LESSON PLAN
ON
DENGUE

Dr. S. RathiDevi

Name of the teacher	**:**	Dr. S. RathiDevi
Subject	**:**	**C**ommunity Health **N**ursing
Unit	**:**	
Topic	**:**	**Dengue**
Hours	**:**	**1 hour**
Date and time	**:**	
Class	**:**	M.Sc (N) Ii year
Level of the student	**:**	Higher level
Number of the students	**:**	**4**
Venue	**:**	Indirani College of Nursing
Teaching methods	**:**	Lecture cum discussion
Teaching aids	**:**	LCD, Chart, Black board

GENERAL OBJECTIVES:

The students will be able to gain knowledge regarding “Dengue” and develop desirable skills and attitude towards the care of client with “Dengue” at various settings.

SPECIFIC OBJECTIVES

At the end of the class, student will be able to

- meaning of dengue
- discuss the epidemiological determinants of dengue
- explain the transmission of dengue
- enlist the high risk patients
- describe the criteria for clinical diagnosis
- describe the clinical features and prevention of dengue
- explain the clinical management of dengue
- enumerate the outbreak control measures and nursing care for dengue

S.NO	SPECIFIC OBJECTIVE	TIME	CONTENT	TEACHERS ACTIVITY	LEARNERS ACTIVITY	AV AIDS	EVALUATION
1	meaning of dengue	2	**Meaning:** Dengue viruses are arboviruses capable of infecting humans, and causing disease. These infections may be asymptomatic or may lead to (a) "classical" dengue fever, or (b) dengue haemorrhagic fever without shock, or (c) dengue haemorrhagic fever with shock. **Problem statement** Dengue fever (DF) and its severe forms dengue haemorrhagic fever (DHF) · and dengue shock syndrome (DSS) have become major international public health concerns. Dengue and DHF is endemic in more than 100 countries in the WHO regions of Africa, the Americas, Eastern Mediterranean, South-East Asia and Western Pacific. The South-East Asia and Western Pacific regions are most seriously affected. Detection of all four serotypes has now rendered the countries hyperendemic. The countries of South-East Asia region are divided into 3 categories *(2).*	Explaining	Listening	Roller board	What is the meaning of dengue?

2	discuss the epidemiological determinants of	2	**INDIA** In India, the risk of dengue has shown an increase in recent years due to rapid urbanization, lifestyle changes and deficient water management including improper water storage practices in urban, peri-urban and rural areas, leading to proliferation of mosquito breeding sites. The disease has a seasonal pattern i.e. the cases peak after monsoon, and it is not uniformly distributed throughout the year. However, in the southern states and Gujarat the transmission is perennial. Dengue is endemic in 31 states/UTs. During 2013, about 74,168 cases were reported with 168 deaths. The case fatality rate was 0.22 per cent. As seen from Table 1, the highest number of cases were reported from Punjab followed by Tamil Nadu, Gujarat, Kerala and Andhra Pradesh. All the four serotypes i.e. dengue 1, 2, 3 and 4 have been isolated in India but at present DENV-1 and DENV-2 serotypes are widespread. **Epidemiological determinants** **Agent factors**	Explaining	Listening	Bulletin board	What are all the epidemiological determinants?

3	dengue explain the transmission of dengue	2	**(a) AGENT** : The dengue virus form a distinct complex within the genus *flavivirus* based on antigenic and biological characteristics. There are four virus serotypes which are designated as DENV-1, DENV-2, DENV-3 and DENV-4. Infection with any one serotype confers lifelong immunity to that virus serotype *(6).* The first infection probably sensitizes the patient, while the second infection with different serotype appears to produce immunological catastrophy. All four serotypes have been associated with epidemics of dengue fever (with or without DHF) with varying degree of severity. **(b) VECTOR** : *Aedes aegypti* and Aedes *Albopictus* are the two most important vectors of dengue. Aedes *aegypti* is a highly domesticated, strongly anthropophilic, nervous feeder (i.e., it bites more than one host to complete one blood meal) and is a discordant species (i.e., it needs more than one feed for the completion of the gonotropic cycle). **Transmission of disease** The Aedes mosquito becomes	Explaining	Listening	Black board	Explain the transmission of dengue?

