UNIT 2 ASSESSMENT AND MANAGEMENT OF FEVERS

Structure

2.0 INTRODUCTION

In the previous unit you have learnt about the practical skills on basic life support. You have learnt in detail about some of the common communicable diseases under vector borne diseases in which fever is a symptom such as malaria, dengue, chickengunia, typhoid etc. in theory Block 3.

In this unit you get acquainted with a common condition seen in all ages and most of the illnesses i.e fever, its assessment, initial management and referral. This will include a review of definition, types, pathophysiology, common causes and signs and symptoms of fever followed by skills used in assessment and management of acute fevers, and fevers with rashes.

2.1 OBJECTIVES

After completing this unit, you should be able to:

- define fever;
- identify the pattern and types of fever;
- list the common causes; and signs and symptoms of fever;
- list the sites and methods of recording body temperature;
- assess the patients presenting with fever;
- describe the non-pharmacological and pharmacological treatment for common fevers; and
- provide initial management and refer the cases of common fevers appropriately.

2.2 FEVER: AN OVERVIEW

Let us now discuss about fever in details as given below:

2.2.1 What is Fever?

Fever, also known as **pyrexia** and **febrile response**, is defined as having a body temperature above the normal range (considered to be 37.5°C (99.5°F).

- Body temperature varies among individuals with a range of 0.3°C to 0.6°C (0.5°F to 1.0°F) and normal temperature too varies at various sites. (Table 2.1)
- Fever is a defence response of the body to an infection. An attempt should be made to find out the underlying cause.

Table 2.1: Average normal temperature for healthy adults at various sites

Oral	Rectal	Axillary	Tympanic	Forehead
37.0°C	37.5°C	36.5°C	37.5°C	34.4°C
98.6°F	99.5°F	97.7°F	99.5°F	94.0°F

2.2.2 Factors Influencing the Normal Body Temperature

Normal body temperature varies depending on many factors such as: age, sex,time of day, surroundings (ambient) temperature and activity level.

Note: A raised temperature is not always a fever.

2.2.3 Stages and Types of Fever

The course of typical fever has following characteristics as shown in Fig. 2.1.

- **Chill Stage:** The person experiences chills, shivers and feels cold even though the body temperature is rising. This stage resolves when the new set point a higher temp is achieved.
- **Plateau Stage:** The chills subside and the person feels warm and dry.
- **The Crisis (or) Flush i.e. Heat & Sweat Stage:** The hypothalamus set point drops initiating heat loss responses. The skin becomes warm and flushed because of vasodilatation. Diaphoresis assists in evaporative heat loss. Stages of fever are shown in Fig. 2.1.
- When fever 'breaks' client becomes a febrile.

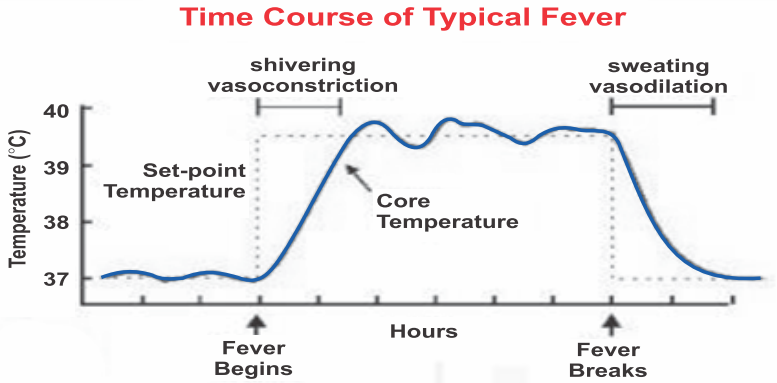


Fig. 2.1 : Stages of Fever

Types of Fever:

- **Continuous fever -** Temperature remains above normal throughout the day and does not fluctuate more than 1°C in 24 hours, e.g. lobar pneumonia, typhoid, meningitis, urinary tract infection, or typhus. Typhoid fever may show a specific fever pattern (*Wunderlich curve* of typhoid fever), with a slow stepwise increase and a high plateau.
- **Intermittent fever -** The temperature elevation is present only for a certain period, later cycling back to normal, e.g. malaria, or kala-azar
- **Remittent fever -** Temperature remains above normal throughout the day and fluctuates more than 1°C in 24 hours, e.g., infective endocarditis, brucellosis.
- **Pel-Ebstein fever -** A specific kind of fever associated with Hodgkin's lymphoma, being high for one week and low for the next week and so on. However, there is some debate as to whether this pattern truly exists.

Hyperthermia - Hyperthermia is high temperature that is not a fever. It occurs from a number of causes including heatstroke, neuroleptic malignant syndrome, stimulants such as amphetamines and cocaine, drug reactions etc.

2.2.4 Pathophysiology of Fever

Temperature is ultimately regulated in the hypothalamus. Infection causes a release of prostaglandin E2, (PGE2), which acts on the hypothalamus, which generates a systemic response back to the rest of the body, causing heat-creating effects to match a new temperature level. (Fig. 2.2).

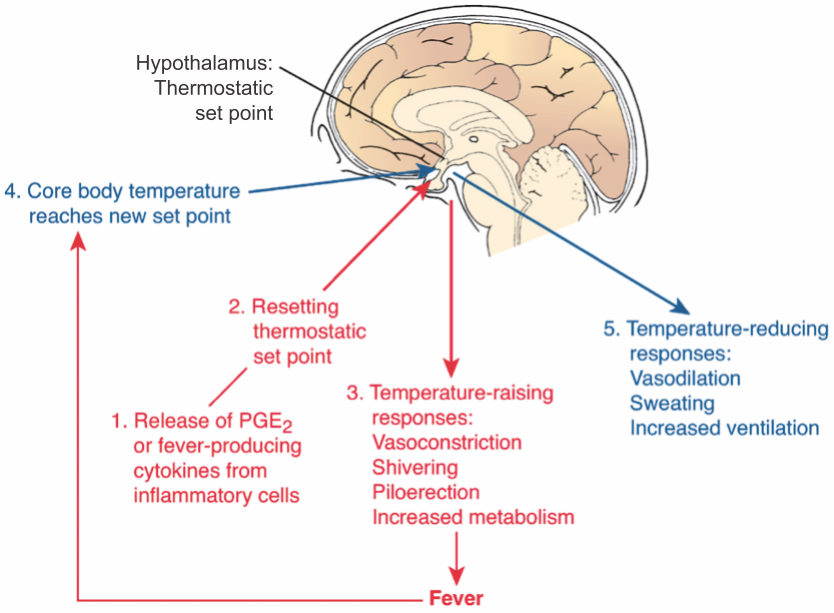


Fig. 2.2 : Pathphysiology of Fever

2.2.5 Signs/ Symptoms and Causes of Fever

You should assess by asking for associated illness among patient suffering from fever such as:

