in .....hrs  
 Isotonic type..... ml in .....hrs  
 10% Dextran -40..... ml in .....hrs  
 Other ..... ml in .....hrs  
 Total amount of IV fluid.....ml in.....hrs. before shock