			infective by feeding on a patient from the day before onset to the 5th day (viraemia stage) of illness. After an extrinsic incubation period of 8 to 10 days, the mosquito becomes infective, and is able to transmit the infection. Once the mosquito becomes infective, it remains so for life. The genital tract of the mosquito gets infected and transovarian transmission of dengue virus occurs when virus enters fully developed eggs at the time of oviposition. **Environmental factors** The population of Aedes *aegypti* fluctuates with rainfall and water storage. Its life span is influenced by temperature and humidity, survives best between 16°C-30°C and a relative humidity of 60-80 per cent. It breeds in the containers in and around the houses. Being a domestic breeder, it is a endophagic and endophilic. **Dengue in the community** A number of factors that contribute to initiation and maintenance of an epidemic include: (i} the strain of the virus, which may influence the magnitude and duration				

			of the viraemia in humans; (ii} the density, behaviour and vectorial capacity of the vector population; (iii} the susceptibility of the human population (both genetic factors and pre-existing immune profile); and (iv) the introduction of the virus into a receptive community. *DF/DHF syndrome* DF/DHF is characterized by the "iceberg" or pyramid phenomenon. At the base of the pyramid, most of the cases are symptomless, followed by DF,DHF and DSS. Clusters of cases have been reported in particular households or neighbourhoods due to the feeding behaviour of the vector. **Affected population** The population affected varies from one outbreak to another. Actual estimates can be made by obtaining clinical/ subclinical ratios during epidemics. In a well-defined epidemic study in North Queensland, Australia, with primary infection, 20% to 50% of the population was found affected.				

4	enlist the high risk patients	2	**Severity of the disease** The serotype that produces the secondary infection and, in particular, the serotype sequence are important to ascertain the severity of the disease. All the four serotypes are able to produce DHF cases. However, during sequential infections, only 2% to 4% of individuals develop severe disease. **High risk patients** The following host factors contribute to more severe disease and its complications : 1) infants and elderly ; 2) obesity; 3) pregnancy; 4) peptic ulcer disease; 5) women who are in menstruation or have abnormal bleeding; 6) haemolytic disease such as G-6PD, thalassemia and other haemoglobinopathies; 7) congenital heart disease; 8) chronic diseases such as diabetes mellitus, hypertension, asthma, ischaemic heart disease, chronic renal failure, liver cirrhosis; and	Explaining	Listening	Handout	What are the high risk group for dengue

5	describe the criteria for clinical diagnosis	4	9) patients on steroid or NSAID treatment. 10) **Clinical mainfestations** Dengue virus infection may be asymptomatic or may cause • undifferientiated febrile illness (viral syndrome}, • dengue fever(DF), or • dengue haemorrhagic fever (DHF} including dengue shock syndrome (DSS} **1. Undifferentiated fever** Infants, children and adults who have been infected with denuge virus, especially for the first time (Le. Primary dengue infection}, may develop a simple fever indistinguishable from other viral infection. Maculopapular rashes may accompany the fever or may appear during defervescence. Upper respiratory and gastrointestinal symptoms are common. **2. Classical dengue fever** All ages and both sexes are susceptible to dengue fever. Children usually have a milder disease than adults. The illness is characterized by an incubation period of 3 to 10 days (commonly 5-6 days). The onset is sudden, with chills and high fever,	Explaining	Listening	Power point	What is the clinical manifestation of dengue