- Lethargy
- Depression
- Anorexia (low appetite)
- Sleepiness
- Myalgia (muscular pain)
- Hyperalgesia,(increased pain sensitivity)
- Decreased ability to concentrate

Remember:

- Rarely a fever may lead to convulsions in children
- Fevers do not typically go higher than 41 to 42°C (105.8 to 107.6°F)

Causes of Fever

There are several conditions, illnesses, and medicines that can cause fever. These include:

- Infections and infectious diseases such as influenza, common cold, HIV, malaria, and gastroenteritis. Infections are the most common cause of fever.
- Medicines such as antibiotics, narcotics, barbiturates, and antihistamines. These cause "drug fevers" due to adverse reactions, withdrawal, or by the drug's design.
- Trauma or injury such as a heart attack, stroke, heatstroke, heat exhaustion, or burns.

- Damage to tissue from haemolysis (breaking open of red blood cells to release haemoglobin) e.g. surgery, heart attack, and haemorrhage.
- Other medical conditions such as skin in flammation, arthritis, hyperthyroidism, some cancers, lupus, metabolic disorder, gout, and embolisms etc.

2.2.6 Sites to Record Body Temperature

These sites are:

- oral (sublingual)
- rectal/anal, axillary
- ear canal.

The most common route used for temperature recording is axillary due to issues such as safety, prevention of infection and convenience.

> **Note:** The most common route used and recommended for temperature recording in infants is axillary

- Body temperature is documented in either Celsius or Fahrenheit degrees.
  - To convert Celsius to Fahrenheit, multiply by 9/5 and add 32.
  - To change Fahrenheit to Celsius, subtract 32 and multiply by 5/9.

Types of thermometers: Let us go through various types of thermometers available to record temperature as given below:

i) **Digital thermometer** - It is a small hand-held device with a "window" showing the temperature in numbers. There are many kinds of digital thermometers. Most digital thermometers are easy to use and measure body temperature within seconds. **Most commonly used for all age groups.** (Fig. 2.3)

Fig. 2.3: Digital Thermometer

ii) **Clinical thermometer with mercury -** It is a thin glass tube with a silver tip and line inside. The silver tip and line is mercury. Mercury is a toxic and hazardous chemical. Hence its use is strongly discouraged. (Fig. 2.4)

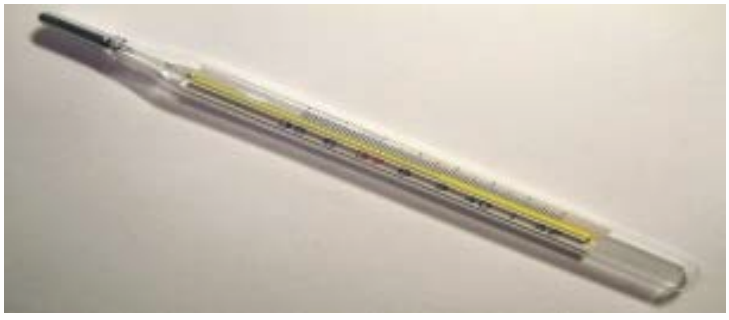


Fig. 2.4: Clinical Thermometer

iii) **Alcohol based glass thermometer:** This is a thin glass tube with a red or blue line inside it. Used for oral temperatures. Are safe to use for people over the age of 5. A child younger than 5 may bite the thermometer, breaking it in their mouth.

iv) **Tympanic thermometer -** It is shaped differently from normal digital thermometers because it is specifically designed to fit into the ear canal. They sense reflected infrared (heat) emissions from the tympanic membrane (eardrum).

v) **Plastic strip thermometer -** Strip-type, are held against the forehead, relatively popular for taking children's temperature, but quite variable in their accuracy.

Note: Considering the safety, easy availability and user friendly, easy to use technique, Digital thermometers are the most common thermometers used now-a-days.

2.2.7 Procedure for Recording Temperature

Let us go through recording of temperature by oral and axcillary routes as given below:

i) **Procedure for recording oral temperature using digital thermometer**

Ensure that person has not consumed anything hot or cold by mouth for 10 minutes before taking temperature by mouth.

1) Explain the procedure to the patient.
2) Take the thermometer out of its holder.
3) Put the tip into a new throw-away plastic cover if one is available. If you do not have a cover, clean the pointed end (probe) with soap and warm water or wiping with alcohol swab. Rinse it with cool water.
4) With patient's mouth open, put the covered tip under the tongue.
5) Ask the patient to close the lips gently around the thermometer.
6) Keep the thermometer under the tongue until the digital thermometer beeps.
7) Remove the thermometer when numbers show up in the "window".
8) Read the numbers in the window. These numbers are patient's body temperature.
9) Record the reading and interpret carefully considering normal values of different age group patients/clients.
10) Clean the thermometer from the stem to the tip using alcohol swab in a circular motion.
11) Place the thermometer back in its holder.

ii) **Procedure for recording axillary temperature**

The underarm or axillary area is commonly used to measure body temperature, although it's not considered as accurate as the mouth, rectum, or ear (tympanic membrane).

- The procedure is same as for oral temperature except the thermometer is placed in the axilla instead of mouth. (Fig. 2.5)
- Make sure the armpit is dry before you insert it. Place the probe into the middle of the armpit (pointing upwards toward the head) and then make sure

the arm is close to the body so the body heat is trapped. Wait atleast a few minutes or until the thermometer beeps with a reading.

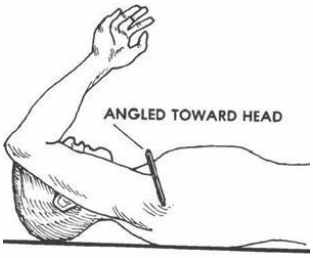


Fig. 2.5 : Recording axillary temperature

Note: In infants, place the thermometer along the bodyline with the probe into the middle of the armpit (pointing upwards toward the head)

Remember:

- Wait at least one hour after heavy exercise or a hot bath before taking body temperature (any site)
- Instruct patient not to talk, cough or bite the thermometer, after it is placed in mouth for oral temperature recording.
- For better accuracy, take readings from both armpits and then average the two temperatures together.
- Axillary measurements with a digital thermometer tend to be lower than other areas, with an average normal temperature being around 97.7°F (36.5°C).
- It is recommended to use individual thermometers, where possible, in order to prevent cross-infection/s.

