

MODULE

# *Acute Febrile Illness (AFI)*

For the Ethiopian Health Center Team



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Jimma University

In collaboration with the Ethiopia Public Health Training Initiative, The Carter Center,  
the Ethiopia Ministry of Health, and the Ethiopia Ministry of Education

2003



Funded under USAID Cooperative Agreement No. 663-A-00-00-0358-00.

Produced in collaboration with the Ethiopia Public Health Training Initiative, The Carter Center, the Ethiopia Ministry of Health, and the Ethiopia Ministry of Education.

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## ACKNOWLEDGEMENT

We would like to express our deep appreciation to The Carter Center, Atlanta Georgia, for funding of the activities in the development of this module. The invaluable, dedicated contribution of Professor Dennis Carlson, Advisor to The Carter Center is greatly appreciated in the conceptualization, development and revision of this module.

We are indebted to the team of Gondar University College, Addis Ababa University Faculty of Medicine, Dilla College of Teachers Education and Health Sciences and Alemaya University for reviewing the module and giving us extremely important comments.

The input of many academicians at home and abroad has contributed to the development of this module. The following academicians deserve special appreciation for taking their invaluable time in reviewing the module, namely: Dr. Daniel Fekade (AAU-FOMS), Dr. Troy Jacobs (Department of Pediatrics, Harbor view Medical Center, University of Washington, USA), Roy E Brown (New York, USA)

We also like to extend our thanks to the Faculty of Medical Sciences, Faculty of Public Health, Community Health Programme, Health Officers Programme, School of Nursing, School of Medical Laboratory Technology, and School of Environmental Health of Jimma University for allowing the team to work on the module. We are also grateful to Ms. Carla Gale, the Resident Technical Advisor and Mr. Aklilu Mulugeta for logistic support during the process of development of the module.

# **UNIT ONE**

## **INTRODUCTION**

### **1.1. PURPOSE AND THE USE OF MODULE**

The scarcity of relevant teaching or learning materials in the higher training institutions of Ethiopia has been one of the bottlenecks in effecting efficient task oriented and problem solving training. Preparation of teaching materials that will meet the aforementioned mission is an activity that should in no way be postponed or delayed.

Therefore, the purpose of this module is to enable students to develop adequate knowledge, attitude and practical skills through interactive and participatory learning. This module will help the health center team comprising of health officers, public health nurses, laboratory technicians and sanitarians to correctly identify cases of acute febrile illness (AFI) and manage them effectively as team members. For this reason separate satellite modules are prepared for each professional category of the health center team based on the tasks expected of them.

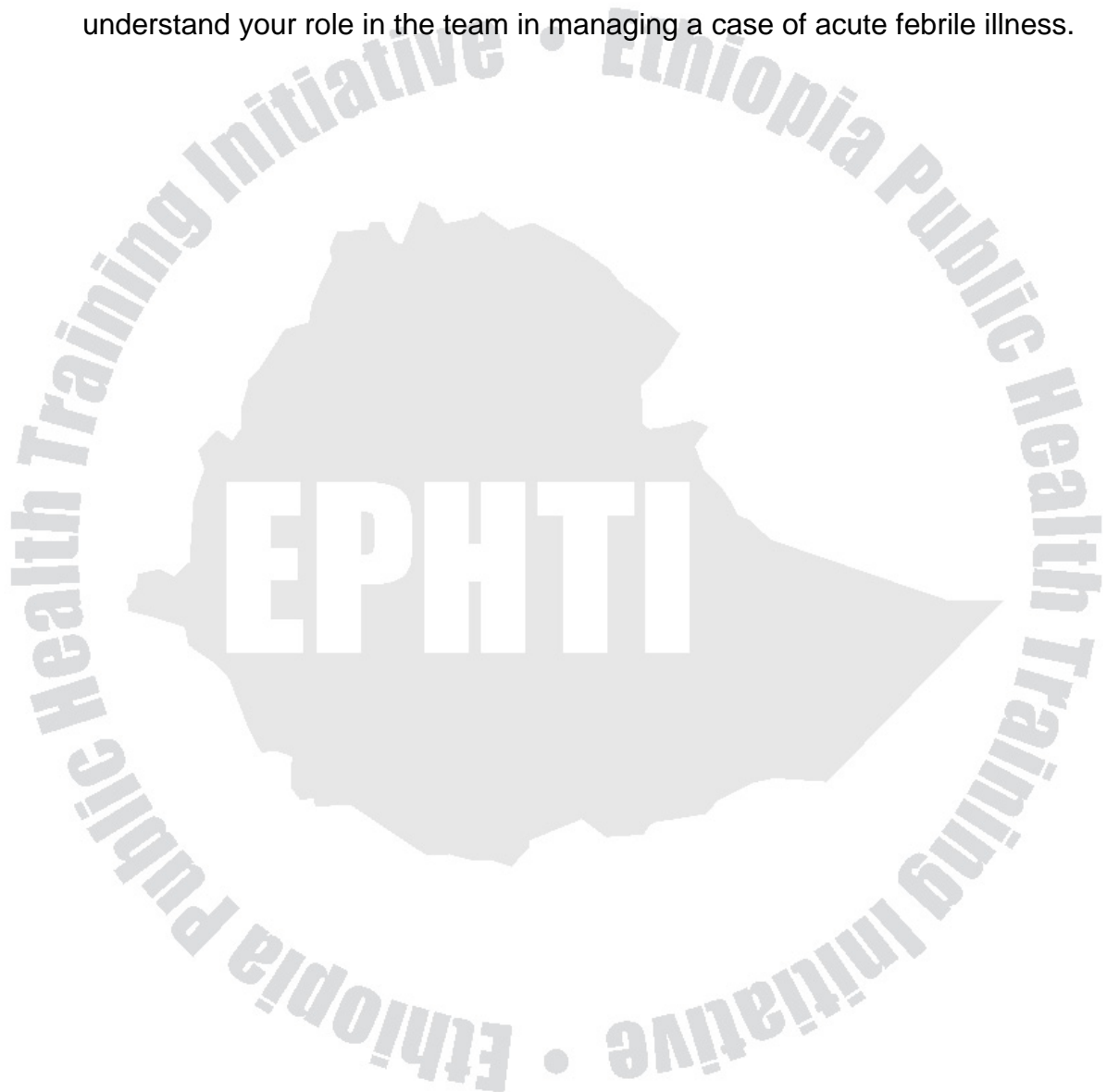
The module can also be used for training of the health center team who are already in the service providing sectors, in the basic training of clinical nurses, community health workers and care givers. However, the module is not intended to replace standard textbooks or other reference materials.

### **1.2. DIRECTION FOR USING THE MODULE**

In order to make maximum use of the module, the health center team should follow the following directions:

- 1.2.1. Do the pre-test pertaining to the core module Section 2.1.1.
- 1.2.2. Read the core module thoroughly.
- 1.2.3. After going through the core module try to answer the pre-test questions.

- 1.2.4. Evaluate yourself by referring to the key given in Section 7.1 and 7.2
- 1.2.5. Read the case study and try to answer questions.
- 1.2.6. Use the listed references and suggested reading materials to substantiate and supplement your understanding of the problem.
- 1.2.7. Look at the satellite module and the task analysis related to your field to understand your role in the team in managing a case of acute febrile illness.



## UNIT TWO

### CORE MODULE

#### 2.1. Pre- and Post-tests

##### 2.1.1. Health Officers

1. Acute febrile illness characterized by gradual onset of fever and increment in temperature in a step ladder fashion is called
  - A. Relapsing fever
  - B. Typhus fever
  - C. Typhoid fever
  - D. Meningitis
  - E. None of the above
2. The causative agent for epidemic relapsing fever gets in to the body through:
  - A. Skin cracks after crashing of the lice on the skin
  - B. Skin cracks from the fecal matter of the lice
  - C. The bite of the parasite
  - D. Contamination of food or drink
  - E. None
3. The mode of transmission of meningococcal meningitis is
  - A. Direct projection through large droplets in overcrowded conditions
  - B. By the carriage of air during sneezing, or breathing in overcrowded conditions
  - C. Direct contact in overcrowded conditions
  - D. By the ingestion of contaminated food or drink
  - E. All of the above

4. Which of the following is not a relevant history in the clinical workup of a patient with acute febrile illness
- A. Travel history
  - B. Transfusion history
  - C. Exposure to animals
  - D. Geographic areas of living
  - E. None of the above
5. Which of the following is not suggestive of the diagnosis of typhoid fever?
- A. Remittent fever
  - B. Sensorial changes
  - C. Rigid board like abdomen
  - D. Massive splenomegaly in the second week
  - E. None of the above
6. Which of the following laboratory investigations is more sensitive for typhoid fever diagnosis in the first week?
- A. Widal titer of 1: 160 or a four fold rise in the titer
  - B. Blood culture
  - C. Urine culture
  - D. Stool culture
  - E. A and B
7. Which of the following is not true about the epidemiology of acute febrile illnesses in Ethiopia?
- A. Tick born typhus is a very common cause of epidemics in Ethiopia
  - B. The peak of meningitis occurs during the dry seasons when the humidity of air is very low
  - C. Typhoid infection is a dose dependent phenomenon in that even if small number of the typhoid bacilli enters into the body, clinical infection may not happen.



- D. Poverty and poor personal hygiene and environmental sanitation are associated to be the main risk factors for both for the louse born relapsing fever and louse born typhus fever.
- E. Mixed epidemic of typhus and relapsing fever may occur in the same locality.

Hajikedir Abdella resides in the highlands of Bale where the weather is very cold. In his small “tukul” himself, his wife and their eight children sleep next to one another. As the weather was very cold, they cuddle next to one another to get warmth. They do not wash clothing and body for fear that they will be cold. One day Hajikedir developed chills, rigors and intermittent fever associated with myalgia and arthralgia. The following day, two of his sons experienced the same kind of problem.

8. From the above story what is the possible cause of fever in that Hajikedir’s household?
  - A. Louse borne relapsing fever
  - B. Tick borne typhus fever
  - C. Meningitis
  - D. Typhoid fever
  - E. Malaria
9. Suppose Hajikedir comes to you in the health service unit, what will you do for him?
  - A. Confirm the diagnosis after proper history, physical examination and blood film examination for Borrelia
  - B. Secure IV line and give him procaine penicillin 600,000 and then tetracycline 250 mg Po QID for 3-5 days
  - C. Control fever with antipyretics
  - D. Visit his home to treat the rest of the family members and delouse their clothing and educate them on the importance of personal and environmental hygiene
  - E. All of the above

10. Considering the living conditions of Hajikedir mentioned above, what risk factor do you identify for the different causes of acute febrile illness?
- A. Overcrowded living condition for meningitis
  - B. Poor personal hygiene for relapsing fever and typhus fever
  - C. Poor personal hygiene for typhoid fever
  - D. Overcrowd living conditions for influenza and common cold
  - E. All of the above
11. Which of the following is not true about the thresholds for predicting the occurrence of epidemic meningococcal meningitis and appropriate management?
- A. 5 cases of meningitis /100,000 population is the alert threshold for an epidemic and needs preparation for early control.
  - B. 10 cases of meningitis /100,000 population for two consecutive weeks is the epidemic threshold for non-vaccinated areas
  - C. 15 cases of meningitis/100,000 population for two consecutive weeks, is epidemic threshold for vaccinated areas.
  - D. All of the above
  - E. None of the above
12. Which of the following is a suggestive finding for the diagnosis of meningitis?
- A. Nuchal rigidity with high grade fever
  - B. High grade fever with hepatosplenomegaly
  - C. Headache and projectile vomiting
  - D. Antecedent upper respiratory tract infection followed by high grade fever and sensorial changes
  - E. All of the above except B

## 2.1.2. Public health Nurses

Answer the following questions accordingly,

1. List the roles of the public health nurse in a team approach to the management of acute febrile illness
  - A. \_\_\_\_\_
  - B. \_\_\_\_\_
  - C. \_\_\_\_\_
  
2. The following are the responsibilities of the public health nurse in the health care settings in managing acute febrile illness
  - A. Institute barrier nursing
  - B. Making isolation practical
  - C. Administer appropriate prescribed medication
  - D. Encourage high fluid intake
  - E. All
  
3. List at least three points to tell to the caregiver of a patient with acute febrile illness
  - A. \_\_\_\_\_
  - B. \_\_\_\_\_
  - C. \_\_\_\_\_
  
4. From the following list which one is **not** the sign or symptom of complicated meningitis?
  - A. Change in respiration
  - B. Decreased pulse rate and increased blood pressure
  - C. Increasing urine output and thereby reduction in weight.
  - D. Persistent or recurrent fever.
  
5. Following the treatment of relapsing fever there may be a reaction known as:
  - A. Anaphylactic shock
  - B. Stevens-Johnson reaction
  - C. Jarish-Herximier reaction
  - D. Idiosyncratic reaction

6. What measure do you take to limit the reaction?
- A. Administer low dose of antibiotic
  - B. Observe the patient
  - C. Secure IV line and get fluids ready
  - D. All of the above
7. What care do you give for the patient with reaction?
- A. Observe the patient closely
  - B. Monitor vital signs
  - C. Administer IV fluids
  - D. Measure intake and outputs
  - E. All of the above

### **2.1.3. Medical Laboratory Technicians**

1. Acute febrile illnesses can be caused by:
- A. N.meningitidis
  - B. S.typhi
  - C. S.paratyphi
  - D. Borrelia species
  - E. All of the above
2. The advantage of a thick blood film over a thin blood film is:
- A. More specific
  - B. Less specific
  - C. All of the above
  - D. None of the above


3. The best specimen for the diagnosis of typhoid fever in the first week of infection is:
- A. Blood
  - B. Cerebrospinal fluid
  - C. Urine
  - D. Stool
  - E. A and B
4. The preferred site for a skin puncture during blood collection in infants is:
- A. Finger tip
  - B. Plantar surface of the heel
  - C. Great toe
  - D. B & C
  - E. All of the above A, B and C
5. In the laboratory *Borrelia* species can be investigated by:
- A. Thick blood film
  - B. Thin blood film
  - C. Both thick and thin blood films
  - D. None of the above
6. *Salmonella* antigens that are usually investigated for typhoid and paratyphoid are:
- A. O antigen
  - B. H antigen
  - C. Both
  - D. None of the above
7. Causes of false gram reaction in gram staining include:
- A. Cell wall damage due to antibiotic therapy
  - B. Excessive heat fixation
  - C. Use of iodine solution, which is too old
  - D. All of the above
  - E. All except A

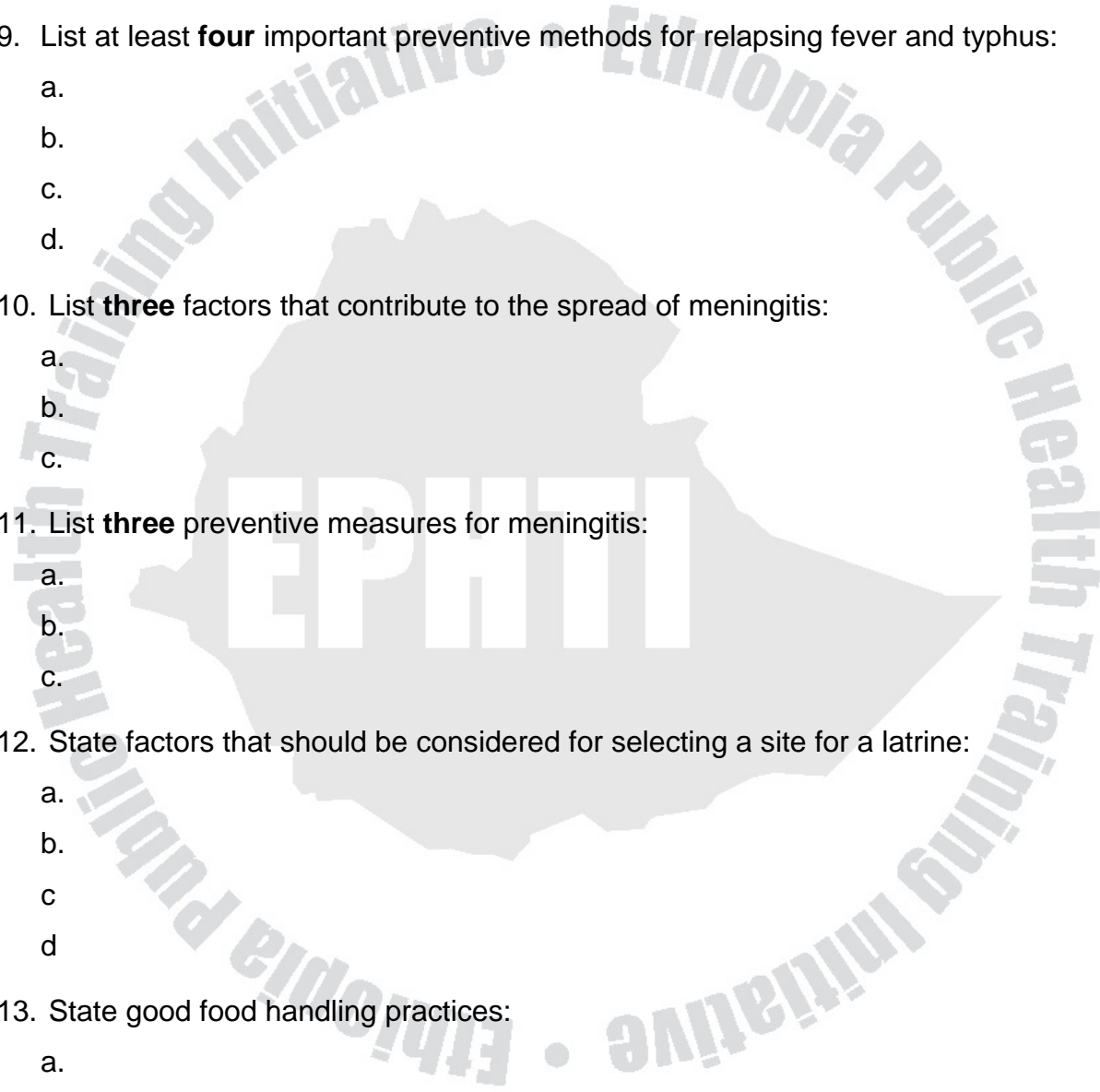
8. The reporting in gram staining shall include:
- A. Gram reaction of the bacteria
  - B. Morphology of the bacteria
  - C. Number of the bacteria
  - D. Species of the bacteria
  - E. All of the above
9. The choice of specimen for laboratory investigation of meningitis is:
- A. Blood
  - B. CSF
  - C. Urine
  - D. Stool
  - E. All of the above
10. For laboratory investigation of AFI, blood shall be collected:
- A. When the patient is in a state of fever
  - B. After the patient took antibiotic therapy
  - C. At any time
  - D. All of the above
  - E. None of the above

#### **2.1.4. Sanitarians**

**Choose the appropriate answer for the following questions**

1. Identify the commonest insect that is responsible for transmission of relapsing fever and typhus in Ethiopia.
- A. Ticks
  - B. Lice
  - C. Fleas
  - D. A and B

- 
2. During an epidemic of relapsing fever which control measure is more important?
- A. Washing and ironing of cloths
  - B. Personal hygiene
  - C. Steaming of all clothes
  - D. Environmental sanitation
3. How does the germ causing relapsing fever enter into the body?
- A. Crushing of lice during scratching (abraded skin)
  - B. Through biting
  - C. Through ingestion
  - D. A and B
4. Typhoid fever is grouped under:
- A. Water based disease
  - B. Water borne disease
  - C. Water related disease
  - D. Water-insect disease
5. When does meningitis occur?
- A. During rainy season
  - B. During dry season
  - C. Before rainy season
  - D. After rainy season
6. What reduces the risk of typhoid fever?
- A. Keeping food and water clean
  - B. Breast feeding
  - C. Using latrines
  - D. Immunization against measles
7. Which hygienic behavior is very important in controlling typhoid fever transmission?
- A. Hand washing
  - B. Washing and ironing clothes
  - C. Housekeeping
  - D. Bathing

- 
8. List at least **four** factors that enhance the spread of typhus and relapsing fever
    - a.
    - b.
    - c.
    - d.
  