			intense headache, muscle and joint pains, which prevent all movement. Within 24 hours retroorbital pain, particularly on eye movements or eye pressure and photophobia develops. Fever is usually between 39°C and 40°C. Fever is typically but not inevitably followed by a remission of a few hours to 2 days (biphasic curve). The skin eruptions appear in 80 per cent of cases during the remission or during second febrile phase, which lasts for 1-2 days. The rash is accompanied by similar but milder symptoms. The rash may be diffuse flushing, mottling or fleeting pin-point eruptions on the face, neck and chest during the first half of the febrile period and a conspicuous rash, that may be maculopapular or scarlatiniform on 3rd or 4th day. It starts on the chest and trunk and may spread to the extremities and rarely to the face. The rash lasts for 2 hours to several days and may be followed by desquamation Fever lasts for about 5 days, rarely more than 7 days after which recovery is usually complete				

			although convalescence may be protracted. The case fatality is exceedingly low. **3. Dengue haemorrhagic fever** Dengue haemorrhagic fever (DHF) is a severe form of dengue fever. The course of dengue illness can be divided into three phases-febrile phase, critical phase and recovery phase **1. Febrile phase** Following an incubation period of four to six days, the illness commonly begins abruptly with high fever accompanied by facial flushing and headache. Anorexia, vomiting, epigastric discomfort, tenderness at the right costal margin and generalized abdominal pain are common. During the first few days the illness usually resembles classical OF, but maculopapular rash usually rubelliform type, is less common. It may appear early or late in the course of the illness. Occasionally, the temperature may be 40°C to 41°C and febrile convulsions may occur particularly in infants. The major pathophysiologic changes that determine the severity of disease				

			in DHF and differentiate it from OF are plasma leakage and abnormal haemostasis, as manifested by a rising haematocrit value and moderate to marked thrombocytopenia. These two clinical laboratory changes are distinctive and constant findings. A positive tournicate test is the most common haemorrhagic phenomenon. The test is performed by inflating a blood pressure cuff to a a mid point between systolic and diastolic pressure for 5 minutes. The test is · considered positive when 10 or more petechiae per 2.5 x 2.5 cm (1 inch square) are observed. In DHF, the test usually gives a definite positive with 20 petechiae or more. **2. Critical phase** Around the time of defervescence, when the temperature drops to 37.5-38°C or less, and remains below this level, usually on days 3-7 of illness, an increase in capillary permeability in parallel with increasing haematocrit levels may occur. This marks the beginning of the critical phase. The period of clinically significant plasma leakage usually lasts 24-48				

			hours. Progressive leukopenia followed by a rapid decrease in platelet count usually precedes plasma leakage. At this point patients without an increase in capillary permeability will improve, while those with increased capillary permeability may become worse as a result of lost plasma volume. Shock occurs when a critical volume of plasma is lost through leakage. It is often preceded by warning signs of abdominal pain or tenderness, persistent vomiting, clinical fluid accumulation, mucosal bleeding, lethargy, restlessness, liver enlargement more than 2 cm. and oliguria. The body temperature may be subnormal when shock occurs. **3. Recovery phase** If the patient survives the 24-48 hour critical phase, a gradual reabsorption of extravascular compartment fluid takes place in the following 48-72 hours. General well-being improves, appetite returns, gastrointestinal symptoms abate, haemodynamic status stabilizes and diuresis ensues. Some patients may have a rash of "isles of white in the sea of red". Some may experience generalized				

			pruritus. Bradycardia and electrocardiographic changes are common during this stage. The haematocrit stabilizes or may be lower due to the dilutional effect of reabsorbed fluid. White blood cell count usually starts to rise soon after defervescence but the recovery of platelet count is typically later than that of white blood cell count. Respiratory distress from massive pleural effusion and ascites will occur at any time if excessive intravenous fluids have been administered. **4. Severe dengue** Severe dengue is defined by one or more of the following : (i) plasma leakage that may lead to shock (dengue shock) and/or fluid accumulation, with or without respiratory distress, and/or (ii) severe bleeding, and/or (iii) severe organ impairment. Patients with severe dengue may have coagulation abnormalities, but these are usually not sufficient to cause major bleeding. When major bleeding does occur, it is almost				