2.3 ACUTE FEVER

The overall mean oral temperature for healthy adult individuals is 36.8 ± 0.4ºC, with a nadir (low) at 6 AM and a peak at 4–6 PM. A morning temperature of greater than 37.2ºC and an evening temperature of greater than 37.7ºC is often considered as fever.

2.3.1 Assessment

It is important to work towards finding the cause of fever as discussed earlier in this unit.

History and physical examination

- Record core body temp during each phase of febrile episode
- Identify the type/ pattern of fever: body temperature, onset of fever, duration, periodicity
- Obtain history of sequence of symptoms, any associated focal symptom(s) such as seizures, exposure to infectious agents and occupational history may be useful.
- Physical examination: Look for clues such as rash, lymphadenopathy, hepatomegaly, splenomegaly, abdominal tenderness, altered sensorium, neck stiffness, lung crepts, etc.
- Drug fever should be considered when the cause of fever is elusive.

Diagnostic tests

A large range of diagnoses may possibly be the cause of fever. If the history and physical examination suggest that it is likely to be more than a simple URI or viral fever, investigations are indicated.

The work-up should include

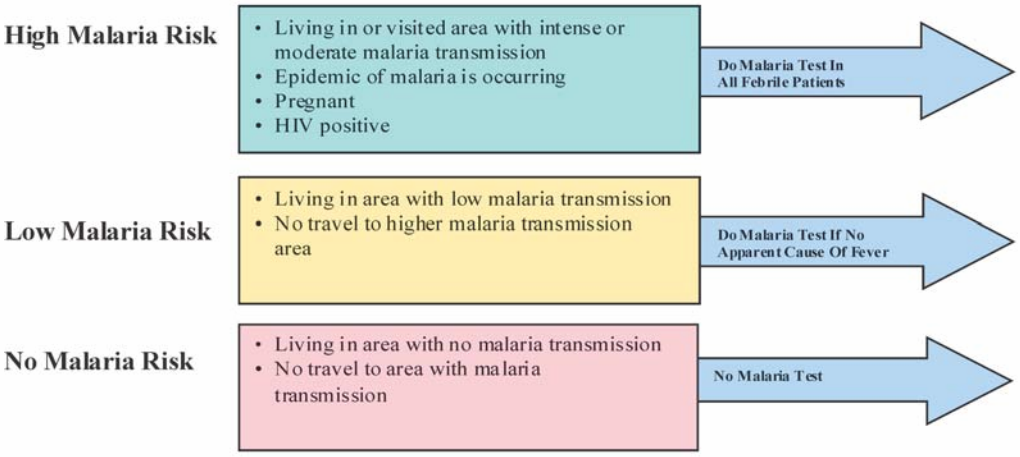
- A complete haemogram with ESR, smear for malarial parasite, blood culture, Widal test, urine analysis including urine culture
- An X-ray chest if fever continues beyond 2 weeks (even in the absence of respiratory symptom.
- Any abnormal fluid collection should be sampled.
- Ultrasonography is needed in some cases of acute fever such as in amoebic liver abscess.

For investigations that are not possible at health and wellness centre, refer the patient to a PHC, CHC or hospital where the needed facilities are available.

Table 2.1: Updated fever pages in the IMAI acute care guideline module

History taking: Does the patient have fever – by history of recent fever (within 48 hours) or feels hot or temperature 37.5°C or above?

If Yes, Ask	Look and Feel
• How long have you had a fever? • Any other problem • What medications have you taken? • Determine if antimalarial and for how long	• Look at the patient's neurological condition. • Is the patient: Lethargic? Confused? Agitated? • Count the breaths in one minute. Determine if fast breathing. If fast breathing, is it deep? • Check if able to drink. • Feel for stiff neck. • Check if able to walk unaided. • Skin rash? • Headache? For how long? • Look for apparent cause of fever – assess all symptoms in this Acute Care algorithm.
Decide malaria risk: ☐ High ☐ Low ☐ No • Where do you usually live? • Recent travel to a malaria area? • If woman of childbearing age – are you pregnant? • Is an epidemic of malaria occurring? • HIV positive? **If HIV status unknown, do/ refer for HIV test**	**Apparent causes of fever:** ☐ Dysentery ☐ Gastroenteritis ☐ Pneumonia ☐ Soft tissue or muscle infection ☐ Influenza/Bronchitis ☐ Severe or surgical abdominal problem ☐ PID ☐ Sinusitis ☐ Tonsillitis ☐ Sore throat Kidney infection Dental abscess



2.3.2 Treatment/Management

In acute febrile illnesses suggestive of viral or bacterial cause, fever should be symptomatically treated.

Non pharmacological	Pharmacological
• Keep the patient in a quiet and cool place. • Remove excess clothing. • Give hydrotherapy with tepid water (if temperature is above 39°celsius) (Fig. 2.6) • If the patient feels cold and begins to shiver, cover with a sheet or blanket • Advise rest and plenty of oral fluids.	• **Non-specific:** Tab. Paracetamol 500-1000 mg (max 4 g in 24 hours) 6-8 hourly. o (**Caution:** Reduce dose in frail elderly, adults weighing <50 kg and those at risk of hepatotoxicity) • **Specific:** Antibiotics/antimalarials depending upon the cause suggested by clinical and laboratory evaluation.

Remember:

- DO NOT use antipyretics in low-grade fever routinely. This may mask important clinical indications.
- DO NOT give Tab. Ibuprofen or aspirin as these may aggravate bleeding.

Initial Management and Referral

Based on the assessment, you can start the non pharmacological and non-specific pharmacological measures. In most cases of fever, patient may either recover spontaneously or with the non pharmacological and non-specific pharmacological measures.

If not, patient should be referred to higher facility like PHC, CHC or hospital.

Remember:

If the patient looks very sick and/ or has associated symptoms like diarrohoea or vomiting etc. it's better to put an intravenous cannula and then refer.

2.3.3 Patient Education

Do's	Don'ts
• Take plenty of fluids • Stay in cool environment • Wash/sponge face and limbs repeatedly • Maintain oral hygiene as oral mucous membrane dry easily from dehydration • Avoid Self-medication and over-medication	• Avoid injectable paracetamol/ NSAIDs. • Avoid covering patient having high fever with a blanket • Antibiotics should be taken only on advice of a physician

Table 2.2: Classification and management of fever in the updated IMAI acute care algorithm

Sign	Classification	Treatment
One or more of the following signs: • confusion, agitation or lethargy, • inability to drink, • inability to walk unaided, • stiff neck or • severe respiratory distress	Very severe febrile illness	• Give artemether (or quinine, if artemether is not available) intramuscularly. • Give first dose of antibiotics intramuscularly • Give glucose • Refer urgently to hospital • If fever is accompanied by bleeding (gums, skin, into eyes or urine) or if jaundice develops within 2 weeks of fever, report case to district clinician.
Malaria test positive	Malaria	Give appropriate oral antimalarial agent. • Look for other apparent cause and treat accordingly. • Consider HIV-related illness • If fever for 7 days or more, consider tuberculosis (send sputum sample, refer). • Follow up in 3 days if still febrile.