  9. List at least **four** important preventive methods for relapsing fever and typhus:
    - a.
    - b.
    - c.
    - d.
  
  10. List **three** factors that contribute to the spread of meningitis:
    - a.
    - b.
    - c.
  
  11. List **three** preventive measures for meningitis:
    - a.
    - b.
    - c.
  
  12. State factors that should be considered for selecting a site for a latrine:
    - a.
    - b.
    - c.
    - d.
  
  13. State good food handling practices:
    - a.
    - b.
    - c.
    - d.



14. Identify areas where water could be contaminated:

- a.
- b.
- c.
- d.

15. Identify factors that contribute to malaria transmission:

- a.
- b.
- c.
- d.

16. List the important control measures for malaria:

- a.
- b.
- c.
- d.

17. Identify areas (conducive environment) where epidemic typhus outbreak may take place:

- a.
- b.
- c.
- d.

## **2.2. SIGNIFICANCE AND BRIEF DESCRIPTION OF THE PROBLEM**

### **1. Typhus Fever:**

Typhus is known to Ethiopia as "*Tessibo Beshita*" indicating the seriousness of the disease. The disease existed in the country for centuries, but the first epidemic was reported in 1866, in army camps and prisons. Epidemics of louse-borne typhus and cases of flea borne typhus were repeatedly reported by Italian health workers during the Italian occupation in 1930s and 1940s. Chloramphenicol and tetracycline, developed in 1940s, have resulted in a significant decline in the incidence of typhus

worldwide. In the 1960s, and 1970s, most cases of louse borne typhus, in the world were reported from Ethiopia, Rwanda and Burundi. Between 7000 and 16,000 cases were reported annually to the Ethiopian Ministry of Health during the period 1952-1980. Fewer cases (2,000 to 4,500) were reported between 1987 and 1990 from all administrative regions. During the last phase of the civil war in 1990 and 1991, serious outbreaks of louse-borne typhus occurred in army camps, relief shelters, and rural villages.

## **2. Relapsing Fever:**

Epidemic relapsing fever is caused by *Borrelia recurrentis* and is transmitted from man to man by pediculous humanis ( the body louse). Following ingestion of an infected blood meal by the louse, the spirochetes penetrate, migrate to and multiply in the hemolymph and remain viable there throughout its life span (several weeks). Human infection results following crushing of the lice during scratching allowing an infected hemolymph to enter through the abraded skin.

Endemic relapsing fever is transmitted by ticks called *Ornithodoros* and epidemic relapsing fever is caused by several species of *Borellia*. Following ingestion of infected blood meals, spirochetes invade all tissues of their arthropod host including salivary glands and reproductive tract. This allows trans-ovarian passage of the spirochetes perpetuating the arthropod infection. Human infection occurs when saliva, coxal fluid or excrement released by the arthropod during feeding comes in contact with abraded skin thereby permitting the spirochetes to penetrate the skin and mucus membranes. These ticks are nocturnal feeders and have painless bite and die immediately following blood meal.

Several thousand cases were reported annually to the Ministry of Health (MOH) between 1981 and 1990, with the largest number in 1983 (43,727), when an epidemic occurred in Walayita. Between one quarter and one half of all cases reported annually between 1987 and 1990 were reported in Welo (1987), Shewa (1988 and 1989), and Gondar (1990). Another 10-15% of the cases were reported annually from health facilities in Addis Ababa. Disproportionately more cases have been reported from Ethiopian highlands than the low lands between 1987 and 1990. Similarly, most

cases of relapsing fever are normally reported during the cool season (August to December).

### 3. Meningococcal Meningitis:

Meningococcal meningitis, an acute disease characterized by high morbidity and mortality during epidemics, is of considerable public health importance in Ethiopia, Sudan and other countries in the Sahel. Ethiopia lies within the “meningitis belt” of sub-saharan Africa, which extends from Mali across the semi arid sahel zone South of the Sahara. (From Senegal in the West to Ethiopia in the East of Africa). In Ethiopia, there has been bouts of meningitis cases and deaths due to meningitis at different times (Table 1).

**Table 1.** Number of case of meningitis and deaths in Ethiopia from 1981 to 2002.

| YEAR    | Cases | Deaths |
|---------|-------|--------|
| 1981    | 50000 | 990    |
| 1989    | 46806 | 1686   |
| 1996    | 771   | 11     |
| 1997    | 319   | 8      |
| 1999    | 268   | 9      |
| 2000/01 | 6864  | 330    |
| 2001/02 | 5037  | 250    |

**Source:** Ministry of Health

Epidemics of meningococcal meningitis, caused by group A serotype of *Neisseria meningitidis*, occur every 8 to 10 years, always during the dry season and affect up to 1% of the population. Smaller outbreaks occur more frequently. The disease is hyper endemic (about 10 to 50 cases/100,000 population/year) between epidemics. Numerous epidemics have been documented in West Africa, Sudan and Ethiopia in the Twentieth Century. In Ethiopia, meningococcal meningitis was first mentioned in

1901. Outbreaks were reported in 1935, in the 1940s and 1950s, in 1964, 1977, and 1981 to 1983 and 1988-89. Where as earlier epidemics are thought to have spread from west Africa to Ethiopia, the 1988-89 epidemic spread with pilgrims returning from Mecca.

#### **4. Typhoid Fever**

The disease is found worldwide but as one of the fecal oral group of bacilli its prevalence will be determined largely by hygienic standards. Its prevalence has indeed been used as an indicator of the level of community hygiene. In Ethiopia Typhoid fever is one of the commonest causes of morbidity and mortality.

### **2.3. Learning objectives**

#### **2.3.1. General Objectives:**

The purpose of this course is to equip the students (trainees) with the appropriate knowledge, attitude and skills required to effectively identify and manage cases as well as prevent and control acute febrile illnesses.

The general objectives are: After completion of the course the student will be able to:

- Identify and manage febrile cases.
- Demonstrate effective prevention strategies in the control of febrile illness.

#### **2.3.2. Specific Instructional Objectives**

For effective management of case of AFI, at the end of the training the student will have the following knowledge, attitude and behavioral outcomes:

1. Define and identify the types of febrile illnesses.
2. Enumerate the causes and risk factors of febrile illness.
3. Describe the magnitude and contribution of febrile illness to the overall health problems both locally and throughout the country.
4. Describe the pathogenesis of acute febrile illness.
5. Identify and describe the clinical manifestations of common febrile illnesses and their complications.

6. Demonstrate the process of assessing a patient with fever.
7. List the diagnostic methods and procedures for a case with fever.
8. Describe the principles and methods of treatment of a patient with fever.
9. Select the appropriate treatment for the common causes of fever.
10. Describe essential care that is needed to be given to a case of fever at home.
11. Demonstrate the treatment and follow up of a case of fever.
12. Demonstrate proper nursing care for a case of fever.
13. Identify and manage or provide timely referral if needed.
14. Demonstrate the appropriate management of a case with fever.
15. List the prominent (major) information, methods and targets for health education in acute febrile illness.
16. Demonstrate (communicate) effectively on home management of acute febrile illnesses to the caretakers as well as the different targets for health education.
17. Demonstrate how to do macroscopic and microscopic examinations of specimens from a case with acute febrile illness.
18. Describe the factors for occurrence and severity of acute febrile illness and the major preventive measures and domains.

## **2.4. CASE STUDY: LEARNING ACTIVITIES**

### **The people in Sulula village**

Sulula is a small village town found North of Desie in Amhara region. It is one of those areas in Wello where the climate is cold and windy owing to its altitude. Being so, the people are farmers; they are especially skilled in producing barley, oats and wheat.

The people in this village were not very poor but their produce can only last them from one season to other. In other words, they will not have any surplus crop to sell. However, they have cows from which they collect butter for selling; goats and sheep to sell and use the money to buy household necessities such as clothing, oil, salt, spices and kerosene.

Since almost everyone in the family assists in the farm activities all the time, their clothes are torn and dirty. Clean clothes are worn only on holidays. Because of such practices and the lack of time the people of Sulula do not wash their clothes and take regular baths. Even if they do, they use only plain water to wash, since such commodity is viewed as a luxury rather than a necessity.

The family size in Sulula village is large as compared to other localities. This village has been relatively healthy for a long time basically because of its fertile soil, hardworking farmers, highland climate and almost no outside contact. Therefore, raising a family and living occurs with virtually no death of children or adults except some due to old age or accident.

Lately, however, all those glorious events are replaced with grief and strife as a result of uncontrolled population growth, resulting in reduced farm areas and overcrowded conditions. Farmers, especially young adults started migrating to nearby towns and cities in search of work. Those that leave the village end up being daily laborers sleeping in verandahs and small rooms with other laborers. Some cannot tolerate such living and hence, they will go back to their villages. Apart from this, as families grow larger, the living condition in the house becomes more congested and overcrowded. Actually, everyone accepts such living conditions as they can cuddle next to each other and keep themselves warm.

As the living condition deteriorated in the village, further sickness and death became more common in this highland village. People mostly suffer from headaches, backaches and intermittent fevers and loss of appetite and many other symptoms. What is troubling the villagers most was once such disease is seen in one person the other family members are sure to get it. If they are lucky no one dies from that family but almost all become debilitated making them unable to be as productive for many days or weeks.

There is no organized health facility in the village except the one available in Gere Gera village a half `day walk from Sulula village. Sometimes health workers visited them but what they told them was something they could not understand.

Now, the villagers understand the problem of having contact with the sick people. Therefore, when a family member is sick the household is isolated and will not be visited by the neighbors.

In one of such outbreaks in the village a relative of a family who lived in the city came to visit them and found three of the family members sick. The visitor was shocked to find all his dear families sick and decided to take them to a clinic in the city where he lives.

In the health center, the patients were striped of their clothing and their hair was cut and they were admitted for continued treatment. The physician visited them together with other staff members daily. They asked the patients where their village is; whether or not there is a health facility, or whether others have such health problems, whether they have enough water in the village, etc. They started to give them all information. Because of the staff's interest in their problems, the villagers became friendly.

After they got well and strong they were discharged. However, the health workers promised that they would visit them in their village in the very near future. The discharged patients also promised that they would wait for them at the roadside with mules and they would start brewing "Tella" as soon as they are back. And so they departed each thinking about the other in many different ways.

### **Question**

- Describe the ecological conditions of the village that may have predisposed the villagers to such illness.
- Why did the health workers shave their hair and remove their clothing?
- What do you think will they do with the clothing?
- Why did neighbors not visit the villagers where there was sickness?
- What do you think was the disease?
- Discuss the general measures you would take when such patients come to the health center.

- What are the precautions the health workers take while the patients are admitted in the health center?
- Why do you think the health workers are visiting the village?

## **2.5. DEFINITION**

Acute febrile illness is defined as a disease characterized by an increase of body temperature more than 37.5 °C resulting from infectious process.

## **2.6. EPIDEMIOLOGY**

### **2.6.1. Typhus Fever**

Louse-borne typhus is caused by *Rickettsia prowazeki* and is transmitted through the bite and feces of lice (*pediculus humanus*). Man is the only reservoir host. This form of typhus is, like relapsing fever, a classic example of an illness that is associated with war, malnutrition, crowding, and poor hygiene. Numerous local epidemics have been reported since the 1940s in Ethiopia, especially in prisons, refugee camps, relief shelters, and rural villages. Changing and washing of clothes once a week reduces the density of lice significantly.

Louse-borne typhus infections increase during the cool, rainy seasons, with persisting famine, political unrest, poor hygienic conditions, and crowded living conditions which are potential for large outbreaks. Flea-borne typhus is caused by *Rickettsia typhi* (formerly called *R. mooseri*), which is transmitted from rats to man by a variety of lice, mites, and fleas, especially the rat flea (*Xenopsylla cheopis*).

The occurrence of *rickettsia conori*, the agent of tickborne typhus (also known as boutonneuse fever and Kenya tick typhus), and *rhhipicphalus* and other tick vectors feeding on dogs and various investigators have reported livestock. Tick-borne typhus is believed to occur in both the highlands and lowlands of Ethiopia.



### 2.6.2. Relapsing Fever

There are three essentials in the cycle of transmission. When a louse infected with *Borrelia recurrentis*, is crushed onto the skin of the host, its gut fluid containing the organism can enter the host's blood through broken skin or any abrasion. If the population is highly susceptible, there can be a major outbreak; this has been well documented, particularly when people have been severely malnourished and living in crowded conditions.

Epidemic relapsing fever is caused by *Borrelia recurrentis* and is transmitted from man to man by *Pediculus humanis* (the body louse). Following an ingestion of an infected blood meal by the louse, the spirochetes migrate to and multiply in the hemolymph and remain viable there throughout its life span (several weeks). Human infection results following crushing of the lice during scratching allowing an infected hemolymph to enter through the abraded skin.

Whereas tick-borne relapsing fever is widespread in Africa, the louse-borne infection is largely limited to Ethiopia, Somalia and Sudan. Relapsing fever is rapidly spread and causes high mortality rates in Ethiopia during war, civil unrest and famines.

When a large number of people are on the move, they sleep together and it is not at all difficult to understand how easy it is for the lice infecting one individual to infect another. Endemic relapsing fever is transmitted by ticks called *Ornithodoros* and epidemic relapsing fever caused by several species of *Borrelia*. Following an ingestion of infected blood meals, spirochetes invade all tissues of their arthropod host including salivary glands and reproductive tract. This allows trans-ovarian passage of the spirochetes perpetuating the arthropod infection. Human infection occurs when saliva, coxial fluid or excrement released by the arthropod during feeding comes in contact with abraded skin thereby permitting the spirochetes to penetrate the skin. These ticks are nocturnal feeders and have painless bite and die immediately following the blood meal.

### **2.6.3. Meningococcal Meningitis**

Meningococcal meningitis appears in epidemics when the relationship between parasite, host (man) and environment are favorable for the spread of infection. Otherwise the bacteria are commensal in nasopharynx of up to 25% or more of healthy people. Different factors favor the occurrence of meningitis epidemic

**2.6.3.1. ENVIRONMENTAL FACTORS:** The climate, in the 'meningitis belt' of Africa and elsewhere plays an important role. In Africa the semi-arid zone called the 'Sahel' is characterized ecologically by scarce vegetation with a typical dry climate in the winter months and a desert wind. This unusual climatic and ecological entity seems to facilitate the spread of meningitis because of a favorable microclimate in human habitations- small, closed, mud- walled houses in which there is practically no light or ventilation. The degree of crowding and of air pollution by oral airborne bacteria in these houses was observed to parallel the incidence of meningitis. The epidemic begins in the dry season when the absolute humidity is low and there are frequent dust storms which may damage the normal mucosal barriers in the nose and throat and allow *N. meningitidis* to invade the blood stream, or be transmitted from one person to another more easily. The peak of these epidemics is between January and end of June. During this time, the mean maximum temperature is high and the minimum temperature is low (i.e. very hot days and cold nights), and the relative humidity is low. With the beginning of the big rains and the rise in relative humidity, the number of cases declines dramatically. Epidemics usually end promptly when the rainy season begins even without public health interventions.

The epidemic occurs in a cyclic fashion every 5-10 years. Vaccination against meningitis during epidemics should give priority to high risk groups of the population such as children and young adults, persons living in dormitories, day care centers, military barracks, and prisoners.

**2.6.3.2. HOST FACTORS:** Humoral immunity (pre-existing antibody against *N.meningitidis*) is probably the most important host factor in determining whether or not a person will become ill. People can become immune in three ways: 1) by vaccination 2) by carriage of *N. meningitidis* in the nose or throat or 3) by carriage of other bacteria that stimulate cross reacting antibody. Humoral immunity may also be important in determining whether the community is at risk of an epidemic. Epidemics may not occur until humoral immunity to a particular strain in a population has declined. This may explain the 8-12 year cycle of epidemic meningitis that has been observed in the meningitis belt.