6	diagnosis describe the clinical features and prevention of dengue	3	always associated with profound shock since this, in combination with thrombocytopenia, hypoxia and acidosis, can lead to multiple organ failure and advanced disseminated intravascular coagulation. Massive bleeding may occur without prolonged shock in instances when acetylsalicylic acid (aspirin), ibuprofen or corticosteroids have been taken. **CRITERIA FOR CLINICAL DIAGNOSIS** A summary of clinical diagnosis of DF and DHF is as follows: **Dengue fever** *Probable diagnosis* Acute febrile illness with two or more of the following; headache, retro-orbital pain, myalgia, - · arthralgia/bone pain, - rash, - haemorrhagic manifestations, - leucopenia (wbc s 5000 cells/mm3), - thrombocytopenia (platelet count <150,000 cells/mm3), - rising haematocrit (5-10%); and at least one of following : - supportive serology on single serum	Explaining	Listening	Power point	Dengue diagnosis?

			sample: titre :2: 1280 with haemagglutination inhibition test, comparable IgG titre with enzyme-linked immunosorbent assay, or testing positive in lgM antibody test, and occurrence at the same location and time as confirmed cases of dengue fever. **Confirmed diagnosis** Probable case with at least one of the following : - isolation of dengue virus from serum, CSF or autopsy samples. - fourfold or greater increase in 1>erum lgG (by haemagglutination inhibition test) or increase in lgM antibody specific to dengue virus. - detection of dengue virus or antigen in tissue, serum or cerebrospinal fluid by immunohistochemistry, immunofluorescence or enzyme-linked immunosorbent assay. - detection of dengue virus genomic sequences by reverse transcription-polymerase chain reaction. **Dengue haemorrhagic fever** All of following : acute onset of fever of two to seven days duration. haemorrhagic				

			manifestations, shown by any of the following; positive tourniquet test, petechiae, ecchymoses or purpura, or bleeding from mucosa, astrointestinal tract, injection sites, or other locations. - platelet count S: 100,000 cells/mm3 . objective evidence of plasma leakage due to increased vascular permeability shown by any of the following : Rising haematocrit/haemoconcentration ~ 20% from baseline or evidence of plasma leakage such as pleural effusion, ascites or hypoproteinaemia/ albuminaemia. **Dengue shock syndrome** Criteria for dengue haemorrhagic fever as above with signs of shock including :tachycardia, cool extremities, delayed capillary refill, weak pulse, lethargy or restlessness, which may be. A sign of reduced brain perfusion. pulse pressure ~ 20 mmHg with increased diastolic pressure, e.g. 100/80 mmHg. hypotension by age, defined as systolic pressure <80 mmHg for those aged <5 years, or SO to 90				

			mmHg for older children and adults. **Laboratory diagnosis** Rapid and accurate dengue diagnosis is of a paramount importance for: (1) clinical management; (2) epidemiological surveillance; (3) research; and (4) vaccine trials. **1. Virus isolation** *:* Isolation of dengue virus from clinical specimens is possible provided the specimen is taken during the first six days of illness and processed without delay. Specimen that are suitable for virus isolation are acute phase serum, plasma or washed b\lffY coat from the patient,autopsy tissue from fatal case (especially liver, spleen, lymph nodes and thymus), and mosquitoes collected from the affected areas. **2**. **Viral nucleic acid detection** *:* Dengue viral genome which consists of RNA, can be detected by reverse transcriptase polymerase chain reaction (RT -PCR) assay and real time RT-PCR. In recent years, a number of RT -PCR assays have been reported for detecting dengue virus. They offer better specificity and sensitivity compared to virus isolation with a much more rapid				