Sign	Classification	Treatment
Malaria test negative and/ orother apparent cause of fever (low malaria risk)	Non-malaria fever	**Sign Classification Treatment** • Treat according to apparent cause. • Consider HIV-related illness if unexplained fever for > 30 days. • Consider fever related to antiretroviral drugs (see *Chronic HIV care*). • If no apparent cause and fever for 7 days or more, send sputum samples for tuberculosis testing and refer to hospital for assessment. • Follow up in 3 days if still febrile.

SOME PROCEDURES: Let us go through the procedure for physical examination i.e. general and basic, followed by hydrotherapy as given below:

I) **Physical examination**

It is a thorough inspection or a detailed study of the entire body or some part of the body to determine the general, physical and mental condition of the patient. In your pre-service training you have already learnt about the purpose/s and the procedure for performing physical examination. Here is a brief review.

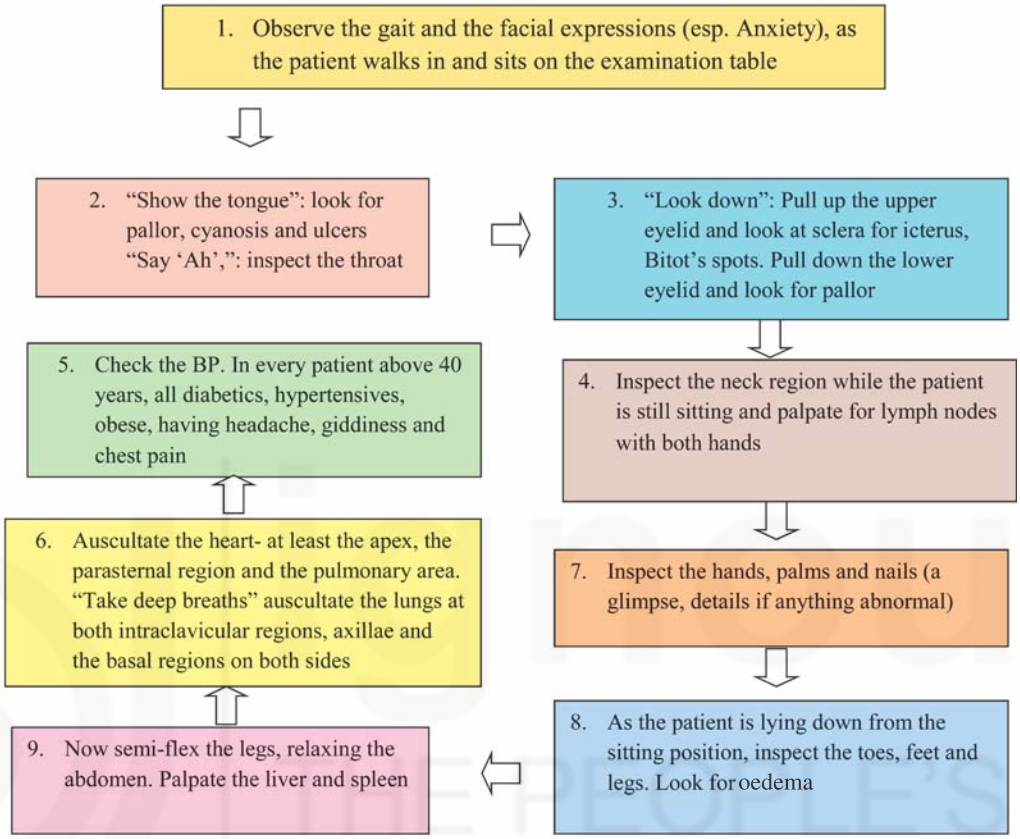
General examination of head to toe/ foot examination: This includes Anthropometry - height, weight

- **General appearance:** posture, body curves, movement, nourishment, body build, health and activity
- **Mental status:** consciousness, type of look (anxious, worried, depressed etc)
- **Skin conditions:** colour, texture, temperature, lesions
- **Head and face:** shape of the skull, fontanelles, head circumference, condition of the skalp and face
- **Eyes:** brows, lashes, lids, eye balls, conjunctiva, sclera, pupils, vision etc.
- **Ears:** external ear, typanic memberane, hearing
- **Nose:** external nares, nostrils
- **Mouth and pahrynx:** lips, odour, teeth, mucous memberane, gums. Tongue, throat and pharynx
- **Neck:** lymphnodes, thyroid glands
- **Chest:** thorax, breath sounds, heart and breast
- **Abdomen:** observation, auscultation, palpation and percussion
- **Extremeties:** joint movements, range of motion

- **Back:** spina bifida, abnormal curves
- **Genitalia:** inguinal lymph glands, vulva or testicles
- **Neurological tests:** co-ordination, reflexes, equilibrium, sensation tests

Basic Examination (Adult)

This is the basic examination that must be done in every adult patient, irrespactive of his/her complaints. It requires less than a minute and most of it overlaps with history taking.



II) **Hydrotherapy/ Cold application**

Cold is applied both by dry and moist methods. Dry cold is provided with ice bags, cold packs, or a hypothermia blanket (or pad). Cold and tepid sponging, cold pack and cold compresses are methods of applying moist cold. Cold and tepid sponging, and cold compresses and Ice caps are commonly used to reduce fever and are discussed here.

Cold and Tepid Sponging

Purpose is to reduce body temperature in hyperpyrexia. As you will not be able to do this procedure at sub-center but you must explain the family members to carry out the procedure for the patient at their home.

Articles required:

• Screen (if available at sub centre) • Long mackintosh with cover • Hot water bottle with cover • Large basin of water at 65°F/ Tepid water and a bowl	• Ice cap or cold compress for the head • Bottle of spirit (optional) • Glass of cold water • Towel

• Ice water in a jug • Bath thermometer • Six sponge towels/ clean cloth pieces	• Articles for recording body temperature: thermometer, spirit swabs and paper bag • 2 buckets for used water and linen

Procedure

1) Wash hands, take articles to bedside (at home set up/sub-center) and explain procedure to the patient
2) Screen the patient and remove all clothes. Cover patient with a sheet
3) Place mackintosh (rubber sheet) with cover under the patient
4) Apply ice cap or cold compress to the head, abdomen, axilla, and groin on one side
5) Place hot water bottle at the feet
6) Expose one side of the body and sponge it with gentle straight strokes using wet sponge clothes/ cloth pieces. Do not dry. Sponge one side for 8 minutes.
7) Same way sponge the other side of the body next.
8) Turn the patient to one side and sponge the back for 4 minutes using straight strokes.
9) Pat dry the back and rub with spirit (if available) and pat dry the body.
10) Remove wet sheets and mackintosh. Put the patient's clothes on.
11) Clean and replace all the articles.
12) After 20–30 minutes, check patient's temperature and record the procedure, (with time) and its effect.