### **2.6.3.3. N.MENINGITIDES SERGROUPS AND OTHER STRAIN CHARACTERISTICS**

The risk of epidemic meningitis differs between *N. meningitidis* sero-groups. *N. meningitidis* sero group A is the main cause of epidemic meningitis in Africa. *N. meningitidis* sero group C has caused occasional epidemics in Africa. *N. meningitidis* sero group B has not been associated with epidemics in Africa's "meningitis belt", but has caused epidemic in other parts of the world. Other *N. meningitidis* serogroups such as Y have not been associated with epidemics. However, sero type W135 has resulted in epidemic in Burkina Fasso and Niger according to a report on the WHO/AFRO Bulletin, resulting in a case fatality rate of 11.5 in Burkina Fasso and 8.82 in Niger.

Within a particular sero-group, certain strains of *N.meningitidis* may be more likely to cause epidemics than other strains. A particular sero group A strain, designated "clonal group III-1" has caused recent epidemics in Nepal, Saudi Arabia, Chad, Ethiopia, Kenya, United Republic of Tanzania, Burundi and Cameroon as well as other countries.

Studies had shown that the risk factors for meningitis during epidemics include: Crowded living conditions, low socioeconomic status, malaria, poor nutritional status and prior upper respiratory tract infections.

#### **2.6.4. Typhoid Fever**

Typhoid is transmitted by water or food contaminated by *Salmonella typhi*. As it is waterborne, a small infecting dose can cause the disease in someone who drinks polluted water. As so many water sources are inadequately protected in Ethiopia, the disease is very common, particularly among overcrowded urban migrants who often live in wretched conditions. It can also be described as water borne disease since it results from fecal or urinary contamination of food and drink. Subjects who are particularly susceptible to typhoid infection include those patients with chronic schistosomiasis who may become chronically infected homozygous sickle cell subjects and HIV patients. All are liable to develop chronic invasive salmonella. The mechanism is uncertain but it may be due to reduced complement-mediated opsonizing activity and deficient macrophage function. An infected person passes the bacteria in urine or stool. 10% of convalescent patients become chronic carriers as their gall bladder continues to discharge typhoid bacilli for up to 3 months after onset of infection. Patients acutely infected also pass the organism in to their urine before treatment is given. The nature of intestinal pathology dictates that most new infections come from either recent cases or from carriers.

The incidence of typhoid rises at the end of the dry season when the rural water supply is lowest and people congregate at the source of water: The infection is more common from October to February when the rain helps spread already contaminated water supplies. Untreated, 10-25% of people with typhoid fever die, but mortality is much less with treatment.

#### **2.7. ETIOLOGY AND PATHOGENESIS OF FEBRILE ILLNESS**

Fever could be a manifestation of bacterial or any other disease, which may have wide range of severity. Benign infections in a normal host include bacterial diseases (otitis media, pharyngitis, impetigo, bacterial meningitis, relapsing fever, typhoid fever, typhus fever) and viral disorders include (pharyngitis, rhinitis, pneumonia).

Severe bacterial infections if untreated lead to significant morbidity and mortality. These include sepsis, pyogenic meningitis, bacterial pneumonia, osteo-articular

infections and pyelonephritis. Febrile diseases that are threats to the life of the victim include: malaria, typhoid fever, typhus fever, relapsing fever, shigellosis (Bacillary dysentery)

Many febrile episodes are self-limited infections that in a normal host manifest with minimal signs of toxicity and require careful history and physical examination with few laboratory tests if any. However, there are well-defined high-risk groups that on the basis of age, associated diseases and immuno-deficiency require an extensive evaluation and in certain situations prompt antibiotic therapy before the pathogen is identified.

In Ethiopia, the commonest causes of fever are: malaria, relapsing fever (louse borne), meningitis, pyelonephritis, tonsillitis, otitis media, septic arthritis and (other) viral illnesses. Therefore, the review of the pathogenesis and clinical manifestation will focus on the aforementioned causes of fever in Ethiopia.

| <b>Common etiologies of fever</b>                  | <b>Febrile Illness</b>      |
|--|-----------------------------|
| Borrelia recurrentis.....                          | Relapsing fever             |
| Salmonella typhi.....                              | Typhoid fever               |
| Rickettsia prowazeki.....                          | Typhus fever                |
| Gram negative bacteria (E. coli, Pseudomona )..... | Pyelonephritis              |
| Plasmodium(malaria, ovale, Falciparum, vivax)..... | Malaria                     |
| Bacterial and viral infections .....               | Acute respiratory infection |
| Shigella .....                                     | Bacillary dysentery         |
| N. meningitidis.....                               | Meningitis                  |

## **2.8. CLINICAL FEATURES (SIGNS AND SYMPTOMS)**

Most febrile illnesses have common type of clinical manifestations simulating one another. This may make the accurate diagnosis of the cause of the fever difficult if not impossible. However, if thorough history and meticulous physical examination is done, it is possible to clinically differentiate the etiology of fever. Laboratory investigations also assist the clinical acumen in arriving at the diagnosis. Therefore, it is essential to have a very high index of suspicion of wider range of the etiologies and

dig out the associated history and investigations thereof. Sometimes there could be a double infection (there could be two causes of fever). It is not uncommon to see a case of typhoid fever to have malaria in addition, a case of malaria presenting with cough etc.

Generally most febrile illnesses may have the following manifestations:

### **Symptoms**

- Fever
- Loss of appetite (Anorexia)
- General malaise and prostration
- Myalgia and arthralgia
- Chills
- Rigors
- Headache
- Cough
- Vomiting
- Convulsion

### **Signs**

- Hepatomegaly
- Splenomegaly
- Rash
- Neck stiffness (Nuchal rigidity)
- Sensorial change

## **2.9. DIAGNOSIS (ASSESSMENT)**

### **Clinical History**

A serious consideration needs to be given to the chronology of symptoms in relation to the use of drugs. A careful occupational history should include:

- Exposure to animals, toxic fumes, potential infectious agents, possible antigens, febrile patients (infected individuals in home, work place or school)
- Geographic areas of living

- Travel history
- Unusual hobbies
- Dietary habits (raw or uncooked food)
- Contact with household pets
- Animal (insect) bite
- Transfusion history
- History of allergy (hypersensitivity)
- History of immunization
- History of substance use (tobacco, marijuana)
- Family history of tuberculosis, febrile diseases, infectious diseases, collagen vascular diseases (arthritis)
- History of unusual familial symptomatology like deafness, urticaria, bone pain, polyserositis, anaemia.
- Haemoglobinopathies, (ethnicity)
- Pattern of the fever (sustained, intermittent, remittent, relapsing, hectic)
- Patients who are newborns, elderly, having chronic renal failure, chronic liver disease, bacterial shock, patients on glucocorticoids, may fail to generate fever and hence hypothermia has to be taken as a sign of severe infection.

## **PHYSICAL EXAMINATION**

Meticulous physical examination is required. All vital signs are relevant.

- Temperature be taken orally or rectally but the site be consistent. Axillary and oral temperatures can be taken (oral temperature measured after intake of hot or cold drinks, smoking or hyper ventilation is unreliable)
- Frequent daily physical examination should continue until the diagnosis is certain and anticipated response has been achieved. Special attention be paid to the skin, lymph nodes, eyes, nail beds, cardiovascular system, chest, abdomen, musculoskeletal system, and CNS.
- Rectal examination is imperative

- The genitalia be carefully examined in males and pelvic examination should be part of a complete physical examination in women.
- Pattern of fever be followed carefully (sustained fever, intermittent fever, quotidian fever, relapsing fever, remittent fever).

### **LABORATORY INVESTIGATION**

Signs and symptoms have many diagnostic possibilities. If history and physical examination suggest more than a simple viral illness or streptococcal pharyngitis, laboratory examination is indicated. Based on the clinical impression of the health officer on the possible differential diagnosis suspected in the patient, only laboratory data which will assist in ruling in or ruling out a diagnosis should be done. The common specimens that need to be examined in a case of acute febrile illness are:

- Blood (blood film, serological tests, widal reaction, weilfelix reaction, WBC and differential counts, ESR, blood sugar, hemoglobin)
- Cerebrospinal Fluid (protein, glucose, pressure, WBC and differential, gram stain, latex agglutination, culture)
- Stool (macroscopic examination and microscopic examination, culture)
- Urine (microscopic examination, culture, chemical examination; physical examination-Specific gravity, PH, color, foam, volume; chemical-bile pigments, protein)
- Bodily discharges (vaginal, urethral, lesion, etc).
- Radiological examination

### **2.10. CASE MANAGEMENT**

Most of the febrile diseases included in this module are epidemic prone diseases. Therefore, their management should focus on management of individual cases as well as the management of outbreaks.



## **A. INDIVIDUAL CASES**

Management of individual cases demands proper history and meticulous physical examination to clinically rule out all possible causes of fever in that area. Consideration of appropriate laboratory investigation will also assist in narrowing down the list of possible differential diagnoses and arriving at the right diagnosis.

Epidemiological considerations are also essential in backing up the clinical work up of a febrile patient. Once the diagnosis is confirmed, the treatment should be instituted promptly accordingly (see the satellite module for health officers, algorithm). While managing individual cases one should make note of their addresses and see if there is any clustering of the cases.

## **B. EPIDEMIC (OUTBREAKS)**

### **Surveillance for early detection of epidemics**

Surveillance is an on going collection, analysis and interpretation of data about people's health. Health officials use the information to plan, implement and to evaluate health programmes and activities. The purpose of surveillance is to:

- Detect outbreaks early
- Plan vaccination campaigns
- Estimate how many people become sick or die
- Assess the extent of outbreak
- See if the outbreak is spreading and where
- Decide whether the control measures are working

It is not difficult to identify an epidemic after it has begun, but it is most important to detect the epidemic early enough for the preventive measures like vaccination campaign to have an impact. Provide feedback of the surveillance data to peripheral levels to promote cooperation and interest in the surveillance system.

Epidemics are defined by the number of attack rates substantially above the usual rate of diseases. The attack rate is the number of cases that occur in a given area, in a given time and it is expressed as a rate per 100,000 population in the case of meningococcal meningitis.

For instance, the thresholds for predicting the occurrence of meningitis epidemics include:

- 5/100,000 is the alert threshold for epidemic and needs preparation for early control.
- 10/100,000 for two consecutive weeks is the epidemic threshold for no vaccinated areas.
- 15/100,000 populations for two consecutive weeks, is epidemic threshold for vaccinated areas.

This attack rate of 15 people per 100,000 populations for two weeks is called the “**threshold attack rate**” and warrants the commencement of vaccination campaigns. This threshold attack rate is best at detecting epidemics when applied to populations between 30,000 and 100,000. If health facilities have catchment populations of less than 30,000, reports from several facilities should be combined so that the total population is at least 30,000. An area with a reporting population of greater than 100,000 should be divided into smaller ones for the purpose of meningitis surveillance. In smaller populations, the weekly rates can vary widely due to few cases and larger populations, localized epidemics may be missed. Because the risk of outbreak of meningitis is great during the dry season, the surveillance system should be strengthened. A separate epidemic register needs to be considered during an outbreak.

#### **Case definition for meningitis according to Integrated Disease Surveillance Reports in Ethiopia 2002:**

**Suspected case:** Any person with sudden onset of fever (> 38.5 degree centigrade rectal or 38.0 axillary) and one of the following signs: Neck stiffness, altered consciousness or other meningial signs

**Confirmed case:** a suspected case confirmed by Isolation of *N. meningitis* from CSF or blood

#### **INVESTIGATION OF AN EPIDEMIC**

In the investigation of an epidemic, it is wise to follow a systematic approach, although public reaction, urgency and the local situation may make this difficult. The

following list of steps need not always be undertaken in the order given and some are done concurrently.

### **1. Verification of the diagnosis**

- Take as detailed history as possible from the informants
- Make tentative differential diagnosis
- Make all arrangements including laboratory equipment for ascertaining the tentative differential diagnosis
- Do clinical and laboratory studies to confirm the diagnosis. This should be done except in few situations where the urgency demands immediate action on the basis of the clinical diagnosis alone.

### **2. Verify the existence of an epidemic**

The existence of an epidemic could be ascertained by comparing the current incidence of the disease with its usual incidence in the community. Approximate estimates of previous incidence of the disease could be obtained from clinical and hospital data and by questioning the local people.

### **3. Identification of affected persons and their characteristics**

- 3.1. Case definition: It is important to define what constitutes a case so that field workers can distinguish between a case and a non-case. This definition may be modified later but it is important to develop a definition before searching for cases.
- 3.2. Details of each confirmed or suspected case: this must be taken in order to obtain a complete picture of the epidemic. The usual details are: age, sex, occupation, address, recent movements, details of symptoms and other details depending on what is suspected. All this information is best recorded on specially prepared record forms.
- 3.3. Active search for additional cases: this step is extremely important. Some of the cases may be mild and can only be identified by careful interviewing of all persons who are related in time and place with already known cases. In the

case of food poisoning, all persons who attended the meal should be identified and interviewed. All health facilities including dispensaries and village health workers should be visited for cases that were not reported.

#### 4. Descriptive analysis

This process is essential to provide the basis for determining the sources of infection and the mode of disease transmission. This is done by relating the outbreak to time (when), place (where) and person (who) from the known cases.

- 4.1. **Person:** Analysis of the cases by personal factors such as age, sex, occupation, etc. gives you the profile of those affected by the disease. This may give clues as to the source of infection. In order to gain a true picture of the disease, this profile must be related to the characteristics and distribution of the entire population at risk. This is achieved by calculating rate of illness in the population at risk by age, sex, occupation, exposure to specific food and other related attributes.
- 4.2. **Place:** Spot map is constructed by plotting all the cases by location. This will help to identify the way the disease is distributed in the community. Clustering of cases on a spot map may indicate a possible source of infection.
- 4.3. **Time:** an epidemic curve which plots cases of a disease by the time of onset of illness is an essential part of the analysis. The curve indicates the type of outbreak-point- source or propagated type. From this, the nature of the source and the type of the disease could be reasonably guessed. The epidemic curve can also provide further information. If the organism and the incubation period are known, the probable time of exposure can be determined. Conversely if the time of exposure is known, the incubation period can be calculated and this is the clue to the causative organism.

#### 5. Formulate and test hypothesis as to source and spread of disease

- Identify the type of epidemic- common source versus propagated
- Consider possible source from which disease may have been contracted on the basis of descriptive characteristics defining the population at the highest

risk of acquiring the disease. Compare the ill population (cases) with the well population with regard to exposure to the postulated source. Make appropriate attempts to confirm epidemiological findings by laboratory tests (samples of blood, feces, food, and so on).

## **6. Management of the epidemic**

6.1. Treatment of cases – the first action is to treat cases

6.2. Prevention of spread and commencement of control measures- depending on the type of the disease the immediate measures include:

- Chemoprophylaxis for immediate contacts
- Immunization
- Isolation of affected persons(quarantine)
- Attack sources and mode of transmission
  - Protection of water sources
  - Food hygiene
  - Vector control
- Health education: This has a large part to play in preventing the spread of the epidemic

6.3. Writing a report: There are three types of reports

- Popular account for laymen
- Account for Ministry of Health
- Report for publication in journals

6.4. Continued surveillance of the population: this is to detect further changes in incidence and to ensure the effectiveness of the selected control measure.

## **2.11. Prevention and control of Acute Febrile Illnesses**

Acute febrile illnesses are those illnesses that are caused basically by poor personal hygiene, poor food hygiene, overcrowding (poor housing, poor ventilation) and poor environmental hygiene. The diseases listed under this are relapsing fever, typhus fever, typhoid fever, malaria, and viral infections such as acute febrile respiratory

diseases. Most of these diseases can be easily prevented by means of proper hygienic practice and behavior change.

The diseases mentioned above are transmitted in the following way.

### **1. Louse borne relapsing fever and typhus fever**

Human beings are the most preferred habitat for lice. All three types of lice live at different foci in our body. The body louse accommodates itself in the folds of clothing; the head lice live in the hair; and the crab lice live in the damp and warm areas of our body. All this benefits lice if they are undisturbed, by washing and ironing of cloth, washing the hair and combing, and taking regular bath using soap. Such exercise disturbs their habitats. Unhygienic conditions favor the lice. Regular washing of clothes, hair and body with soap as well as combing hair and ironing clothes prevent lice.

Lice also like warm and humid conditions. This is provided by the person himself and by the environment he lives in. Such an environment as crowded and unventilated housing favors an easy migration of lice from one person to the other.

Transmission of the germ that causes relapsing fever or typhus fever is activated by bites and by the feces that are deposited on the body and get access through a crack in the body which usually is caused by itching following bites by the insect. In the case of relapsing fever, the microorganisms from the louse enter into the body of a person when the infected louse is crushed over the body surface or due to scratching of the itching caused by the bite of the tick. A community or nation wide epidemic could arise as a result of louse infestation and overcrowded conditions.

There are also other insects that transmit relapsing fever and typhus. These insects are ticks and fleas. Ticks transmit a disease known as tick born relapsing fever and fleas transmit Murine typhus. Both diseases are not common in Ethiopia, although the insects are present. The two diseases may sometimes cause mixed epidemics in the same locality.

## Prevention

- Since the main cause of the disease is being infested by lice, prevention should concentrate on teaching individuals about :
  - Body hygiene which includes regular bathing, regular ironing of clothing or exposing it to the sun,
  - Avoid overcrowded living
  - Improve ventilation
  - Apply insecticide to the hair, clothes and bedding
  - Institutions such as prisons that are crowded with hundreds of inmates in a single cell should arrange a steam barrel where the inmates themselves do periodic steaming. Clothes of incoming prisoners could also be steamed before they are admitted to cells.

## 2. Typhoid fever and paratyphoid fever

Typhoid fever is another illness that is common in Ethiopia. Typhoid and paratyphoid fevers are caused by bacilli bacteria, which enter the body and invade the intestine. *Salmonella typhi*, the causative agent of typhoid fever is transmitted through intestinal discharges. They are generally grouped under food borne disease. The mode of transmission of this disease involves drinking of contaminated water, eating of contaminated food (Fecaloral transmission). Contamination occurs by contact with soiled hands, flies or fomites. It has been indicated that only 1% to 2% of the persons who swallow a single viable typhoid fever bacillus are likely to develop the disease. However, the usual infecting dose is 100,000 organisms (the infecting dose for bacillary dysentery is about 100 organisms).