			turnaround time. **3.** ***Immunological response and serological tests :*** Following tests are available for diagnosis of dengue infection: a. Haemagglutination inhibition assay (HIA); b. Complement Fixation (CF); c. Neutralization test (NT); d. IgM capture enzyme-linked immunosorbent assay (MAC-ELISA); e. Indirect lgG- ELISA, and f. IgM/IgG ratio **4.** ***Viral antigen detection :*** ELISA and dot blot assays directed against the envelop/membrane (EM) antigens and nonstructural protein 1 (NSl) can be detected in both patients with primary and secondary dengue infection upto 6 days after the onset of the illness. Commercial kits for the detection of NSl antigens are now available; however, these kits do not differentiate between the serotypes. Besides providing an early diagnostic marker for clinical management, it may also facilitate the improvement of epidemiological surveys of dengue infection.				

			5. ***Rapid diagnostic test (RDT)*** *:* A number of commercial rapid format serological test-kits for anti-dengue IgM and IgG antibodies have become available in the past few years, some of these producing results within 15 minutes. Unfortunately, the accuracy of most of these tests is uncertain since they have not yet been properly validated. **6. Analysis of haematological parameters :** Standard haematological parameters such as platelet count and haematocrit are important and are part of the diagnosis of dengue infection. They should be closely monitored. The diagnostic tests are summarized in Table 2.				
7	explain the clinical management of dengue	3	**CLINICAL MANAGEMENT** **Guidelines for treatment** A full blood count of the patient should be done at the first visit. In the absence of the patients baseline, age specific population haematocrit levels could be used as a surrogate during the critical phase. **1. Management of dengue fever**	Explaining	Listening	Pamp-hlet	What are the clinical management of dengue?

			These are patients who are able to tolerate adequate volumes of oral fluids and pass urine at least once every six hours, and do not have any of the warning signs, particularly when fever subsides. Those with stable haematocrit can be sent home after being advised to return to the hospital immediately if they develop any of the warning signs, and to adhere to the following action plan : (1) Encourage intake of oral rehydration solution (ORS), fruit juice and other fluids containing electrolytes and sugar to replace losses from fever and vomiting. Adequate oral fluid intake may be able to reduce the number of hospitalizations. {Caution : fluids containing sugar/glucose may exacerbate hyperglycaemia of physiological stress from dengue and diabetes mellitus.) (2) Give paracetamol for high fever if the patient is uncomfortable. The interval of paracetamol dosing should not be less than six hours. Tepid sponge if the patient still has high fever. Do not give acetylsalicylic acid (aspirin), ibuprofen or other non-steroidal anti-				

			inflammatory agents (NSA!Ds) as these drugs may aggravate gastritis or bleeding. Acetylsalicylic acid (aspirin) may be associated with Reye's Syndrome. (3) Instruct the care-givers that the patient should be brought to hospital immediately if any of the following occur; no clinical improvement, deterioration around the time of defervescence, severe abdominal pain, persistent vomiting, cold and clammy extremities, lethargy or irritability/ restlessness, bleeding (e.g. black stools or coffee-ground vomiting), not passing urine for more than 4-6 hours. Patients who are sent home should be monitored daily by health care providers for temperature pattern, volume of fluid intake and losses, urine output {volume and frequency), warning signs, signs of plasma leakage and bleeding, haematocrit, and white blood cell and platelet counts. **2. Management of DHF (Febrile Phase)** The management of febrile phase is similar to that of DF. Paracetamol is recommended to keep the				

			temperature below 39°C. Copious amount of fluid should be given orally, to the extent the patient tolerates, oral rehydration solution (ORS), such as those used for the treatment of diarrhoeal disesases and/or fruit juices are preferable to plain water. IV fluid may be administered if the patient is vomiting persistently or refusing to feed. Patients should be closely monitored for the initial signs of shock. The critical period is during the transition from the febrile to the afebrile stage and usually occurs after the third day of illness. Serial haematorcrit determinations are essential guide for treatment, since they reflect the degree of plasma leakage and need for intravenous administration of fluids. Haematocrit should be determined daily from the third day until the temperature has remained normal for one or two days. If haematocrit determination is not possible, haemoglobin determination may be carried out as an alternative. The details of IV treatment when required for patients.				