Cold Compress

Cold Compress is a method of local moist cold application.

Purpose

1) To relieve headache
2) To reduce temperature
3) To prevent swelling in an injured area/ joint
4) To relieve pain and congestion

Articles required

1) A bowl with ice cold water and evaporative lotion (spirit and water in 1:3 ratio)
2) Pieces of folded gauge/ flannel/ soft cloth (8×8" size)
3) Mackintosh and towel to protect the bed

Procedure

1) Wash hands, explain procedure to the patient
2) Protect bed with mackintosh and towel
3) Immerse the gauge pad/ flannel/ soft cloth in cold water, wring it to remove excess of water, make sure water is not dripping

4) Apply it to the body part intended to receive application
5) Replace the compress as soon as it becomes warm
6) Continue for 15–20 minutes
7) Take temperature before and after the procedure and record
8) When procedure is over, remove compress, dry the part/s and make patient comfortable
9) Record procedure and effect
10) Wash and replace articles

Note: Family members/ patient can be taught how to do the cold compress.

Ice Cap/ ice bags

The ice cap application is a method of local dry cold application.

Purpose

1) To reduce fever
2) To relieve swelling and pain in an injured area/ joint
3) To check haemorrhage

Articles required

1) Ice cap with water - 1
2) Hot water bottle - 1
3) Mackintosh and bath towel - 1
4) Ice cubes and Salt
5) Face towels - 2
6) Jug of cold water

Procedure

1) Explain procedure to the patient
2) Assemble the articles
3) Break the ice into small pieces about the size of a walnut
4) Sprinkle the ice with salt to lower melting point of the ice
5) Test the ice bag for leakage by pouring some cold water in it
6) Empty the bag, and then fill the bag ½ with ice
7) Keep the bag on a flat surface, expel the air and screw the cap tightly
8) Wipe the outside of the bag and put the cover on the bag
9) Protect bed with mackintosh and towel
10) Apply it to the body part intended to receive application, for reducing fever it is kept on the head
11) It should rest lightly and then apply again
12) When the ice is melted, remove water and refill it if necessary and apply again
13) Take temperature before and after the procedure and record

14) When procedure is over, remove the cap and make patient comfortable

15) Record procedure and effect of the application

16) After removal empty the bag, wash with soap and water and then dry and powder it, blow in some air and keep in proper place

Note: Family members/ patient can be taught how to do the cold compress.

Hot water bottle may be used to keep the peripheries warm (if patient is feeling cold in other body parts that where cold application is given, then use hot water bottle for the patient comfort).

2.4 MALARIA

Parasitic infection due to protozoa of genus *Plasmodium* transmitted by the female Anopheles mosquito. There are four plasmodia species: *P. falciparum*, *P. vivax*, *P. malariae*, and *P. ovale*.

2.4.1 Salient Features

Malaria is an acute and chronic protozoan illness characterised by paroxysms of fever, chills, sweats, fatigue, anaemia and splenomegaly. In atypical cases, classical symptoms may not manifest.

Falciparum malaria (severe and complicated malaria) severe manifestations can develop over a short span of 12–24 hours and is associated in varying degrees with the following clinical signs:

- **Cerebral:** Mental clouding, coma, convulsions, delirium and occasionally localising signs.
- **Hyperpyrexia** (>40.5ºC), haemolysis, haematocrit <15% or Hb <5 g/dl, hypoglycaemia, oliguria, anuria, pulmonary oedema, macroscopic haemoglobinuria and jaundice.

2.4.2 Assessment

Obtain complete history of illness:

- Present complaints, fever characteristics such as severity, onset, duration, periodicity etc.
- Any other associated symptoms like convulsions, bleeding, urinary problems etc.

Physical examination:

- Head to toe examination
- Check vital signs: Temperature, Pulse, Respiratory Rate (T.P.R.) and B.P.
- Look for any pallor, rashes etc.

Investigations:

- Blood smear examination: During fever take blood from patients for thick and thin smear slides and examine for malaria parasite after proper staining. Thick smear for easy detection of parasite and thin smear for identification of species.

Note: Blood films may be negative even in a severe attack

- Rapid Diagnostic Tests (RDT) for diagnosis of Pf malaria in high Pf endemic areas/ where microscopy results are not obtainable within 24 hours of sample collection
- Haemoglobin (Hb)% and White Blood Cell count (WBC)

2.4.3 Treatment/Management

All fever cases suspected to be malaria should be investigated by microscopy or RDT. Patients of uncomplicated malaria can be managed at primary level but patients with severe malaria with complications should be admitted and managed in a hospital where facilities for detailed investigations and blood transfusion exist.

Principles of management of uncomplicated malaria

- Use of antimalarials.
- Hyperthermia: Tepid sponging, paracetamol tablet: 5mg/ kg body weight.
- Dehydration: I/V fluid, glucose saline.
- Convulsions: Diazepam 0.15 mg/kg body weight I/V slowly.
- Anaemia: Oral iron and folic acid tablet.

Treatment of *P. vivax* cases (Table 2.3)

Chloroquine: 25 mg/kg body weight divided over three days, i.e. 10 mg/kg on day 1, 10 mg/kg on day 2 and 5 mg/kg on day 3.

Primaquine: 0.25 mg/kg body weight daily for 14 days.

Table 2.3: Age-wise dosage schedule for treatment of *P. vivax* cases

Age (in years)	Tab Chloroquine (150 mg base)			Tab Primaquine (2.5 mg base
	Day-1	Day-2	Day-3	Day-1 to Day-14
<1	½	½	1/4	0
1-4	1	1	1/2	1
5-8	2	2	1	2
9-14	3	3	1/2	4
15 & above	4	4	2	6

* Primaquine is contraindicated in infants, pregnant women and individuals with G6PD deficiency. 14 days regimen of Primaquine should be given under supervision

Note: Patients should be instructed to report back in case of haematuria or high-coloured urine/cyanosis or blue colouration of lips and Primaquine should be stopped in such cases. Care should be taken in patients with anaemia.