## Prevention

- Disposal of feces in a well maintained sanitary latrine that is screened or vented to discourage fly access.
- Drinking water from protected sources, pot storage, exposure of drinking water to sunlight, or boiling before drinking.

- Washing of cooking and eating utensils using soap and hot water, dry them on a rack and store them in a cabinet and out of the reach of children and animals such as dogs, cats and chickens.
- Conduct hygiene education for the general public and especially for food handlers of mass catering institutions such as prisons, restaurants and hospitals.
- Cooks from such institutions should be checked periodically to restrict carriers from working in food preparation areas.

### **3. Malaria**

Malaria is a disease that propagates itself due to lack of management of the immediate human environment. Malarial mosquitoes breed in areas with stagnant water (such as ponds, false banana leaves, tin cavity and old tires).

The mosquito usually bites at dusk or during the night. In the course of feeding blood mosquitoes may ingest malaria parasite from an infected person. After prolonged development of the parasite inside the mosquito it would be infective to a healthy person upon injection into humans by the mosquito. The transmission continues to affect many people in certain localities.

#### **Prevention**

- Sustainable prevention and control could only be effected if the environment where the mosquitoes breed is modified to a non-supportive environment. This is accomplished by filling or draining ponds and other water bodies near houses, burying tin cans, periodically draining water contained in false banana leaves, spraying water bodies with burnt oil to suffocate the larvae, etc.
- Although expensive and unsustainable residual insecticide spraying of the inside of the house is also very helpful.
- Using impregnated (treated) bed nets, screening windows and other entrance is also one aspect of preventive measures that one may be able to afford.



#### **4. Meningitis**

Meningitis is caused by a variety of infective agents. The disease occurs at different times within a year and at different locations. In countries like Ethiopia (tropical range) the disease is frequently observed in children.

The disease can very easily spread under crowded conditions such as in prisons. The disease spreads through droplets (cough) and discharges from throat and nose. Unsanitary behaviors can very easily spread the disease especially in schools, barracks and prisons where a large number of people are accommodated night and day.

##### **Prevention**

- Basic prevention measures are proper hygienic practice. Regular and sustained hygiene/ health education on basic hygiene to susceptible individuals is very important.
- Avoiding contact of an infected person, rather isolation may be important. Isolation areas should be kept ventilated and clean.
- Since overcrowding is one important mechanism for fast transmission of the disease, institutions should limit occupancy of rooms to avoid overcrowding. They should also provide enough ventilation preferably a screened window that will allow fresh air even during the night.

#### **5. Acute Respiratory Infections (ARI)**

Respiratory diseases can also be infectious. Children living in areas with a pronounced rainy season that is colder and wetter are vulnerable. It is also a disease of overcrowding, transmitted through droplets, direct kissing and by fomites (eating utensils, etc). Contamination of the hand may occur due to unhygienic practices during defecation, consequently auto infection or contaminating others such as by shaking hands will spread the disease.

## Prevention

- Any infection that is propagated through droplets and discharges from mouth, nose and feces has to be contained in sanitary manner. This may require behavior change such as covering the mouth during coughing, depositing discharges in sanitary manner and hand washing after defecation and hand shaking.
- Avoiding overcrowding and living together with an individual with respiratory disease in a poorly ventilated house.

## 2.12. LEARNING ACTIVITIES (CASE STUDY) CONTINUED

Discuss the following questions

1. If an outbreak of relapsing fever occurs in Sulula Vilage how do you investigate it as a team?
2. What factors do you consider as predisposing to the situation?
3. How would you control the occurrence of such a situation in your community?
4. How do you prevent such events from happening?
5. What do you think should be the role of people in Sulula Village in averting such an outbreak from happening?

## UNIT THREE

### STATELLITE MODULES

#### 3.1. SATELLITE MODULE FOR HEALTH OFFICERS

##### 3.1.1. INTRODUCTION

###### 3.1.1.1. Purpose of the module

The ultimate purpose of this training module is to produce competent health officers who can correctly identify and effectively manage cases of acute febrile illness both in clinical and community settings.

###### 3.1.1.2. Direction for using the satellite module

This satellite module can be used in the basic training of health center teams particularly health officers who are in the training and service programs. In order to make maximum use of the satellite module, the health officer should follow the following directions.

- 3.1.1.2.1. Do the pretest for satellite module of Health Officers in Section 2.1. of the Core Module
- 3.1.1.2.1. Check or read the Core Module very thoroughly
- 3.1.1.2.2. Read the case study and try to answer questions pertinent to it
- 3.1.1.2.3. Use listed references and suggested reading materials to supplement your understanding of the problem.
- 3.1.1.2.4. For total and comprehensive understanding of the causes (Etiology/pathogenesis), epidemiology and prevention of acute febrile illnesses the health officer students are advised to refer to the core module.
- 3.1.1.2.5. Evaluate yourself by doing post-test in Section 2.1. of the Core Module and compare your score by referring to the key given in unit seven Section 7.2.1.

## **3.1.2 HEALTH OFFICERS**

### **3.1.2.1. Pre and Post Test for the Satellite Module of Health Officers**

See the pre and posttests for the health officers in the core module under unit 2, Section 2.1.

### **3.1.2.2. Significance and Brief Description of the Problem**

See the part under Unit 2 Section 2.2 in the core module.

### **3.1.2.3. Learning Objectives**

For effective case management of acute febrile illnesses, the health officer student will be able to do the following at the end of the training

1. Demonstrate the process of assessing a child with acute febrile illness
2. Identify and describe the clinical manifestations/complications in a child with acute febrile illness
3. List the diagnostic methods and procedures for a case with acute febrile illness
4. Describe the principles and methods of treatment of acute febrile illness
5. Select the appropriate treatment plan for a case of acute febrile illness
6. Identify and manage or refer timely, a case of acute febrile illness when needed
7. Demonstrate the appropriate management of cases of acute febrile illness

### **3.1.2.4. Learning Activity**

Read the story of Sulula village in the Core Module so that you will be able to answer questions in Unit 2, Section 2.12 of this module

### **3.1.2.5. Definition**

Refer to the core module Unit 2, Section 2.5

### **3.1.2.6. Epidemiology**

Refer to the core module Unit 2, Section 2.6

### 3.1.2.7. ETIOLOGY AND PATHOGENESIS

Febrile illnesses could be caused by infectious microbial causative agents which mainly include:

**Bacteria:** Meningitis, otitis media, tonsillitis, pneumonia, relapsing fever, typhoid fever, typhus fever, bacillary dysentery, pyelonephritis, Arthritis, Brucellosis

**Virus:** Rhinitis (common cold), Measles, Variscela zoster, yellow fever, lassa fever, ebola fever, human immunodeficiency virus (HIV).

**Parasitic:** Malaria, Kalazar.

Possible etiologies can be classified by systems affected.

|  |
|--|
| <b>SYSTEMIC OR NO FOCALITY:</b> plague*, bacterial sepsis*, miliary tuberculosis*, malaria*, typhoid fever*, kal-azar*, HIV/AIDS, Epstein-Bar virus, Arboviruses*, adenoviruses, cytomegalo virus, occult bacteremia |
| <b>CENTRAL NERVOUS SYSTEM:</b> Meningitis/ encephalitis*, brain abscess  |
| <b>OCULAR:</b> Orbital cellulites*, peri-orbital cellulites  |
| <b>UPPER RESPIRATORY TRACT:</b> Croup*, epiglottitis*, laryngeal diphtheria*, peritonsillar abscess*, retropharyngeal abscess*, otitis media, sinusitis, pharyngitis, common cold                                    |
| <b>LOWER RESPIRATORY TRACT:</b> pneumonia*, bronchiolitis*, tuberculosis   |
| <b>CARDIAC:</b> edocarditis*, pericarditis*, myocarditis*  |
| <b>GASTROINTESTINAL:</b> gastroenteritis*, peritonitis*, appendicitis*, mesentric adenitis, intrabdominal abscess and hepatitis.   |
| <b>GENITO URINARY:</b> urinary tract infection, pyelonephritis, pelvic inflammatory disease* (in women only), urethritis   |
| <b>MUSCULOSKELETAL:</b> septic arthritis, osteomyelitis  |
| <b>CUTANEOUS (+SYSTEMIC):</b> necrotizing fascitis*, viral rashes (roseolla, rubella, measles*, enteroviruses), bacterial rashes (scarlet fever, meningococemia*),   |

|  |
|--|
| Spirochetical rashes (syphilis, relapsing fever)*, rickettsial rashes (typhus)*  |
| <b>VACULITIS/HYPERSENSITIVITY REACTIONS:</b> acute rheumatic fever*, lupus erthematosus, Henoch-Scholein purpura, serum sickness*, StevenJohnson syndrome*, Kawasaki’s disease, drug reactions(e.g. Quinidine, vaccines) |
| <b>Cancers:</b> leukemia*  |
| <b>Metabolic:</b> excessive dehydration*, thyrotoxic crisis*   |

\*Potentially dangerous if rapid intervention not done.

### 3.1.2.8. CLINICAL FEATURES (SIGNS AND SYMPTOMS AND DIFFERENTIAL DIAGNOSIS)

Differential diagnosis of acute febrile illnesses. and their most prominent clinical manifestations (\* = *Most prominent manifestation*)

#### 1. Acute Onset Without Chills

##### INFLUENZA

- a. Marked prostration
- b. Myalgia, photophobia
- c. Non productive cough
- d. 3 day fever
- e. No lymphadenopathy
- f. No rash
- g. Occurs everywhere

##### DENGUE

- a. Marked prostration
- b. Mayalgia, photophobia
- c. Leukopenia with leukocytosis
- d. No cough
- e. Fever
- f. Diffuse lymphadenopathy
- g. Rash
- h. Occurs in moist areas

## 2. Acute Onset with Chills and Petecchial Rash

| <b>Typhus</b>  | <b>Relapsing Fever</b>  | <b>Meningococemia</b>   |
|--|---|---|
| *a. Rash occurs later in the diseases mostly over the back and buttock, rare in Ethiopia (tick born) | *a. Rash occurs mostly over the pectoral area                                     | *a. Rash is diffuse occurs early in the disease                               |
| *b. Fever high and sustained, it may be relapsing  | *b. Fever high and sustained  | *b. Fever irregular   |
| *c. very severe headache   | Moderate headache   | Usually no headache unless meningitis occurs, then stiff neck is also present |
| *d. Toxemia and mental confusion   | d. Alert  | d. Alert  |
| e. Occasional splenomegaly (10-25%)  | *e. frequent splenomegaly   | e. Occasional splenomegaly (10-25%)   |
| f. Occasional epistaxis  | *f. Frequent epistaxis  | f. Occasional epistaxis   |
| g. Back and leg pains  | g. Calf pains   | g. Arthralgia with poly arthritis in 10%                                      |
| h. Non productive cough  | h. Non productive cough   | Preceding upper respiratory tract infection                                   |
| i. WBC 12,000  | i. WBC15, 000 or more   | i. WBC 15,000 or more   |
| j. Fever decreases in 24-48 hours with therapy. Patient looks toxic for another week                 | j. Fever decreases in 12 hours with therapy. Patient wants to go home in 24 hours | j. Fever decreases in 24 hours with therapy                                   |
| k. Occurs in all ages  | k. Occurs in all ages   | k. Occurs primarily in children   |

\*\*Viral exanthemas caused by measles, roseola and rubella and other non infectious causes of rash and fever like drugs and idiopathic thrombocytopenic purpura are important differential diagnosis.

### 3a. Acute Onset with Chills, Splenomegaly and Leukocytosis

| Typhus  | Relapsing fever   | Meningococcemia   | MiliaryTB   |
|---|---|---|---|
| *a. Rare in Ethiopia. Rash occurs mostly over back and buttock. The rash occurs later in disease. | *a. Rash occurs mostly over pectoral area   | a. Rash is diffuse; occurs early in the disease                                 | a. No rash, however, petechial rash may be present in the severe form of the disease                            |
| *b. Fever high and sustained  | *b. Fever high and sustained. May be relapsing                                      | *b. Fever irregular   | b. Fever irregular  |
| *c. Very severe headache  | c. Moderate headache  | *c. Usually no headache unless meningitis occurs. Then stiff neck also presents | *c. Meningitis occurs in 60%  |
| * d. Toxemia and mental confusion   | d. Alert  | d. Alert  | d. Alert  |
| e. Occasional splenomegaly (10-25%)   | *e. Frequent splenomegaly   | e. Occasional splenomegaly (10-25%)   | *e. Splenomegaly usually present and quite pronounced. Usually associated with hepatomegaly and Lymphadenopathy |
| f. Occasional epistaxis   | * f. Frequent epistaxis   | f. Occasional epistaxis   |   |
| g. Back & leg pain  | * g. Calf pains   | *g. Arthalgias with polyarthritis in10%   | -   |
| h. Non-productive cough   | h. Non-productive cough   | *h. Preceding URI   | *h. Cough uncommon. If present, it is usually non-productive  |
| i. Leukocytosis of WBC 12,000/mm <sup>3</sup>   | i. Leukocytosis WBC 15,000 or more/mm <sup>3</sup>                                  | i. Leukocytosis WBC 15,000 or more/mm <sup>3</sup>                              | *i. WBC may be leucopenia or leukemoid  |
| * j. Fever decreases in 24-48 hours with therapy. Patient looks toxic for another week            | * j. Fever decreases in 12 hours with therapy. Patient wants to go home in 24 hours | j. Fever decreases in 24 hours with therapy                                     | *j. Fever responds in 2 weeks to therapy  |
| k. Occurs in all ages   | K. Occurs in all ages   | *k. Occurs primarily in children  | *k. Occurs primarily in children.   |



### 3b. Acute Onset With Chills, Splenomegaly And Leukopenia

| MILIARY TB  | BRUCELLOSIS  | KALAAZAR   | MALARIA   |
|---|--|--|---|
| a. Acute onset  | a. Onset insidious in about 50%; may be acute                        | a. Onset of fever usually insidious; may be acute  | a. Onset of fever acute   |
| b. Fever irregular, high and spiking  | b. Fever intermittent at first, may later be undulating.             | b. Fever intermittent or remittent at first. Later may be undulating. At times double quotidian fever occurs | b. Fever occurs in paroxysms of short duration, often preceded by chill and followed by sweats. |
| c. Marked prostration   | c. Patient often looks quite well despite marked subjective weakness | c. Patient looks and feels well despite fever  | c. Patient looks acutely ill during paroxysm.   |
| d. Splenomegaly usual   | e. Splenomegaly  | d. Splenomegaly frequent and often massive   | d. Splenomegaly frequent and often massive  |
| f. hepatomegaly and generalized lymphadenopathy present                               | e. Cervical lymphadenopathy common                                   | e. Cervical lymphadenopathy Common   | e. Lymphadenopathy infrequent   |
| g. Often soaking sweats   | f. Soaking night sweats  | f. Usually sweats not prominent  | f. Sweats occur only after paroxysms.   |
| h. Occurs primarily in young children. Occurs everywhere. Usually history of exposure | g. Occurs everywhere   | g. Occurs in lowlands  | g. Occurs in lowlands   |
| i. Meningitis develops in 60%   | h. Severe neck and back pain with arthralgias                        | h. Edema common. Skin lesions of Kalazar   | h. No neck stiffness  |
| j. WBC may be very high   | i. WBC normal or decreased   | i. Marked leukopenia   | i. Moderate leukopenia  |
| k. Mantoux often negative   | j. Positive Brucellin skin test                                      | j. Positive Formol Gel   | j. Positive thick smear   |
| l. Responds to antituberculous therapy in 2 weeks or so.                              | k. Responds to chloramphenicol in 7 days                             | k. Patient often gets worse during early stages of treatment with antimony. Then temperature falls to normal | k. Responds in 12 hours to chloroquine(P.vivax) and Fansidar & quinine(P.falciparum)            |

#### 4. Acute Onset with Chills And Localizing Signs

| PNEUMONIA                            | PRIMARY PULMONARY TB                           | PYELONEPHRITIS  |
|--------------------------------------|--|---|
| *a. Onset acute                      | *a. Onset gradual                              | *a. Onset acute   |
| *b. Fever high and sustained         | *b. Fever irregular                            | *b. Fever high and sustained                            |
| *c. Single shaking chill             | *c. May have multiple chills                   | *c. May have multiple chills                            |
| **d. Severe pleuritic pain is common | d. Occasionally have pleuritic chest pain      | **d. Marked CVA tenderness                              |
| *e. Usually in young adults          | *e. Usually in children                        | *e. Children and women of child bearing age or old men. |
| **f. Cough with thick "rusty" sputum | **f. Cough with thick sputum, often with blood | **f. Cloudy urine and dysuria                           |
| *g. WBC 15,000                       | *g. Leucopenia                                 | *g. WBC 15,000  |
| *h. Gram + diplococci in sputum      | *h. AFB in sputum                              | *h. Bacteria and WBC in un-spun urine                   |

## 5. Gradual Onset of Fever

| TYPHOID   | BRUCELLOSIS  | KALAZAR   |
|---|--|---|
| a. Onset of fever gradual, rising in stepladder fashion for one week. | a. Onset insidious in about 50%. May be acute                        | a. Onset of fever usually insidious but may be acute  |
| b. Fever remittent and sustained                                      | b. Fever intermittent at first, may later be undulating              | b. Fever intermittent or remittent at first later may be undulating. At times double quotidian fever occurs |
| c. Toxic appearance   | c. Patient often looks quite well despite marked subjective weakness | c. Patient looks and feels well despite fever   |
| d. Splenomegaly in second week  | d. Splenomegaly frequent   | d. Splenomegaly frequent and often massive  |
| e. Usually no lymphadenopathy   | e. Cervical adenopathy common  | e. Cervical adenopathy common   |
| f. Soaking night sweats uncommon                                      | f. Soaking night sweats  | f. Usually sweats not prominent   |
| g. Occurs everywhere  | g. Occurs everywhere   | g. Occurs in lowlands   |
| h. Abdominal signs and symptoms common                                | h. Severe neck and back pain with arthralgia                         | h. Edema common. Skin lesions of Kalazar  |
| i. WBC usually less than 5000   | i. WBC normal or decreased   | i. Marked leucopenia  |
| j. Positive Widal   | J. Positive brucellin skin test                                      | j. Positive Formol Gel  |
| k. Responds to chloramphenicol in 3-4 days                            | k. Responds to chloramphenicol in 7 days                             | k. Patient often gets worse during early stages of Rx with antimony. Then temp falls to normal.             |