			3. Management of DHF Grade I and II Any person who has dengue fever with thrombocytopenia and haemoconcentration and presents with abdominal pain, black tarry stools, epistaxis, bleeding from the gums and infection etc needs to be hospitalized. All these patients should be observed for signs of shock. The critical period for development of shock is transition from febrile to abferile phase of illness, which usually occurs after third day of illness. A rise of haemoconcentration indicates need for IV fluid therapy. If despite the treatment, the patient develops fall in BP, decrease in urine output or other features of shock, the management for Grade III/IV DHF/ DSS should be instituted. Oral rehydration should he given along with antipyretics like paracetamol, sponging, etc. as descrilied above. The detailed treatment for patients with DHF Grade I and II is given in Fig. 3. **4. Management of DHF Grade III and IV**				

			Common signs of complication are observed during the a fehrile phase of DHE Immediately after hospitalization, the haematocrit, platelet count and vital signs should be examined to assess the patient's condition and intravenous fluid therapy should be started. The patient requires regular and sustained monitoring. If the patient has already received about 1000 ml of intravenous fluid, it should he changed to colloidal solution preferably Dextran 40/haemaccele or if haematocrit is decreasing, fresh whole blood transfusion 10 ml/kg/hour should be given. However, in case of persistent shock when, after initial fluid replacement and resuscitation with plasma or plasma expanders, the haematocrit continues to decline, internal bleeding should be suspected. It may he difficult to recognize and estimate the degree of internal blood loss in the presence of haemoconcentration. It is thus recommended to give fresh whole blood in small volumes of 10 ml/kg/hour for all patients in shock as a routine precaution. Oxygen should				

			he given to all patients in shock. The detailed graphical presentation of the treatment for patients with DHF Grades III and IV Indications of red cell transfusion 1. Loss of blood (overt blood) - 10 per cent or more of total blood volume - preferably give whole blood or components to be used. 2. Refractory shock despite adequate fluid administration and declining haematocrit. 3. Replacement volume should be 10 ml/kg body weight at a time and coagulogram should be done. 4. If fluid overload is present packed cells are to be given.Indications of platelet transfusion In general there is no need to give prophylactic platelet even at< 20,000/cu.mm. 1. Prophylactic platelet transfusion may be given at level of < 10,000/cu.mm. 2. Prolonged shock; with coagulopathy and abnormal coagulogram. 3. In case of systemic massive bleeding, platelet transfusion may be needed in addition to red cell				

			transfusion.				
8	enumerate the outbreak control measures and nursing care for dengue	2	**Criteria for discharge of patients** 1. Absence of fever for atleast 24 hours without the use of anti-pyretic drugs. 2. Return of appetite. 3. Visible clinical improvement. 4. Good urine output. 5. Minimum of 2-3 days after recovery from shock. 6. No respiratory distress from pleural effusion or ascites. 7. Platelet count> 50,000/cu.mm. **CONTROL MEASURES** **1. Mosquito control** The vectors of DF and DHF (e.g., *A.* aegypti) breed in and around houses and, in principle can be controlled by individual and community action, using antiadult and antilarval measures. These measures are outlined in chapter 12. **2. Vaccines** So far, there is no satisfactory vaccine and no immediate prospect of preventing the disease by immunization. **3. Other measures** Isolation of the patient under bed-	Explaining	Listening		

			nets during the first few days; individual protection against mosquitoes. The personal prophylactic measures are wearing of full sleeves shirts and full pants; use of mosquito repellent creams, liquids, coils, mats etc.; use of bed-nets for sleeping infants and young children during day time to prevent mosquito bite. The environmental measurements are detection and elimination of mosquito breeding places, management of roof tops, porticos and sunshades, proper covering of stored water, observation of weekly dry day.				

BIBLIOGRAPY:

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