Treatment of uncomplicated P. falciparum cases (Table 2.4)

Artemisinin based combination therapy (ACT): Artesunate 4 mg/kg body weight daily for 3 days plus Sulfadoxine (25 mg/kg body weight) -Pyrimethamine (1.25 mg/kg body weight) on first day.

(**Caution:** ACT is not to be given in 1st trimester of pregnancy).

Primaquine: 0.75 mg/kg body weight on day 2

Table 2.4: Age-wise dosage schedule for treatment of *P. falciparum* cases

Age (in years)	1st day			2nd day	3rd day
	Artesunate (50 mg)	SP*	Artesunate (50 mg) Base)	Primaquine (7.5 mg	Artesunate (50 mg)
<1	¼	¼	½	0	1/2
1-4	1	1	1	1	1
5-8	2	½	2	2	2
9-14	3	2	3	4	3
15 & above	4	3	4	6	4

Treatment of uncomplicated P. falciparum cases in pregnancy

1st trimester: Quinine salt 10 mg/kg 3 times daily for 7 days (**Caution:** Quinine may induce hypoglycaemia; pregnant women should not start taking quinine on an empty stomach and should eat regularly, while on quinine treatment).

2nd and 3rd trimesters: ACT as per dosage given above.

Treatment of mixed infections (P. vivax + P. falciparum) case

All mixed infections should be treated with full course of ACT and Primaquine 0.25 mg per kg daily for 14 days.

Note:

- In cases where parasitological diagnosis is not possible due to non-availability of either timely microscopy or RDT, suspected malaria cases should be treated with full course of chloroquine, till the results of microscopy are received.
- Once the parasitological diagnosis is available, appropriate treatment as per the species, is to be administered.

Presumptive treatment with chloroquine is no more recommended.

Resistance to treatment:

- Resistance should be suspected, if in spite of full treatment with no history of vomiting, diarrhoea, patient does not respond within 72 hours, clinically and parasitologically.
- Such cases not responding to ACT, should be treated with oral Quinine with Tetracycline/Doxycycline.
- These instances should be reported to concerned District Malaria/State Malaria Officer/ROHFW for initiation of therapeutic efficacy studies.

Criteria for Referral of severe malaria cases:

- Persistence of fever after 24 hours of initial treatment
- continuous vomiting and inability to retain oral drugs
- headache continues to increase
- severe dehydration – dry, parched skin, sunken face, too weak to walk in the absence of any other obvious reason
- change in sensorium e.g. Confusion, drowsiness, blurring of vision, photophobia, disorientation
- convulsions or muscle twitchings
- bleeding and clotting disorders
- suspicion of severe anaemia, jaundice, or hypothermia

Remember:

Severe malaria is an emergency and these patients should be referred to a hospital where facilities for detailed investigations and blood transfusion exist.

Monitoring

- Monitor core temperature (preferably rectal), respiratory rate and depth, pulse, blood pressure and level of consciousness every 4 hours;
- Record urine output, and look for the appearance of brown or black urine (haemoglobinuria) or oliguria;
- Monitor therapeutic response, both clinical and parasitological, by regular observation and blood films;
- Carry out regular laboratory evaluation of haematocrit or haemoglobin, glucose, urea or creatinine and electrolytes (Refer if facilities not available)
- Avoid drugs that increase the risk for gastrointestinal bleeding (aspirin, corticosteroids).

2.4.4 Patient Education

Your role as MLHP is to educate and make people aware of to stop mosquito breeding and protect from mosquitoes, e.g. mosquito nets,

- Fever without any other signs and symptoms should be reported to nearest health facility.
- Take Chloroquine with plenty of water after food and not on empty stomach.
- If chloroquine syrup is not available for children, the tablet should be crushed and given with honey or thick syrup.
- Watch for side effects of drugs prescribed. Chloroquine may cause nausea, vomiting and diarrhoea, mild headache and skin allergy/rash.
- If vomiting occurs within 30 minutes of chloroquine intake, repeat the dose of chloroquine.

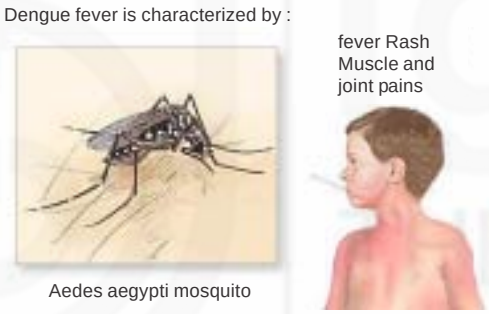
- Chloroquine, primaquine and sulphadoxine + pyrimethamine should not be given, if patient is suffering from G6PD deficiency. G6PD is one of many enzyms which help in carbohydrate metabolism to provide energy. It is enzyme deficiency which can cause haemolytic anaemia.
- Report back if haematuria or high-coloured urine, cyanosis develops; stop primaquine immediately.
- If no improvement after 48 hours or if condition worsens, occurrence of cerebral malaria symptoms, seek medical help immediately.

2.5 DENGUE

Dengue is the most important emerging tropical viral disease of human beings in the world today. *Aedes aegypti*, a day time mosquito, is the principal vector in India and countries of South-east Asian region, mostly seen in rainy season or in months following rainy season. All cases of dengue fever should be reported. Please refer for more details in BNS-041, Block 3, Unit 1.

Types of dengue fever

All four dengue virus types (Den 1, 2, 3 and 4) infections may be asymptomatic or may lead to: Classical dengue fever (DF), Dengue haemorrhagic fever (DHF) and Dengue shock syndrome (DSS).



Aedes aegypti mosquito

2.5.1 Salient Features

Let us discuss characteristic features related to dengue fever as given in Box below:

- **Dengue fever** is an acute febrile illness of 2-7 days duration with two or more of the following manifestations: Headache, retro-orbital pain, myalgia/arthralgia, rash, haemorrhagic manifestation (petechiae and positive tourniquet test) and leucopenia.
- **Diagnosis:**
  - Confirmation of diagnosis of DF is based on demonstration of IgM antibody specific for dengue virus.
  - Total leucocytes count is either normal or decreased.
  - Platelet count is less than normal.
- **Dengue haemorrhagic fever (DHF):** If one or more of the following are present: Positive tourniquet test, petechiae, ecchymosis or purpura, bleeding from mucosa, injection or other sites, haematemesis or melaena,

thrombocytopenia (platelets 100,000/mm^3 or less) and evidence of plasma leakage.

- **Dengue shock syndrome (DSS):** All the above criteria of DHF plus signs of circulatory failure.