### 3.1.2.9. DIAGNOSIS

Algorithm for the diagnosis and management of the commonest causes of febrile illnesses in Ethiopia

|  |   |   |  |   |   |
|--|---|---|--|---|---|
| <p><b>1.Fever</b><br/>Associated with runny nose, head ache, sneezing, or dry cough of few days, no history of vaginal discharge or diarrhea</p>     | <p><b>1. High grade Fever</b><br/>Preceded by the prodromal symptoms of **URTI followed by nuchal rigidity, vomiting headache or any sensorial changes</p>            | <p><b>1. Fever</b><br/>Associated with cough, chest pain, respiratory distress, grunting and chest in-drawing in children</p> | <p><b>1. Acute onset</b><br/>intermittent Associated with chills rigors, myalgia, arthralgia, headache, loss of appetite</p> | <p><b>1. Fever Insidious</b><br/>onset with stepladder type of increases, remittent type of fever, GI Upset(constipation or diarrhea), global headache, loss of appetite, general malaise and prostration</p> | <p><b>1. Fever</b><br/>Associated with urinary complaints like urgency, frequency, reddish discoloration of urine, flank pain, nausea or vomiting</p> |
| <p>2. No localizing sings or organomegaly, CVA tenderness, no meningeal signs, no areas of tenderness in the abdomen or pelvis, no chest finding</p> | <p>2. On examination meningeal signs positive, raised fontanel in the case of infant, sensorial changes, no organomegaly, chest finding or abnormality in the GUS</p> | <p>2. On examination<br/><br/>Chest finding, respiratory distress, chest indrawing, no organomegaly or meningeal signs</p>    | <p>2. On examination<br/>High grade fever, hepatosplenomegaly, acutely sick looking, no relative bradycardia</p>             | <p>2. On examination<br/>Acutely sick looking, splenomegaly, intermittent cough relative bradycardia, remittent fever</p>   | <p>2. On examination, if there is supra-public or CVA tenderness</p>  |
| <p><b>3. Lab data</b><br/>Showed no leukocytosis, no heamoparasite no finding on U/A</p>   | <p>3. CSF turbid, gram stain or culture suggestive</p>  | <p><b>3. Laboratory</b><br/>Exam. shows lekocytosis, blood film negative</p>  | <p><b>3. Blood film</b><br/>Positive either for Borrelia or malaria</p>  | <p><b>3. Blood film</b><br/>negative for haemoparasite and lower WBC counts. If possible <b>Widal</b> test reactive</p>   | <p><b>3. U/A</b><br/>Suggestive of <b>UTI</b></p>   |
| <p><b>Supportive treatment for viral infection and follow up</b></p>   | <p><b>Treat for cerebrospinal meningitis</b></p>  | <p><b>Treat for Pneumonia</b></p>   | <p><b>Treat for malaria or relapsing fever accordingly</b></p>   | <p><b>Treat for Typhoid/ or Typhus</b></p>  | <p><b>Treat for Urinary tract Infection (UTI)</b></p>   |

\*\*URTI Upper respiratory tract infection, \*GUS= Genito uniryary sytem, \*\*GI = Gastrointestinal, CSF = Cerebrospinal fluid, CVA= Costovertebral Angle, U/A= Unrine Analysis, UTI = Urinary tract infection, WBC= White blood cell urinary

## Drug Treatment Regimen for Acute Febrile Illnesses

| Acute febrile illness                | Drug therapy  |
|--------------------------------------|---|
| 1. Meningococcal meningitis          | High dose parental crystalline penicillin 50,000 units/kg/ 4-6 hours I.V. for 5-7 days. Other antibiotics like chloramphenicol I.V. should be given in combination.   |
| 2. Typhoid fever                     | Chloramphenicol 500 mg PO. QID for two weeks and treatment of fever, (paracetamol gram PO PRN)  |
| 3. Typhus fever                      | Tetracycline 500 mg PO QID for 10 days or Chloramphenicol 500 mg PO QID for 10 days (and treatment of fever). Same dose of Tetracycline or chloramphenicol for 3 days or Doxycycline 100 mg single dose is sufficient during epidemics. |
| 4. Relapsing Fever                   | Secure I.V line, Give tetracycline normal dose 250- Procaine penicillin 600,000-800,000units IM followed by oral Tetracycline 500mg PO Bid for 2-3 days. This effectively terminates parasitaemia).                                     |
| 5. Urinary tract infection           | Ampicillin 500mg PO. QID for 7 days,<br>Cotrimoxazol 960 mg PO. BID for 7 days  |
| 6. Pneumonia                         | Ampicillin 500 mg PO. QID for 7 days,<br>Erythromycin 500 mg PO. QID for 7 days,<br>Procaine Penicillin 800,000 IU IM BID for 7 Days, Cotrimoxazole 480mg BID for 7 days  |
| 7. Viral Respiratory tract infection | Supportive treatment, rest, fluid intake, vitamin C and paracetamol   |

## **3.2. SATELLITE MODULE FOR PUBLIC HEALTH NURSES**

### **3.2.1. INTROUDUCTION**

#### **3.2.1.1. Purpose and use of the module**

In this satellite module under the general headings of AFI (Acute Febrile Illness), typhoid fever, meningitis, relapsing fever, and typhus will be considered. The main purpose of this satellite module is to equip the trainees with knowledge and skills required to identify and manage efficiently the aforementioned cases. The public health nurse can use this satellite module in their pre-services or in service training programme.

#### **3.2.1.2. Direction for using the satellite Module**

For better understanding of this module, the public health nurse are should do the following:

- Do pre test pertinent to your field in Unit 2 Sections 2.1 of the core module.
- Read or refer the Core Module thoroughly
- Read the story of Sulula village
- Evaluate yourself by doing pre-test and comparing your score by referring to the key given

## **3.2.2. SATELLITE MODULE FOR PUBLIC HEALTH NURSES**

### **3.2.2.1. Pretest and posttest**

See the Core Module Unit 2, Section 2.1.

### **3.2.2.2. Significance and brief description of the problem**

See the Core Module Unit 2, Section 2.2.

### **3.2.2.3. Learning Objectives**

The main objectives of this Satellite Module is to equip the trainees with the appropriate knowledge, and skills required to efficiently identify and manage cases` as well as prevent acute febrile illnesses.

### **3.2.2.3. Learning Activities**

Read the story of Sulula village so that you will be able to discuss questions in Section 2.12. of this module.

### **3.2.2.5. Definitions**

Refer to the core module Unit 2, Section 2.5.

### **3.2.2.6. Epidemiology**

Refer to the core module Unit 2, Section 2.6.

### **3.2.2.7. Etiology and pathogenesis**

Refer the core module Unit 2, Section 2.7.

### **3.2.2.8. Clinical features (Symptoms and signs)**

Refer to the core module Unit 2, Section 2.8.

### **3.2.2.9. Diagnosis**

Refer to the core module Unit 2, Section 2.9.

### **3.2.2.10. Case management**

#### **Role of the Public Health Nurse in Acute Febrile Illness.**

The Public Health Nurse does have a role in:

- Diagnosing the case accurately.
- Promptly providing treatment
- Following the cases to the end point
- Providing continuous follow up
- Reporting accurately to the concerned body
- Participating actively in epidemic control system
- Investigating the case
- Mobilizing the community for prevention activities
- Analyzing data from the peripheral level for epidemiological links, trends and achievement of control targets.
- Providing feedback to the peripheral level
- Organizing essential logistics

#### **Responsibility of the PHN in the AFI**

##### **a) In health care setting**

- Isolation of patients
- Institute barrier nursing (wearing gloves, masks)
- Replace fluid and electrolytes
- Provide appropriate prescribed therapy
- Detection and prompt management of complications



### **b) At the community**

- Visiting health posts and the community at large
- Performing home, school, and prison visits
- Following-up at home of patient discharged from health center.
- Giving health education and demonstrations
- Providing immunizations and other preventive health programme.

### **Nursing Management of Typhoid Fever:**

The goals of nursing management are to:

1. Give supportive care
2. Monitor for complications
3. Institute the prescribed medication at the right time the right dose through the right route.

Although the term acute febrile illness is applied to any viral or bacterial infection, in practice it refers to a group of particular ailments easily spread from person to person often occurring in epidemics and particularly common in low socio economic group of people. In this specific Satellite Module, typhoid fever, meningitis, relapsing fever and typhus will be considered.

The above-mentioned diseases display the following characteristics:

1. Onset acute with rise of temperature rapidly.
2. The disease is caused by a specific bacteria or viruses.
3. It tends to run a definite course and often occurs in epidemic forms.
4. It is very infectious.

Therefore, giving attention to these patients is extremely important.

### **Common Problems:**

- Delirium
- Drowsiness
- Indifferent to surrounding
- Incontinent of urine and feces

- Temperature >40°C
- Perspiration
- Poor oral intake
- Bladder distention due to loss of urge to void during the toxic state
- Retention of feces

**Supportive Nursing Intervention:**

1. Use of side rails for patient safety
2. Bed in low position
3. Sedation
4. Soft restraints if necessary
5. Tepid water sponging
6. Increased fluid intake to prevent dehydration
7. Observation for bladder distention
8. Enema under low pressure to prevent perforation
9. Change of position and skin care

**Monitoring For Complication:**

Intestinal hemorrhage is the most common complication occurring in 4-7% of patients during the third week, signs are:

- Apprehension
- Sweating
- Pallor
- Weak rapid pulse
- Hypotension
- Bloody or tarry stool

**Nursing Intervention:**

Managed by supportive measures such as

- Cross-matched and perfectly screened blood transfusion
- Intravenous fluid replacement with multivitamins combinations.

- Intestinal perforation occurs most common by in 3<sup>rd</sup> week

Intestinal content may spill in to abdominal cavity causing peritonitis

If such conditions developed in the patient, the possible manifestation are:

- Acute abdominal pain (lasts few seconds & stops) and at times the pain may be persistent if irritation is persistent.
- Abdominal tenderness & rigidity during examination.

**Nursing intervention includes preoperative nursing care which consists of:**

- Checking vital signs
- Giving information about the type of operation
- Providing enema
- Maintaining nothing per OS (NPO) for 12 hours
- Consent form signed
- Inserting naso-gastric tube
- Opening an IV line to administer fluid and correct electrolyte imbalance.
- Teaching the patient deep breathing exercises
- Providing premedication
- Inserting urinary catheter.
- Making ready cross-matched and screened blood ready.
- Preparing an anesthesia bed.
- Notifying the operation room personnel.

**Postoperative care**

- Check the vital signs every 30 minutes for the next two hours and every two hours for the next 6 hours and every 8 hours then after. If the patient becomes unstable the vital signs should be taken more frequently.
- Maintaining NPO until the gag reflex and the bowel movement return.
- Provision of a fluid diet depends on the condition of the patient and the order of the physicians.
- Check the IV line
- Provide mouth, back and body bath.

- Measure the input and output and record.
- Give medication as ordered.
- Notify immediately if you observe unusual conditions.
- Check the operated site and change the dressing every day.
- Remove the stitch after 7 days post operatively
- Encourage and support the patient to get out of bed after 24 hours postoperatively.
- Implement deep breathing exercises.

### **Nursing Management of Meningitis:**

The goal of nursing management is:

- To promote the healing process within the shortest period of time.
- To prevent complications
- To maintain body temperature
- To keep patients' normal feeding pattern
- To maintain normal function of internal organs.
- To keep skin integrity.

Patients with meningitis are severely ill and toxic; this requires the most skilled nursing care. They resent all interference, so, great patience on the part of the nurse is needed in order to make sure that the patient gets sufficient fluids. In the early stage the patient will be able to take only fluids with glucose; as soon as specific treatment has had effect, light diet will be possible. The patient is best nursed in subdued light on account of the photophobia. Quietness is essential as noise is poorly tolerated.

\* The prognosis may depend on supportive care given

### **Common problems and their nursing interventions**

#### 1. Fever

- Constant monitoring of vital signs
- Provision of cold sponging.
- Attention to skin and oral hygiene.

- Provision of ordered medication on time.
- Examining the patient for other focal infection.

## 2. Dehydration

- Provide IV fluids based on order.
- Start fluid diet as soon as possible and encourage the patient to take as he/she tolerates.
- Measure input and output.

## 3. Decubitus Ulcer

- Frequent change of positions
- Provision of back care and massage
- Change of bed sheet and linen as soon as possible
- Avoiding wet cloth
- Encouraging the patient to be out of bed if his/her condition allows.

## 4. Airway obstruction

- Protection during seizure while comatose.
- Take care for vomits and oral discharge.

## 5. Infection.

- Early diagnosis and treatment
- Provision of the ordered medications
- Giving chemoprophylaxis for contact cases.
- Encourage the patient to have deep breathing exercises.

## 6. Confusion

- Observe patient's condition very frequently.
- Make sure that the patient has been accompanied by someone
- Be aware of the complication of meningitis:
  - Changes in respiration, low pulse rate, high blood pressure, papillary changes or decreased responsiveness may indicate increasing intracranial pressure.
  - Decreasing urine output and increasing body weight

- Sudden appearance of skin rash and bleeding from veni-puncture sites may indicate disseminated intra-vascular coagulation.
  - Persistent or recurrent fevers
5. Ensure adequate nutrition
- Carefully monitor the administration of IV fluids and nutrients
  - Insert NGT when necessary
  - Initiate oral feeding as soon as possible if the patient's condition allows.
    - Begin offering small feeds and note vomiting and abdominal distention
    - Increases amount of feed gradually
    - Resume regular feeding schedule according to clinical condition
6. Provide supportive care during the stage of irritability
- Reduce the general noise level around the patient
  - Organize nursing care to provide periods of uninterrupted rest
  - Minimal handling; when necessary handle gently
  - Speak in moderate tone to reduce anxiety
  - Provide therapeutic and supportive care for convulsions, respiratory, and cardiovascular complications.
7. Public Health Nursing measures
- Support provision of chemoprophylaxis for contacts of the meningitis patient
  - Encourage contacts especially household contacts and to be immunized in meningococcal epidemics.
8. Inpatient education
- Encourage parents to visit the patient and help in his/her care.
    - Provide them with opportunity to express their fears and anxiety.
    - Answer questions they have regarding the patient's progress, care and prognosis
  - Discuss complications (seizure, deafness) that may occur after discharge.

- Give specific instructions regarding medications to be administered at home.

### **Nursing Management of Relapsing Fever**

The goals of nursing management are:

- To reduce disease transmission
- To promote the healing process of an infected person
- To prevent any complication that may arise.
- To delouse patients

#### **\* Supportive nursing measures**

- Decreasing high temperatures.
- Maintaining skin integrity
- Observing drug reactions
- Encouraging fluid and dietary intake
- Combating generalized discomfort
- Monitoring vital signs

### **Nursing management of typhus**

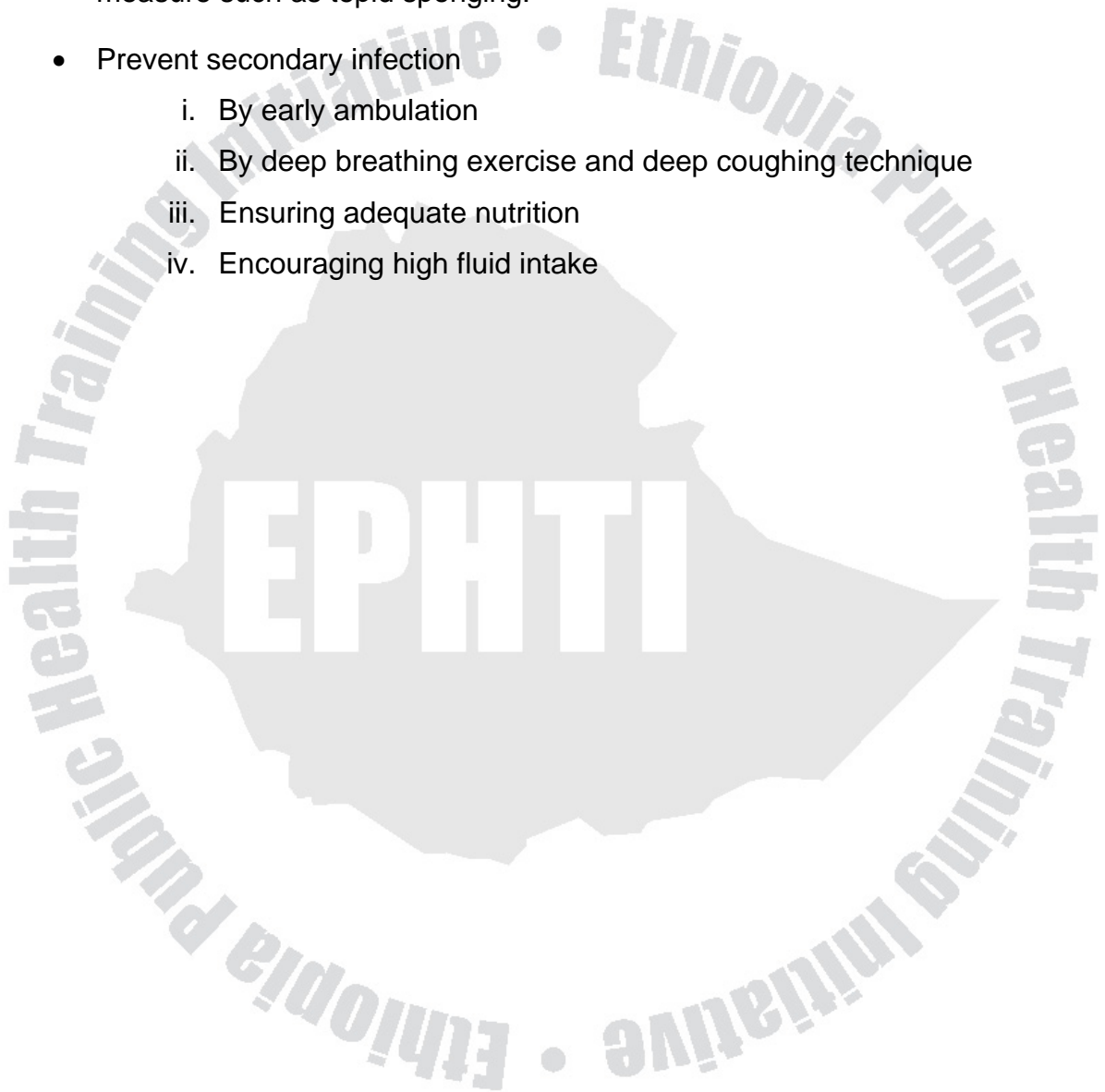
The goal of nursing management is:

1. To prevent disease transmission
2. To avoid complications
3. To promote the healing process

Supportive nursing measures are used to combat fever, restlessness, and pain, and to promote comfort.

- Position the patient carefully because he/she may have severe edema and necrosis from vasculitis.
- The circumference of the abdomen, arms and legs are measured once or twice per day to determine the extent of edema.

- Intake and output records are kept and evaluated to assess for oliguria, because the patient may develop renal failure as a result of poor tissue perfusion from vascular degeneration
- Reduce fever by instituting the ordered antipyretic or using the nursing measure such as tepid sponging.
- Prevent secondary infection
  - i. By early ambulation
  - ii. By deep breathing exercise and deep coughing technique
  - iii. Ensuring adequate nutrition
  - iv. Encouraging high fluid intake





## **3.3. SATELLITE MODULE FOR MEDICAL LABORATORY TECHNICIANS**

### **3.3.1. INTRODUCTION**

#### **3.3.1.1. Purpose of the module**

This module helps laboratory technicians to participate in the team management of acute febrile illnesses, with a particular emphasis on the laboratory investigations. The module is designed to be used by the medical laboratory technicians as a member of the health center team for both the pre-service and in-service training levels.

This part of the module stipulates the role of laboratory technicians in the identification, diagnosis, management and prevention of acute febrile illnesses as part of the health center team.

#### **3.3.1.2. Direction for using the satellite module**

1. Do the pretest in Section 2.1.2.3. in Unit 2 of the Core Module
2. Read the core module thoroughly
3. Use listed references and suggested reading materials to supplement your understanding of the problem.
4. Read the story of people in Sulula village in the core module and discuss the questions related to your profession
5. Do the post test in Section 2.1.3 in Unit 2 of the Core Module and evaluate yourself by referring to the key in Unit 7, Section 7.2.3.

### **3.3.2. Learning Objective**

By using this Satellite Module and other reference materials, trainees will be able to:

1. Demonstrate collection of appropriate specimens
2. Explain how to handle appropriate specimens
3. Describe how to preserve appropriate specimens
4. Explain when to examine appropriate specimens
5. List what to look for in appropriate specimen examination
6. Carry out macroscopic examination of different specimens
7. Carry out microscopic examination of different specimens
8. Identify the haemoparasite through microscopic examination

#### **3.3.2.1. Pre and posttest**

Refer to the core module Unit 2, Section 2.1.2.3

#### **3.3.2.2. Significance and brief description of the problem**

Refer to the core module Unit 2, Section 2.2.

#### **3.3.2.3. Epidemiology**

Refer to the core module Unit 2, Section 2.6

#### **3.3.2.4. Etiology and pathogenesis**

Refer to the core module Unit 2, Section 2.7

### 3.3.2.5. Laboratory Diagnosis of Acute Febrile Illnesses

Different microorganisms cause acute febrile illnesses; as a result, there are different laboratory procedures for their diagnosis. For an accurate laboratory diagnosis of AFI, the following should be taken into consideration:

#### 3.3.2.5.1. Collection of specimen

The reliability of the results obtained will depend largely on the care taken in collecting specimens. The following precautions should be taken in handling the specimens

##### Collection of a sufficient quantity

The sample that is going to be collected shall be of sufficient quantity (e.g. stool specimen should be at least 4ml(4cm<sup>3</sup>) to prevent rapid drying of stools) and to ensure the validity of the test that is going to be performed on the sample. Specimen containers should be leak-proof, clean, dry and free from traces of disinfectant.

##### The container used

Ensure that the container used for the sample collection is suitable and labeled correctly with:

- date
- patient's name
- patients number
- time of collection

##### Blood

Blood is one of the major clinical specimens submitted to the laboratory. It is collected for different types of tests and identification of different microorganisms. In case of AFI, blood is collected for the identification of malaria parasites such as *P.vivax*, *P. ovale*, *P. malariae*, *P.falciparum* and others like *S. typhi*, *S. paratyphi*, *Borrelia species*, *R. prowazeki*, *R .typhi*, etc.

The accuracy & reliability of laboratory results greatly depend on the correct collection

of the specimen. For routine purposes it can be collected from vein or capillary.

If a large amount of blood is needed for a certain procedure, the samples need to be collected from vein. The veins often chosen are those in the upper arm (or antecubital fossa) area as these veins are easily palpable & fairly well fixed.

For the small quantities of blood required for most hematologic procedures and for micro techniques a blood sample may be obtained from the capillary bed by puncture of the skin. From certain patients such as babies, burned patients, or amputees, it may be necessary or desirable to only obtain a very small amount of blood. This can be accomplished easily by means of capillary puncture. In adults and older children the tip of finger is punctured; in infants the plantar surface of the heel or the large toe is punctured. The ear lobe should be avoided for puncture because there is a slower flow of blood there and the concentration of cells and hemoglobin will be greater.

#### **PROCEDURE FOR FINGER PUNCTURE**

1. Assemble the necessary equipment: lancet, alcohol pad, dry gauze, slides, and capillary tubes or other supplies necessary to receive the blood
2. Be sure that the patient is seated comfortably.
3. Choose an area for the puncture that is free from calluses, edema, or cyanosis. Warm the puncture site if it is cold by immersing it in warm water or by rubbing it.
4. Cleanse the skin of the puncture site on the third or fourth finger vigorously with a pad soaked in 70% alcohol. This will remove dirt and epithelial debris, increase the circulation, and leave the area relatively sterile. Allow the area to air dry.
5. Grasp the finger firmly and make a quick, firm puncture about 2-3 mm deep with the sterile disposable lancet. This puncture should be made at right angles to the fingerprint striations on the patient's finger midway between the edge and mid-point of the fingertip. The puncture should not be made too far down on the finger and should not be too close to the fingernails. Deep puncture hurts no more than a superficial one and it gives a much more satisfactory flow of blood.
6. Discard the lancet in the appropriate disposal container. Dirty lancets should never be left lying on the work area. They should be discarded immediately after use and should not be touched again. Used lancets must be autoclaved before final

7. Wipe away the first drop of blood, using a clean piece of dry gauze or tissue. This drop is contaminated with tissue fluid and will interfere with laboratory results if used. The succeeding drops are used for tests.
8. If a good puncture has been made, the blood will flow freely. If it does not, use gentle pressure to make the blood form a round drop. Excessive squeezing will cause dilution of the blood with tissue fluid.
9. Collect the specimens by holding a capillary tube to the blood drop or by touching the drop to a glass slide. Rapid collection is necessary to prevent coagulation, especially when several tests are to be done using blood from the same puncture site.
10. When the blood samples have been collected, have the patient hold a sterile, dry piece of gauze or cotton over the puncture site until the bleeding has stopped.

#### **PROCEDURE FOR VENIPUNCTURE**

1. Assemble the necessary equipment:
  - a. For a vacuum tube system (the Vacutainer method): Thread the short end of the double-pointed needle into the holder and tighten securely. Place the vacuum tube in the holder and push the tube forward until the top of the stopper meets the guide mark in the holder. The point of the needle will thus be embedded in the stopper without puncturing it and losing the vacuum in the tube.
  - b. For a needle and syringe system. Remove the syringe from its protective wrapper and the needle from the vial and assemble them, allowing the vial to remain covering the needle when not in use. Attach the needle so that the bevel faces in the same direction as the graduation marks on the syringe. Check to make sure the needle is sharp, the syringe moves smoothly, and there is no air left in the syringe.
6. Identify the vein to be entered, preferably one in the antecubital fossa area of the arm. These veins are usually easily palpable and fairly well fixed in place.

7. Apply the tourniquet so that it can be easily released. The tourniquet should not be left in place unless the technician is ready to proceed immediately with the venipuncture.
8. Cleanse the skin at the venipuncture site thoroughly by rubbing well with 70% alcohol.
9. With the patient's cooperation, grasp the elbow with your left hand and hold the arm left extended. Anchor the vein with your thumb, drawing the skin tight over the vein to prevent it from moving. Ask the patient to open and close the fist.
10. Using the assembled vacuum tube system or syringe and needle, try to enter the skin first and then the vein, at a 30-40<sup>0</sup> angle. Enter the vein with the bevel of the needle up.
11. With the vacutainer system, when in the vein, push the vacuum tube into the needle holder all the way so that the blood flows into the tube. Blood will fill the tube under this vacuum.
12. With the syringe and needle system, if the vein has been entered, blood will spontaneously enter the syringe. In persons with low venous pressure, the plunger of the syringe is withdrawn slightly to make certain the needle has entered the vein. Blood should enter the syringe if the needle is in the vein properly. Withdraw the blood by using the left hand to pull back the plunger while steadying the syringe with the right hand.
13. When sufficient blood has been withdrawn, release the tourniquet. Place a dry gauze pad over the needle and puncture site and gently withdraw the needle.
14. Instruct the patient to hold the gauze pad over the venipuncture site for 2 or 3 minutes.
15. With the vacutainer system, remove the tube from the vacutainer system, remove the tube from the vacutainer holder and, if anticoagulation is used, invert several times gently to mix the blood with the anticoagulant. Label the tubes with the patient's name, hospital number, and other information required by the hospital.

16. With the syringe and needle system, remove the needle from the syringe and gently expel the blood into the tube. Avoid foaming or the rupture of the cells by using gentle pressure on the plunger of the syringe. Stopper the tube and invert gently to mix anticoagulant with the blood, if anticoagulant is used. If a vacutainer tube is used to hold the blood, push the needle through the stopper and allow the blood to collect in the tube under the vacuum in the tube. Label the tube properly. Use scoop technique of recapping needles.
17. Reinspect the venipuncture site to ascertain that the bleeding has stopped. If bleeding has stopped, apply a Band-Aid over the wound; otherwise continue to apply pressure until the bleeding stops. Do not leave the patient until the bleeding stops. Blood is used as a sample for serological diagnosis of AFI. The following procedure are indicated for AFI.

#### **3.3.2.5.2. Widal test for Typhoid fever and paratyphoid fever**

This is a serological technique, which tests for the presence of salmonella antibodies in a patient's serum. It is used when tests detecting antigen are not available. It is also used in the investigation of salmonella food poisoning.

When investigating typhoid fever, four the patient's serum is tested for O and H antibodies. (Agglutinins) against the following antigen. Suspensions usually (against stained suspensions):

S.typhi, O antigen suspension 9,12

S.typhi, H antigen suspension d

When testing for paratyphoid A, B, or C the following antigens are required

- S.paratyphi A, O antigen suspension, 1, 2, 12
- S.paratyphi H antigen suspension, a
- S.paratyphi B, O antigen suspension, 1, 4, 5, 12
- S.paratyphi B, H antigen suspension, b phase 1
- S.paratyphi C, O antigen suspension, 6, 7
- S.paratyphi C, H antigen suspension c phase 1

**Principle:** A series of dilutions of serum are made on physiological saline. A suspension of agglutinable organism with “H” and “O” salmonella antigen is added and the mixture is incubated. Finally the higher dilution giving 2+ agglutination is determined.

There are two methods to perform the Widal test: test tube and slide method. Due to the nature of the technique that involves the test tube method, it is rarely performed at health centers. The slide method being simple and relatively easy and cheap it is often performed in health centers. The slide method cannot differentiate between recent and past infection, as it is difficult to determine the titre. The test tube method is a diagnostic test. This indicates that when the test becomes positive using the slide test one shall confirm with the test tube method.

Salmonella contains two major antigens.

Somatic antigen (O antigen)

Flagella antigen (h antigen)

Additionally, in some species there is another antigen called Vi antigen (virulent antigen)

### **Slide method**

#### **Procedure**

1. Using a 0.2 ml or 0.2 ml graduated to 0.01 ml, place 0.08, 0.04, 0.02, 0.01 and 0.005 ml of serum on 4 or 5 squares respectively on a glass plate for each antigen.
2. Shake the antigen bottle well. The antigens used for the tube method are not to be used for the slide method. Add a drop of antigen to each square (slide). The dropper should deliver .003 ml of antigen per drop or use a 0.1 ml pipette.
3. Mix using a clean applicator stick for each different antigen. Start with the largest dilution and move to the smallest;
4. Tilt the slide back and forth for 2 minutes.
5. View against a black background.
6. Grade as 4+, 3+, 2+, 1+,  $\pm$ , 0 and report the highest titer showing 2+ reaction.

The squares could be ordinary microscopic cover slips.



**NB.** The correct type of antigen shall be used and the test controls shall be included during performance of the test. These controls are EH, EO, BH, BO, AH, AO and occasionally CH and CO. This procedure can be modified by different manufacturers, and as a result, it is advisable to follow the manufacturer's directions

**N.B** *Always run quality controls for every procedure.*

### **3.3.2.5.3. Lab Diagnosis of Relapsing Fever (RF)**

There are two forms of relapsing fever

**Louse borne relapsing fever:** caused by *Borrelia recurrentis* which is transmitted from human to human by the human head/body louse (*Pediculus humanus*).

**Tick born relapsing fever:** caused by *Borrelia dutoni* which is transmitted from human to human by soft ticks of genus *Ornithodoros*.

The laboratory diagnosis of RF is mainly by making use of blood film. There are two types of blood film. These are thin and thick blood films. The thick blood film can concentrate the parasites and hence is more sensitive than the thin blood film. For the investigation of RF both methods are used.

For the collection of blood sample (skin puncture refer to the section under blood sample collection).

Procedure for preparation of thin and thick blood films.

1. Cleanse the lobe of the finger (or heel if an infant) using a swab moistened with 70% alcohol. Allow the area to dry.
2. Using a sterile lancet, prick the finger or heel. Squeeze gently to obtain a large drop of blood. Collect the blood preferably in a small plastic bulb pipette.
3. Using a completely clean grease-free microscope slide and preferably malaria slide card, add a small drop of blood to the centre of the slide and a large drop about 15 mm to the right.
4. Immediately spread the thin film and thick blood film using a smooth edged slide spreader. Blood from anemic patients needs spreading more quickly with the spreader held at a steeper angle.

5. Without delay (using the end of a plastic pipette or piece of stick), spread the large drop of blood to make the thick smear. Cover evenly an area about 15x15 mm. It should just be possible to see (but not read) newsprint through the film. When spreading the blood, mix it as little as possible to avoid the red cells forming marked rouleaux which can cause the blood top be easily washed from the slide during staining.
6. Using a black lead pencil, label the slide with the date and patient's name and number. If a slide having a frosted end is not used, write the information neatly on the top of the thin film (after it has dried).
7. Allow the blood films to air-dry with the slide in a horizontal position and placed in a safe place (where there is no risk of the blood coming into contact with any person or object).

### **Drying thick films**

It is good practice to keep a separate box or deep tray for drying malaria blood films. Cover it with a lid made from netting to protect the films from insects and dust (flies will rapidly "clean" blood from slides). If the box or tray is placed in a warm sunny place, the thick film will dry quickly (do not allow the blood to remain in the sun after it has dried). In humid climates, it may be necessary to use a hand dryer or an incubator to dry thick blood films.

### **Fixation of thin blood films (by using absolute ethanol)**

1. Place the slide horizontally on a level bench or on a staining rack.
2. Apply a small drop of absolute methanol or ethanol to the thin film, making sure the alcohol does not touch the thick film. Alternatively apply the methanol to the thin film-using swab.
3. Allow the thin film to fix for 1-2 minutes.

### **Staining blood films**

The stains most frequently used in district laboratories are

- Fields stain
- Giemsa stain
- Wright stain

For practical purposes and availability of the reagents, Giemsa staining technique will be discussed.

## **Giemsa Staining Technique**

### **Required**

- Giemsa stain
- Buffered water, pH 7.1-7.2
- Or buffered saline, pH 7.1-7.2

### **Procedure**

1. Immediately before use, dilute the Giemsa stain as required. E.g. 10% solution for 10 minute staining (measure 45 ml of buffered water, pH 7.1-7.2 in a 50 ml cylinder. Add 5 ml of Giemsa stain to 50 ml mark 0 and mix gently).
2. Place the slides face down wards, in a shallow tray supported on two rods, in a Coplin jar or in a staining rack for immersion in staining troughs. Thick blood films must be thoroughly dried and thin blood films must be fixed (methanol for 2 minutes).
3. Pour the diluted stain into a shallow tray, Coplin jar, or staining troughs. Stain for 10 minutes.
4. Wash the stain from the staining container using clean water (need not be distilled or buffered). Important: Flushing the stain from the slides and staining container is necessary to avoid the films being covered with a fine deposit of stain.
5. Wipe the back of each slide clean and place it in a draining rack for the preparation to air-dry.
6. Examine the blood film first by 40x objective and then with 100x oil immersion.