2.5.2 Assessment

- Obtain complete history:
  - Present complaints, fever characteristics - onset, duration, periodicity etc.
  - Any other associated symptoms like Headache, retro-orbital pain, myalgia/arthralgia, rash, haemorrhagic manifestation (petechiae and positive tourniquet test) and leucopenia, bleeding, urinary problems etc.
- **Physical examination**
  - Head to toe examination
  - Check vital signs: Temperature, Pulse, Respiratory Rate (T.P.R.) and B.P.
  - Perform tourniquet test
  - Look for any pallor, rashes etc.
- **Investigations**
  - Complete Blood Count (CBC) and Hematocrit
  - ELISA, NS1 (non-structural protein), Rapid dengue test kit

How to perform the tourniquet test:

Inflate the blood pressure cuff to a point mid-way between the systolic and diastolic pressures for 5 minutes. A test is considered positive, when 10 or more petechiae per 2.5 cm^2 are observed. In DHF, the test usually gives a definitive positive result (i.e. >20 petechiae). The test may be negative or mildly positive during the phase of profound shock.

Attention: Look for danger signs	
• Fast breathing	• Haemetemesis
• Severe abdominal pain	• Bleeding from gums
• Continuous vomiting	• Cold and clammy skin
• Restlessness	• Delayed capillary refill time(>2 sec)

2.5.3 Treatment/ Management

Let us discuss treatment and management as given below:

DF/DHF has an unpredictable course. Most patients have a febrile phase lasting 2–7 days followed by a critical phase (2–3 days), during this phase, the patient is afebrile and is at risk of developing DHF/DSS. A patient can progress from DHF to DSS and depending on the stage of the disease when the patient reports, a

mixed picture can be seen. DHF is classified into four grades of severity, where grades III and IV are considered to be DSS. The presence of thrombocytopenia with concurrent haemoconcentration differentiates grades I and II DHF from DF.

Grade I : Fever accompanied by non-specific constitutional symptoms; the only haemorrhagic manifestation is a positive tourniquet test and/or easy bruising.

Grade II : Spontaneous bleeding in addition to the manifestations of grade I patients, usually in the form of skin or other haemorrhages.

Grade III : Circulatory failure manifested by a rapid, weak pulse and narrowing of pulse pressure or hypotension, with the presence of cold, clammy skin and restlessness.

Grade IV : Profound shock with undetectable blood pressure or pulse.

A) **DF and DHF during febrile phase**

Most cases of DHF grade I can be managed on outpatient basis:

Nonpharmacological	Pharmacological	Patient Education
• Rest and plenty of oral fluids or ORS • Follow-up daily until temperature is normal • Check haematocrit daily where possible • Check for signs of severe illness	• Tab. Paracetamol 500 mg 6 hourly (not more than 4 times in 24 hours) • ORS in patients with dehydration **Caution** • No role of antibiotics, steroids; • Do Not give aspirin or ibuprofen as these medicines may aggravate bleeding	• Instruct patient to report immediately, if any of the following danger signals appear: • Severe abdominal pain • passage of black stools • bleeding into the skin or from the nose or gums • sweating and cold skin

Indications for hospitalisation

- Signs of significant dehydration: Tachycardia, increased capillary refill time (>2 seconds), cool, mottled or pale skin, diminished peripheral pulses, changes in mental status, oliguria, sudden rise in haematocrit or continuously elevated haematocrit despite administration of fluids, narrowing of pulse pressure (<20 mmHg), hypotension (a late finding representing uncorrected shock).
- **Note:** Initiate IV therapy with crystalloid fluids such as 5% dextrose in normal saline 6 ml/kg/h for 1–2 h and REFER the patient to PHC/ CHC or District Hospital.

B) **DHF grade III (with circulatory failure) and grade IV (profound shock with undetectable blood pressure and pulse)**

Initial management and referral - Initiate IV therapy with crystalloid fluids such as 5% dextrose in normal saline 6 ml/kg/h for 1–2 h. And IMMEDIATELY

REFER to a hospital where trained personnel can manage shock and where blood transfusion facilities are available

Monitor - Monitor patient's progress

- **Improvement -** Haematocrit falls, pulse rate and blood pressure stable, urine output rises.
- **No improvement -** Haematocrit or pulse rate rises, pulse pressure falls below 20 mmHg, urine output falls.
- **Unstable vital signs -** Urine output falls, signs of shock.

2.5.4 Patient Education

- Carefully watch for danger signs and immediately report to a doctor. Do Not wait.
- Do not take aspirin or ibuprofen for fever or pain.
- The complications usually appear between the third and fifth day of illness.
- Watch the patient for two days after the fever disappears. Arthralgia may continue longer but eventually resolves with no sequelae.
- Give large amounts of fluids (water, soups, milk and juices) along with normal diet.
- All control efforts should be directed against the mosquitoes and prevent mosquito bites by using appropriate full sleeved clothing, repellent creams, bed nets, etc.

2.6 CHIKUNGUNYA

Chikungunya is caused by an arbovirus and transmitted by *Aedes aegypti* mosquito. It resembles dengue fever, it is rarely life-threatening. After an incubation period of 4–7 days, symptoms last for 3–7 days. Severe cases of chikungunya can occur in the elderly, in the very young (newborns) and in those who are immunocompromised.

2.6.1 Salient Features

- Sudden onset of flu-like symptoms including fever, chills, headache, nausea, vomiting, severe joint pain (arthralgia) and rash.
- Rash may appear at the outset or several days into the illness; its development often coincides with falling of an elevated temperature, which takes place around day 2 or day 3 of the disease.
- The rash is most intense on trunk and limbs.
- Migratory polyarthritis usually affects the small joints. The joints of the extremities in particular become swollen and painful to touch.
- Although rare, the infection can result in meningoencephalitis, especially in newborns and those with pre-existing medical conditions.
- Pregnant women can pass the virus to their foetus.
- Haemorrhage is rare and all but a few patients recover within 3–5 days.

- Residual arthritis, with morning stiffness, swelling and pain on movement may persist for weeks or months after recovery.

2.6.2 Assessment

- Obtain complete history:
  - Present complaints, fever characteristics such as severity, onset, duration, periodicity etc.
  - Any other associated symptoms like chills, headache, nausea, vomiting, severe joint pain (arthralgia) and rash
- Physical examination: Head to toe examination, Check vital signs

Diagnosis:

Serology test (ELISA, PCR): Refer to CDU or PHC/CHC/DH for test.

2.6.3 Treatment/Management

Treatment is mainly supportive as there is no specific treatment and is same as for dengue (For details see section on Dengue).

Dengue fever and chikungunya outbreaks evolve quickly, requiring emergency actions to immediately control infected mosquitoes in order to interrupt or reduce transmission and to reduce or eliminate the breeding sites of the vector mosquito, *Ae. aegypti*.