### **Results**

- Borrelia species- large spirochete measuring 10-20 x 0.5 micro meters with uneven size coils.
- Red cells-gray to pale mauve
- Reticulocytes-grey blue
- Nuclei of neutrophils-dark purple

- Granules of neutrophils-Mauve purple
- Granules of eosinophils-red
- Cytoplasm of mononuclear cells - blue grey

## **Reporting**

Reporting should include the following information

- Indicate whether the blood film is positive for Borrelia species or not.
- The numbers of bacteria present, whether many, moderate or scanty
- Gram reaction of the bacteria, whether cocci,diplococci, streptococci, rods, or coccobacilli. Also, whether the organisms are intracellular or extracellular.
- Presence and number of pus cells
- Presence yeast cells and epithelial cells

**N.B** *Always run quality controls for every procedure.*

### **3.3.2.5.4. Weil-Felix reaction for typhus fever.**

This test is not specific for typhus fever as the antigen is prepared from Proteus bacteria and detects antibodies produced due to rickettsial and proteus infections. It is an example of heterophile antibody (antibodies that react with an entirely different organism and phylogenetically unrelated to the organism or antigen responsible for their production). This test is not practical in Ethiopian health centers as a result of the laboratory facilities.

### **3.3.2.5.5. Laboratory Diagnosis of malaria**

Refer to module on malaria.

### **3.3.2.5.6. Laboratory Examination of Meningitis**

Meningitis is caused by N.meningitidis. The specimen of choice is CSF which is usually collected by experienced health officer or physician. The laboratory investigation of meningitis at health centre level is mainly by gram staining. There are also other supportive tests on CSF like protein estimation, sugar estimation, cell count and others.

### **Gram staining procedure:**

Gram staining reaction is used to help identify pathogens in specimens by their Gram reaction (Gram positive or Gram negative) and morphology. Bacteria is divided in to two groups based on Gram reaction: Gram positive and Gram negative.

### **Required**

crystal violet stain

Lugol's iodine

Acetone-alcohol decolorizer

Neutral red (0.1 % w/v) or safranin

### **Procedure**

1. Prepare the smear of CSF on clean glass slide in optimum time.
2. Let the smear dry by air
3. Fix the dried smear by applying methanol for 2 minutes.
4. Cover the fixed slide with crystal violet stain for 30-60 seconds.
5. Rapidly wash off the stain with clean water. Note: when the tap water is not clean, use filtered water or cleaned boiled rainwater.
6. Tip off all the water, and cover the smear with Lugol's iodine for 30-60 seconds
7. Wash off the iodine with clean water.
8. Decolorize rapidly (few seconds) with acetone alcohol. Wash immediately with clean water. *Caution:* Acetone alcohol is highly flammable, therefore use it well away from an open flame.
9. Cover the smear with neutral red stain for 2 minutes.
10. Wash off the stain with clean water.
11. Wipe the back of the slide clean, and place it in a draining rack for smear to air-dry.

12. Examine the smear microscopically, first with the 40x objective to check the staining and to see the distribution of material and then with the 100x oil immersion objective to report the bacteria and cells.

### **Results**

Gram positive bacteria----- Dark purple  
Gram negative bacteria----- Pale to dark red  
Nuclei of pus cells ----- Red  
Epithelial cells----- Pale red

### **Reporting**

The report should include the following information

- Numbers of bacteria present, whether many, moderate, few or scanty.
- Gram reaction of the bacteria, whether gram positive or gram negative
- Morphology of the bacteria, whether cocci, diplococci, streptococci, rods or coccobacilli. Also, whether the organisms are intracellular.
- Presence and number of pus cells
- Presence of yeast cells and epithelial cells

### **Variations in Gram staining (causes of false gram positive and false negative)**

Gram positive organisms may lose their ability to retain crystal violet and stain Gram negatively for the following reasons:

- Cell wall damage due to antibiotic therapy or excessive heat fixation of the smear.
- Over decolorization of the smear.
- Use of an iodine solution which is too old, i.e. yellow instead of brown in color (always store in a brown glass or other light opaque container).
- Smear has been prepared from an old culture

Gram negative organisms may not be fully decolorized and appear as gram positive when a smear is too thick.

**N.B** Always run quality control for procedure.

### 3.3.2.5.7. Laboratory Examination of Stool

The commonest causes of fever with GI manifestations necessitating stool examination are bacillary dysentery and typhoid fever. Some of the features which help to differentiate bacillary dysentery from dysentery caused by other conditions like amoebiasis microscopically are the following:

| <u>Amoebic dysentery</u>                  | <u>Bacillary dysentery</u>                     |
|---|--|
| - Few pus cells                           | - large number of pus cells                    |
| - Very few macrophages                    | - large and numerous macrophages               |
| - charcoat leyden crystals may be present | - nil  |
| - motile amoebae containing red cells     | - no motile amoebic containing red blood cells |

### Microscopic Examination of Stool

Acute febrile illness (AFI) can be caused by pathogenic organisms such as bacterial, viral, or parasitic, and other factors. In the case of acute and chronic febrile conditions, a well equipped laboratory is required for culture, sensitivity, serum electrolytes and other tests, which are not typically available at the health center level. For detailed procedures and collection refer the Diarrhea module.

### 3.3.2.6. Prevention and control

Refer to Section 2.11 in the Unit 2 of the core module

### 3.3.2.7. Role and task Analysis

Refer to the core module Unit 4

### 3.3.2.8. Glossary and Abbreviation

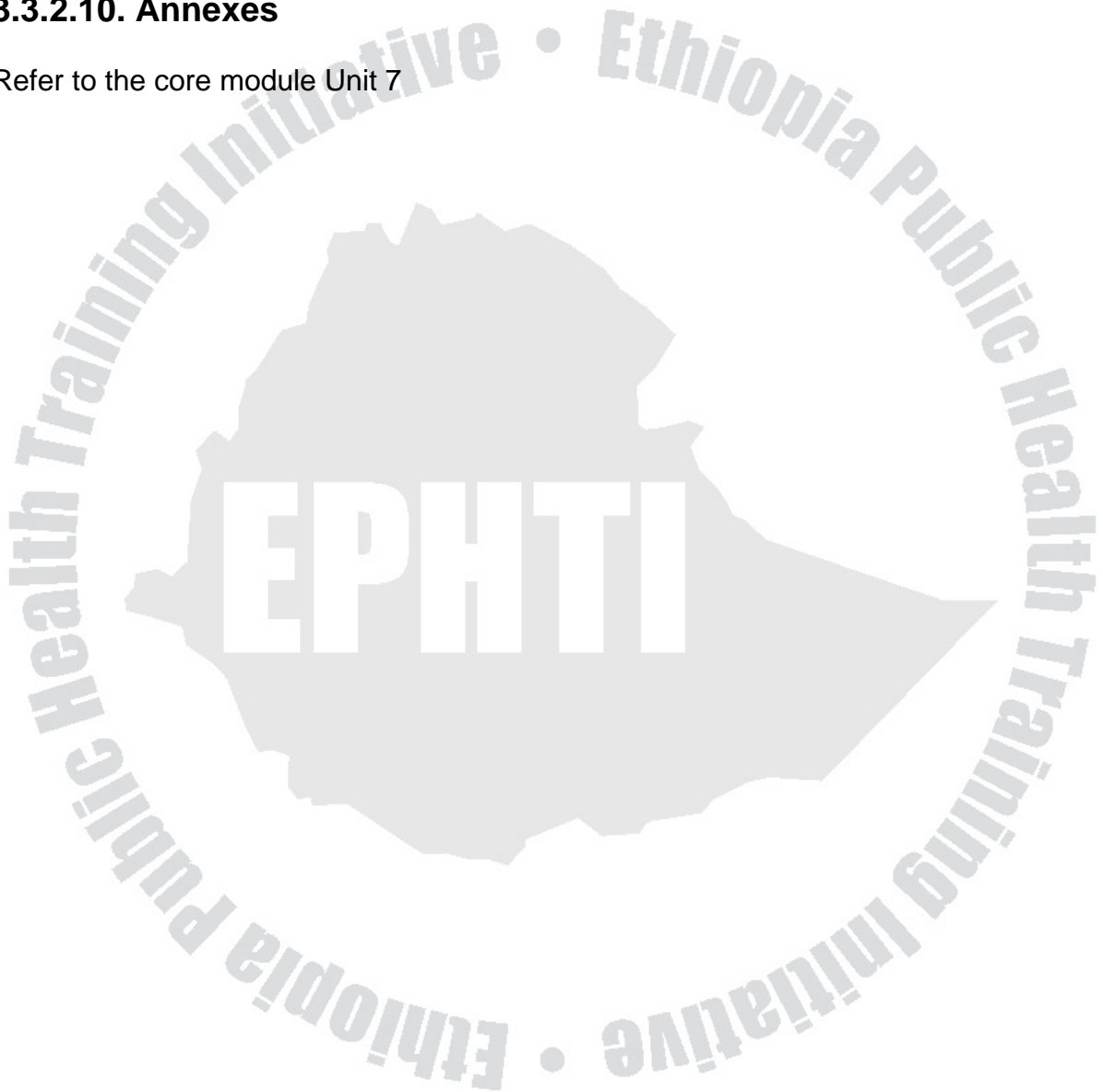
Refer to the core module Unit 5

### **3.3.2.9. References**

Refer to the core module Unit 6

### **3.3.2.10. Annexes**

Refer to the core module Unit 7





## **3.4. SATELLITE MODULE FOR SANITARIANS**

### **3.4.1. INTRODUCTION**

The diseases under the category of AFI need a favorable environment such as unwashed clothing, overcrowded and unventilated living quarters (prisons, hospitals and other institutions) improperly disposed refuse, garbage and human feces. Lice favor overcrowded conditions to spread the disease; colds, influenza, meningitis etc. spread by droplets and other discharges from nose, mouth or throat.

Prevention and control of these diseases depends on how much we are aware and ready to make the environmental condition unfavorable for the vectors and our behavior in containing or safely disposing of waste and other discharges.

The sanitarian together with the other team members is expected to play a major role in the prevention and control of these diseases

The purpose of the module and directions for its use are depicted under the introduction in the core module (refer to the core module)

#### **3.4.1.1. Purpose and use of the module**

This module can be used in the training of sanitarians that are in actual training or those already in service, for management of diarrheal diseases.

#### **3.4.1.2. Directions for using the module**

- Do the pretest pertaining to your profession in Section 2.1.2.4 of the Core Module.
- When using this Satellite Module, it would be profitable if the sanitarian follows the knowledge gained from the core module with his knowledge of the community he is working in.
- The sanitarian should also read the core module thoroughly first and when referred in this module.

- Read the reference materials listed to supplement your understanding.
- In addition, the sanitarian could be successful in using this module if he/she works with other team members and intersectorally with other development workers (agriculture extension agents, development workers, home economists etc.).
- Do the post test pertaining to your profession in Section 2.1.2.4 of the core module and evaluate yourself by referring to the keys in Unit 7 Section 7.1.2.4.



## **3.4.2. SATELLITE MODULE FOR SANITARIANS**

**3.4.2.1. Pretest and posttest:** Please refer to Section 2.1-2.4 in the Core Module

**3.4.2.2. Significance and brief description of the problem:** please refer to Section 2.2 in the Core Module

### **Goal**

The ultimate goal of this training module is to produce competent sanitarians that can understand the disease transmission mechanism of acute febrile illness (AFI) and carry out effective and sustainable preventive measures in their control in community settings together with the team and the communities.

### **3.4.2.3. Learning Objectives**

At the end of the training students will be able to:

1. Describe ways of preventing AFI.
2. Describe why personal hygiene, domestic and environmental hygiene practices prevent AFI.
3. Describe the ways and advantages of preparing a behavioral, target in designing effective health education programme to prevent AFI.
4. Describe the importance of target audiences.
5. Understand all the mechanisms or routes of (faecal-oral) transmission of disease.
6. Describe the control methods for vector borne febrile illnesses.

#### **3.4.2.4. Learning activity (case Study)** “the story of people in Sulula village”:

Please refer to the story in Section 4.1 in the core module and the exercise to section 2.9 in this Unit.

#### **3.4.2.5. Definition:**

Please refer to Section 2.5 in the core module

#### **3.4.2.6. Epidemiology:**

Please refer to Section 2.6 in the core module

#### **3.4.2.7. Etiology and pathogenesis;**

Please refer to Section 2.7 in the core module.

#### **3.4.2.8. Prevention of AFI**

Acute febrile illnesses could be prevented and controlled if one can keep his/her personal hygiene, control the immediate human environment from being littered by refuse and feces, using sanitary latrines, clean water, food at all times and practice good hygiene behavior. Personal hygiene includes:

- Proper disposal of feces and solid waste (environmental hygiene)
- Vector control
- Food hygiene
- Water sanitation

Most of the diseases that cause AFI will come under the above headings either in personal hygiene, water waste or vector.

A sanitarian is advised to examine the five environmental health domains to see their role in the transmission of the diseases.

### **1. Personal Hygiene**

Personal hygiene, especially hand washing, is the most important factor in preventing typhoid and paratyphoid disease transmission. Mothers, caregivers, cooks who may

be carriers can contaminate food and drinks unless they practice proper hand washing.

What is proper hand washing? It is washing hand using soap, ash or any other cleansing materials: It is a behavior which must be practiced by every one in the family more so by caregivers and cooks. Hand washing should be performed immediately:

The other personal hygiene practice is keeping of self, housing and compound as clean as possible or else fly borne, and louse borne diseases will spread.

- After using latrines
- After cleaning child's bottom or cleaning child feces
- After cleaning houses
- Washing and ironing clothing especially night cloth and under wears
- Washing of hair, shaving, or trimming short at all times.
- Take regular baths

## **2. Proper disposal of human feces**

Human feces contain many types of disease causing organisms including those that could cause typhoid and paratyphoid fevers. Isolating feces is one of the most essential barriers (first barrier) for typhoid fever. Isolation can be effected by many methods, which include the traditional pit latrines.

The most important thing to consider is not only to have latrines but:

- The latrine should be sited away from water source (about 30 meters) and kitchen (10 meters)
- The latrine must be constructed in such a way that guarantees privacy and will not cause any accident
- It should be cleanable and cleaned regularly
- The latrine hole should be covered or vented to avoid fly breeding
- There should be a hand washing facility attached to the latrine so that users will practice hand washing.

### 3. Water protection and use

Water though essential for life is incriminated in harboring many disease organisms. Water is contaminated in many ways in different areas. The areas of contamination are:

- At the source by surface runoffs, animal wastes, and from an underground infiltration
- When women or children are drawing it with no precaution for hygiene.
- From a dirty cover that people use to cover water during transport
- During storage and drawing water from storage especially when water is drawn by dipping.

Therefore, the second important barrier in the prevention of typhoid is to prevent access of the contaminant (*Salmonella typhi*). The methods of protection are:

- Protection of the water source so that there will not be contamination from the surface, subsurface or animals.
- Cleaning water containers during or before water fetching
- Using clean covering materials
- Storing water in clean containers that are small enough to lift and pour rather than dipping

#### 4. Food Hygiene

Food is one of the sources for the transmission of diseases such as AFI. This is usually from handling the food, cooking and preserving practices.

Food can be contaminated:

- From the source
- During preparation if food is touched by unwashed hands
- by flies
- If displayed in dirty food contact surfaces
- When left at room temperature and exposed to flies and dirt
- When Leftover food is not properly heated before eating

If we concentrate more on the above during our teaching, many food borne infections could be eliminated or prevented.

#### 5. Vector Control

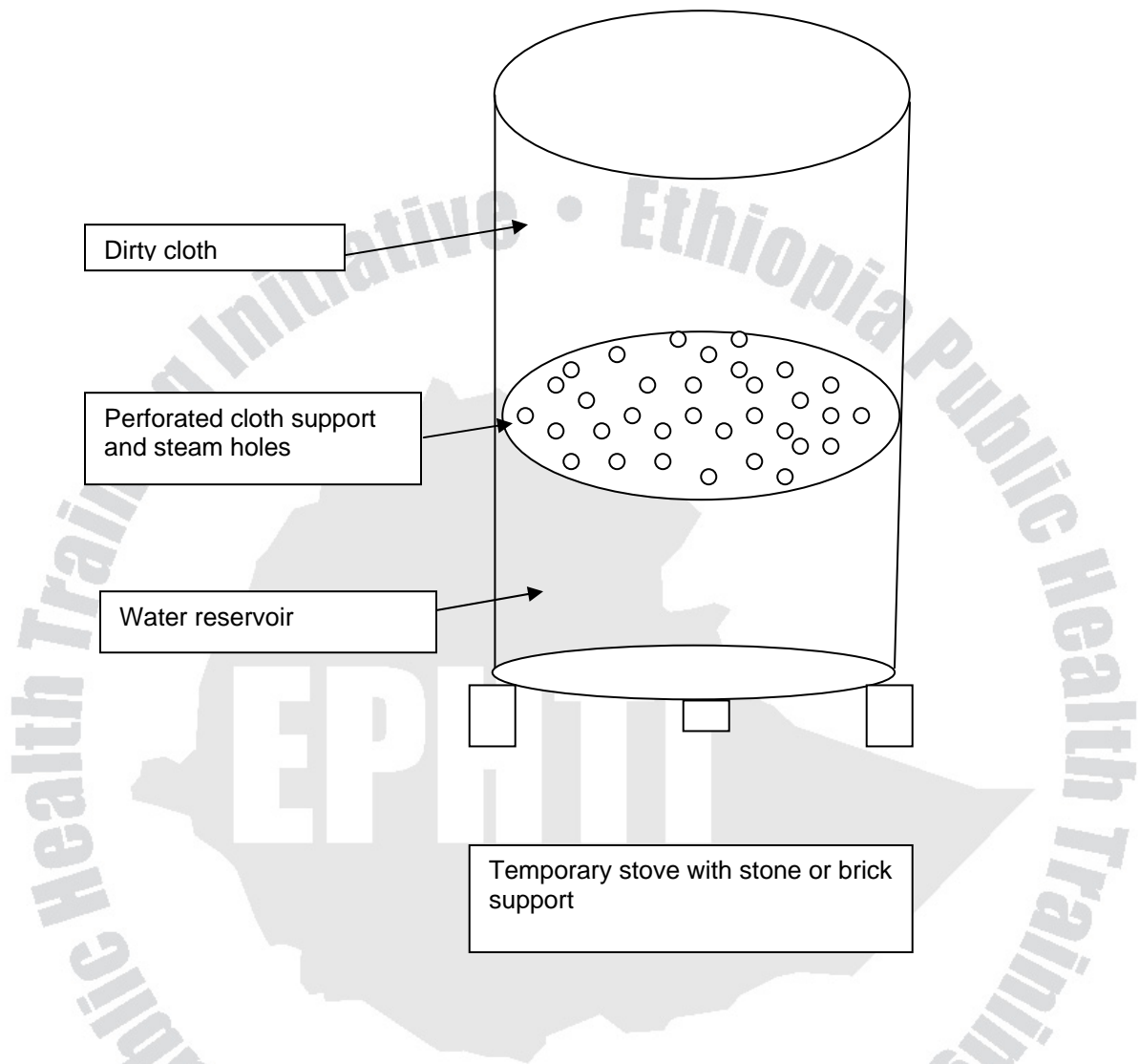
Arthropods play an important and determinant role in the transmission of many types of diseases among which are typhus, relapsing fever, and malaria. The epidemiology of these diseases is related to the habitat or ecology of the vector.