2.7 TYPHOID OR ENTERIC FEVER

It is caused by *Salmonella typhi* and *paratyphi*. *Salmonella typhi* causes a variety of illnesses including asymptomatic carriage, gastroenteritis, enteric fever, etc.

2.7.1 Salient Features

The onset of fever is typically gradual, continuous (temperature up to 40°C) with constitutional symptoms like malaise, anorexia, lethargy, headache, constipation or diarrhoea (pea-soup stool), etc. which may be associated with abdominal pain and tenderness, and/or chronic abdominal pain and tenderness, hepatomegaly, splenomegaly. Usually, the patient is sick and toxic looking with a coated tongue and has a soft splenomegaly. Typhoid fever can present atypically in young infants as an acute febrile illness with shock and hypothermia.

Examination may reveal a toxic look with relative bradycardia and mild soft splenomegaly. Complete blood counts in most cases with typhoid fever are normal. Leucopenia or pancytopenia is seen in 10–25% cases.

Diagnosis is suggested by rising titers of 'O' antibodies (Widal test) and confirmed by isolation of organism in blood culture, bone-marrow, urine or stool. Level of 1 in 160 dilution or more is taken as positive test. Widal test may be negative in cases with fever of less than 5–7 days duration. Blood culture and sensitivity testing/ IgM.

Complications like hepatitis, peritonitis, meningitis, pneumonitis, and myocarditis can occur, usually after the first week.

2.7.2 Assessment

Diagnosis is based on the following :

- History: Obtain complete history with present complaints like fever and its characteristics.
- Physical examination:
  - Head to toe examination
  - Look/ feel for associated symptoms like abdominal pain and tenderness, hepatomegaly, splenomegaly, toxic look, relative bradycardia
- Investigations:
  - Hemogram, Complete Blood Count, Widal test, Blood culture, urine and stool culture

Note: Refer to PHC/CHC or DH for investigations not available at HWC.

2.7.3 Treatment/ Management

Specific therapy. Multidrug resistance is prevalent among *S. typhi*. Antibiotics are recommended on the basis of available institutional culture and sensitivity pattern or epidemiological data. (Table 2.5)

Table 2.5: Specific therapy for uncomplicated enteric fever

Uncomplicated Enteric Fever	Enetric Fever in Children Uncomplicated Enteric Fever
Tab. Ciprofloxacin 10 mg/kg in 2 divided doses, up to a maximum of 750 mg twice a day for 10-14 days (for 1 week after the fever subsides). Oral drug should be taken about an hour after meals and not on empty stomach. Or Tab.Ofloxacin 200-400 mg daily for 5-7 days. Or Cap. Azithromycin 10-20 mg/kg (max 500 to 1000 mg/day) once daily for 5 days.	Tab. Cefixime 10-20 mg/kg/day in 2 divided doses for 14-21 days. Or Tab. Chloramphenicol 50-75 mg/kg/day in 4 divided doses for 14-21 days Or Cap. Ampicillin 75-100 mg/kg/day in 4 divided doses for 14 days Or Tab. Cotrimoxazole (8TMP +40SMX)/ day in 2 divided doses for 14 days. Or Cap. Azithromycin 10-20 mg/kg (max 500 to 1000 mg/day) once daily for 7 days.
The usual duration of antibiotic treatment is 10-14 days or at least 7 days after the patient has become afebrile. Intravenous therapy is used during acute phase among the admitted patients. Less sick patients can be treated with oral drugs on an outpatient basis.	

Initial management

- **Adequate nutrition and hydration** should be maintained ensuring adequate intake either orally or with intravenous fluids.
- **Management of fever** (see section on acute fever):
  - Use antipyretics judiciously as they can cause precipitous fall in temperature and even shock, in enteric fever.
  - Hydrotherapy is preferred for fever management in such patients.
- **Refer:** to PHC/CHC or DH
  - For confirmation of diagnosis, if you suspect enteric fever based on clinical presentation
  - In case of already confirmed severe enteric fever
  - if patient is very sick, not accepting orally with inadequate urine output, patient has altered sensorium/drowsiness or is having very high pyrexia particularly in the second week of illness when the risk of complications increases or if the complications have already ensued
  - Patient worsens or fails to show any response to therapy in 4–7 days or so

Remember:

Before referring the patient, insert IV cannula and start I/V fluid infusion.

- **Monitor:** For complications and usual indications for hospitalisation- Myocarditis (fall in perfusion and BP, arrhythmias), altered sensorium, shock (tachycardia, cold clammy skin, diaphoresis, hypotension), perforation peritonitis (acute pain in abdomen, guarding, rigidity, hypotension, bilious vomiting).

2.7.4 Patient/Parent Education

- Continue small frequent feeds. Give plenty of oral fluids and compensate for increased fluid loss from the body due to high grade fever.
- Fever usually lasts 5–7 days even after starting effective treatment in most cases. Frequent change of therapy should, therefore, be avoided.
- The treatment should be completed till the patient has been afebrile for at least 7 days as incomplete treatment increases the risk of relapse and emergence of resistance.
- Inform the caregivers of the patients about the complications as described above.
- Ciprofloxacin and ofloxacin are very bitter and cause severe nausea and gastritis. Patient should be asked to report any missed doses due to vomiting.
- Three types of vaccines are available to prevent this disease (see section on immunisation for details).

2.8 LET US SUM UP

In this unit you reviewed the definition of fever and its types, pathophysiology, common causes and signs and symptoms. You also reviewed the methods of

recording temperature and providing cold therapy. Fever is a common manifestation seen in several conditions like infections, trauma, cancer and use of certain medicines. Some common fevers are those seen in malaria, dengue, chikungunya and typhoid etc. In this unit you learnt about the assessment, initial management and referral for common fevers and fever with rash. Appropriate assessment and management can minimise the risk for complications and their consequences.

2.9 ACTIVITY

A 35 year old male (Weight 60 kg) walks in the centre complaining of fever for last one day. There is no chills/ rigors or sweating. No associated symptoms like skin rash, lethargy, confusion, restlessness, stiff neck. Patient is able to drink. On examination, Temperature: 39.6^{o}C, Pulse: 90/minute, Respiration: 26/min, B.P. 116/ 80; malaria test: negative; no apparent cause of fever seen.

How will you manage this case?

- Visit the OPD and perform complete assessment of a case of fever.
- Guidelines
  - History taking
  - Fever: severity, onset, duration, periodicity

    .....

    .....
  - Associated symptoms

    .....

    .....
  - Any medicines taken

    .....

    .....
  - Physical examination

    .....

    .....
  - Investigations to be carried out (if any)

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