In the case of mechanical transmission (e.g. flies) the vector may carry the infective agent on its body or limbs and deposit it in the food we eat or drink and the organism is ingested.

In biological transmission the vectors acquire the infective agent from blood or skin tissue of infected host and transfer it to the healthy person during biting.

The host could also become infected through contamination of the mucus membrane or skin by the infective feces of the vector. E.g. Infective tissue or fluid is released when the vector (louse) is crushed on the skin and enters the body through cracks causing relapsing fever.

Vector control involves the modification of the living environment or habitat of the vector as explained under prevention and control of RF, and Malaria.



## 5. Domestic and Environmental sanitation

Many disease organisms arise from the human environment. The immediate human environment is his house and its surrounding. Over 85% of the Ethiopian populations live in rural areas. Most of the rural people are farmers. By and large, the society has animals or chicken that they raise and live with. Such animals produce waste matters which may contribute to human infections such as *salmonella typhi*. Waste materials such as animal dung, urine, solid waste, deposited in the living compound are causes for the propagation of infectious diseases such as AFI



Based on the above domains, the role of the sanitarian in the prevention and control of AFI is to design a health and hygiene education program.

### **Health Education**

It has to be understood that one of the problem in the spread of AFI is lack of knowledge or information. Giving health education should be:

- Targeted (to whom should a health education program be prepared and delivered)
- Simple (short and to the point facts have to be given to the target audiences)
- Convincing (target audience should be able to get the point and demonstrate it).
- Timely (proper time, place, and condition should be selected).

Before undertaking a health education program, the following must be analyzed.

#### 1. Behavioral analysis

What are the current behaviors with regard to:

- Personal hygiene /hand washing
- Food sanitation
- Latrine use
- Water hygiene
- Vector control
- Housing and ventilation

#### 2. Select target behaviors

What target behavior do you want to change?

#### 3. Are there examples that you want to build on:

- For example people wash hands with soap after eating but not before eating
- People wash hands before eating but not after latrine use

4. What methods should be used to educate the target audience
  - Person to person or face to face (interpersonal communication)
  - Group discussion
  - Role playing
5. What channels
  - Posters
  - Tape recorders
  - Flip charts

Almost all AFI are killers or debilitating diseases especially for the poor and underserved rural population in Ethiopia. It is very important that the team and especially the sanitarian devote their time to conveying a sustained health and hygiene education program in their communities. Forming a health committee is also essential so that the community will be mobilized through them. Community participation in solving such problems as acute febrile illnesses will guarantee sustainability for such problems that concern Ethiopia.

#### **3.4.2.9. Role and task Analysis**

Refer to the core module Unit 4

#### **3.4.2.10. Glossary & Abbreviation**

Refer to the core module Unit 5

#### **3.4.2.11. References**

Refer to the core module Unit 6

#### **3.4.2.12. Annexes**

Refer to the core module Unit 7

## **3.5. SATELLITE MODULE FOR PRIMARY HEALTH WORKERS (PHW)/COMMUNITY HEALTH WORKERS (CHW)**

### **3.5.1. INTRODUCTION**

#### **3.5.1.1. Purpose and Use of the Module**

Materialization of the Community based management of Acute Febrile Illness is made possible through training of PHWs/CHWs that are well equipped with the basic knowledge, attitude and skills of diagnosing, treating, timely referral, controlling and preventing acute febrile illnesses. Therefore, this satellite module will be utilized in the training of CHWs to fulfill the aforementioned purposes.

#### **3.5.1.2. Direction for the use of the module**

1. Administer the pretest in Section 2.2.5, in Unit 2 of the core module.
2. The satellite module can be used in the training or refreshment of PHWs/ CHWs by the health center team, NGOS and other such organizations.
3. Read the core module thoroughly before using this satellite module for the training of PHWs/CHW
4. Read the story of Sulula Vilage and try to pose practical questions to the PHW/CHWS
5. Use more participatory and simple methods of training for this group.
6. Re-administer the post-test at the end of the training
7. Interpret this satellite module into the local language for better understanding if need arises

## **3.5.2. THE SATELLITE MODULE**

### **3.5.2.1. Pre and post test**

See the pre and post test for PHW/CHW in the core module section 2.1-2.5

### **3.5.2.2. Significance and brief descriptions of the problem**

The user of this module for training PHWs/CHWs is highly advised to refer to the core module sections 2.2.

### **3.5.2.3 Learning Objectives**

At the end of completing these modules the PHW/CHW will be able to:

1. Identify and define types of acute febrile illnesses
2. Treat a child with fever
3. Give health education on the prevention of acute febrile illnesses
4. Advise mothers/care takers on the importance of continued feeding during acute febrile illnesses

### **3.5.2.4. Learning activities (Case Study)**

Read story of Sulula village for the class (make them read) thoroughly so that they will be able to discuss questions in Unit 2, Section 2.12 of this module.

### **3.8.2.5. Definition**

See the Core Module Section 2.5.

### **3.5.2.6. Epidemiology**

The common causes of acute febrile illness in Ethiopia are relapsing fever (“Yegirsha Beshita”), Malaria (“Weba”), Typhoid fever (“Ye anjet Tesibo”), Meningitis (“Majirat

getir”), Typhus (“Tesibo”). These diseases are the major causes of mortality and morbidity in Ethiopia. They are epidemic prone diseases, which at times result in outbreaks.

### **3.5.2.7. Causes**

Different germs that get into our body through different routes cause acute febrile illnesses. The germs could get into our body through the bite of lice or ticks (typhus and relapsing fever), by droplets in the air (in meningitis and common cold). Unhygienic practices like poor personal and environmental hygiene and food hygiene are risk factors for the transmission of acute febrile illnesses.

Risky hygienic practices include: collecting, storing and using drinking water unhygienically and inappropriate disposal of human excreta including that of children's.

### **3.5.2.8. Clinical feature**

See the clinical picture in the Core Module.

### **3.5.2.9 Diagnosis**

a) In diagnosing the types of acute febrile illnesses

#### **History**

- History of fever
- Travel history
- Contact history with a patient having similar health problems
- History of drug intake, especially antipyretics and antibiotics or traditional medicines or therapies
- History of passing urine in the last 24 hours
- History of vomiting and diarrhea
- History of rashes
- History of breathing difficulty or fast breathing

## Physical Examination

- Vital signs-pulse rate, respiratory rate, temperature and rash, neck stiffness.

### 3.5.2.10. Case Management

- Discuss and demonstrate how to measure temperature
- Advise the mother/care giver to give more fluid and food without interruption
- Give drugs to control fever and febrile convulsion
- Refer cases if indicated

### 3.5.2.11 Prevention and Control

#### Prevention

- Body hygiene
- Avoid overcrowded

Give hygiene education on the prevention and risk factors of acute febrile illness.

#### Prevention

- Body hygiene which include regular bathing, regular ironing of clothing or exposing it to the sun,
- Avoid overcrowded living conditions
- Improve ventilation
- Apply insecticide to the hair; clothes and bedding. Institutions such as prisons that are crowded with hundreds of inmates in a single cell should arrange a steam barrel where the inmates themselves do periodic steaming. Clothes of incoming prisoners could also be steamed before they are admitted to cells.
- Using soap to wash hands before eating

### 3.5.2.12. Learning activities (case study) continued

Read the story of Sulula village for the class (make them read) if need arises, translate it into the major local languages and discuss the following questions in the class.

1. What factors contribute to development of acute febrile illnesses?
2. What do you think are the preventive measures?

### **3.5.2.13. Role and task Analysis**

Refer to the core module Unit 4

### **3.5.2.14. Glossary and Abbreviations**

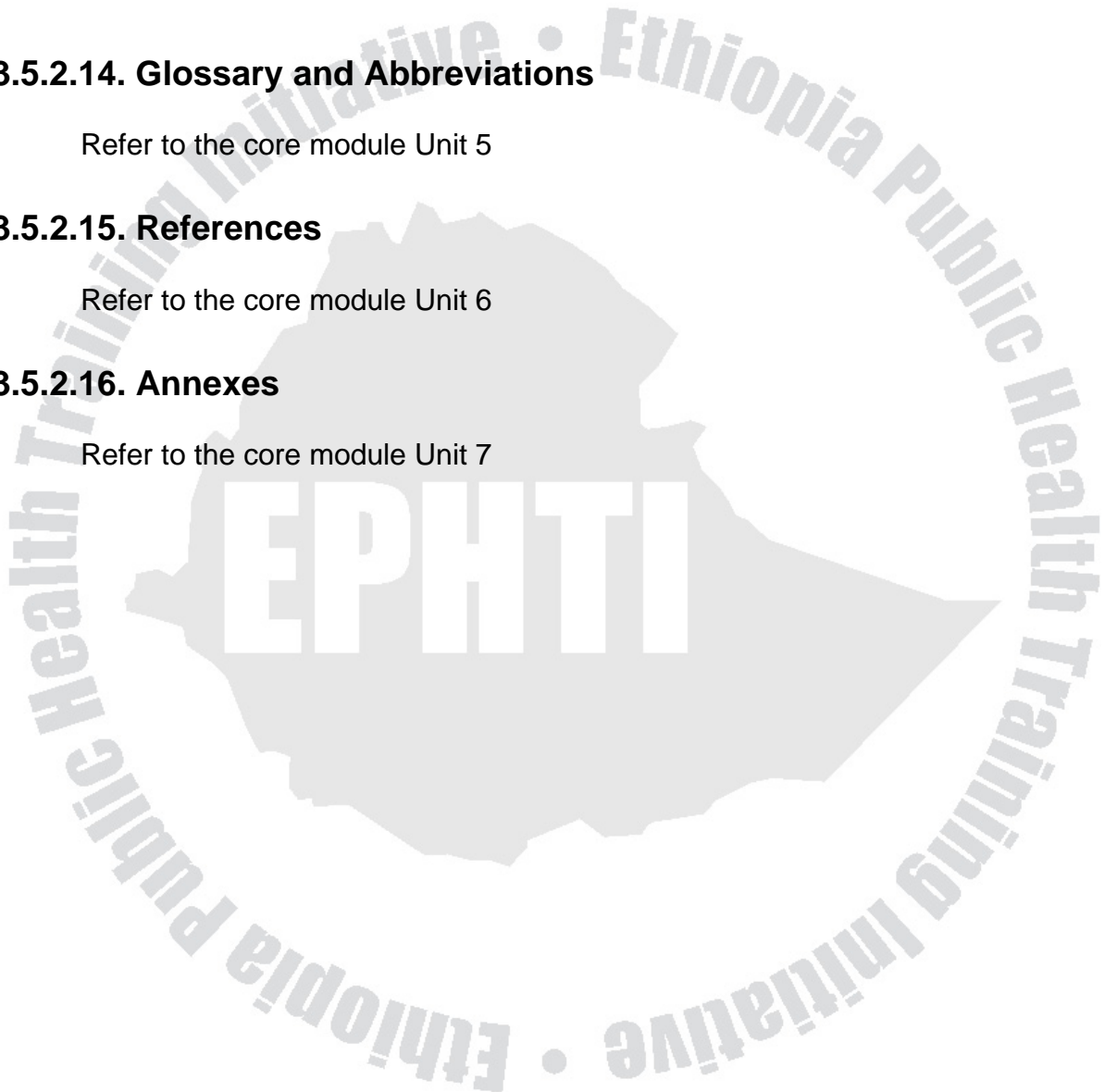
Refer to the core module Unit 5

### **3.5.2.15. References**

Refer to the core module Unit 6

### **3.5.2.16. Annexes**

Refer to the core module Unit 7



### 3.6. TAKE HOME MESSAGE FOR MOTHERS/ CAREGIVERS

The caregiver should bear in mind the following messages:

- Give more fluid continuously to a person with acute febrile illness provided that his/her condition allows. Give small amount of fluid more frequently.
- Provide other supplementary foods especially high protein diets to facilitate healing process
- Take the person immediately to the nearest health institution if he/she has a fever, vomiting, convulsion, refusal to drink or drowsiness with fever
  - a. Get the person shaved and his clothes thoroughly disinfected
  - b. Dispose the infested clothes to avoid transmissibility.
  - c. Comply with the treatment offered by the health center team or CHW.
  - d. Avoid bottles for feeding of children and infants. Instead use cup and spoon.
  - e. Keep your house and compound clean.
  - f. Keep the hygiene of drinking water both at the collection sites, and storage until before it is served.
  - g. Keep the hygiene of food during preparation, storage and during serving (tell them the specific points as to how to the keep hygiene of their food).
  - h. Get your children and yourself vaccinated for meningitis and other vaccine preventable diseases.
  - i. Participate in the preventive activities against acute febrile illnesses at home and surrounding community.



## UNIT FOUR

### TASK AND ROLE ANALYSIS

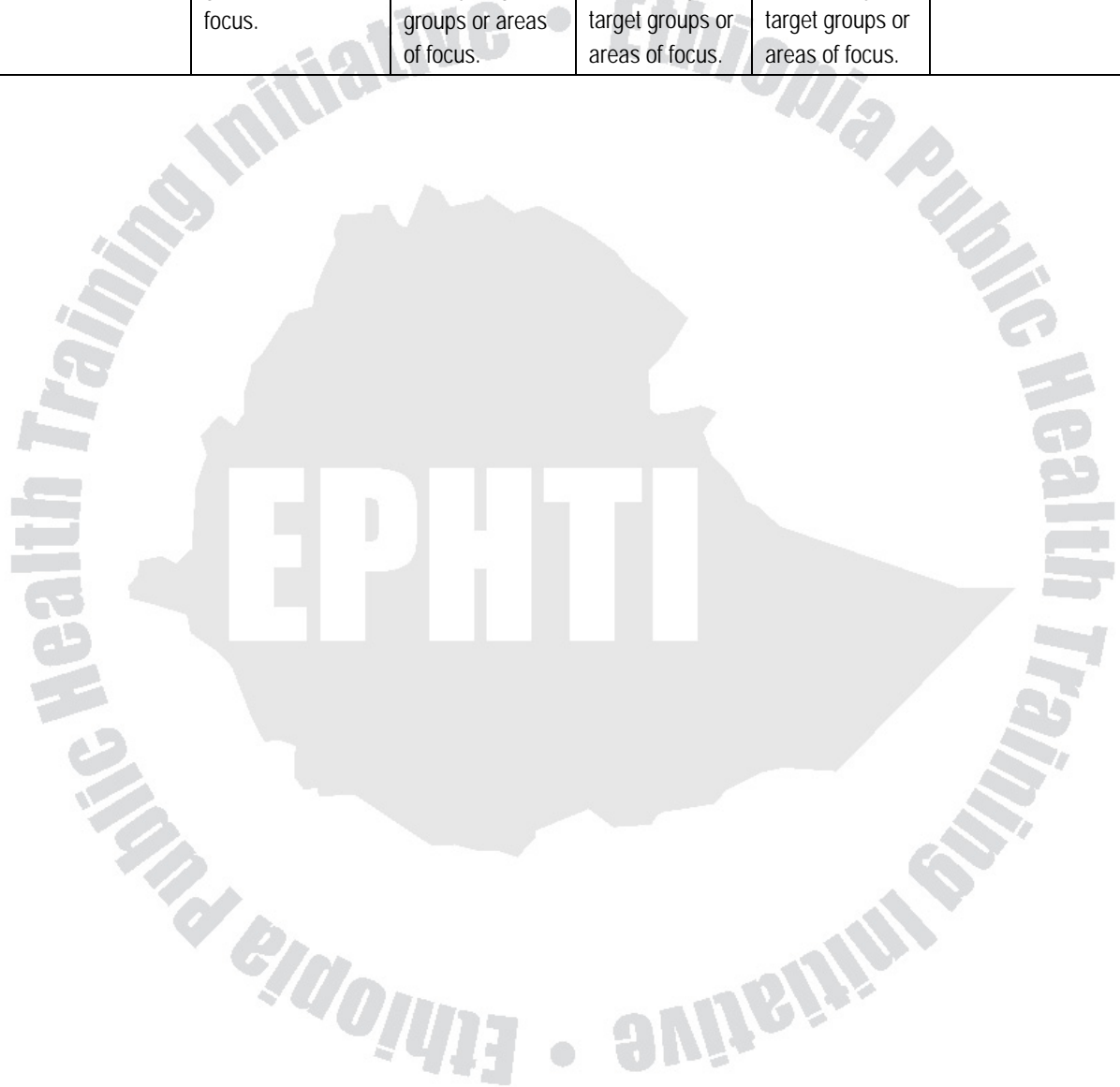
**Table 1.** Knowledge objects and specific tasks of the Health Center Team

|           | <b>Learning objective (expected outcome)</b>  | <b>HO</b>   | <b>PHN</b>  | <b>EH</b>   | <b>MLT</b>  | <b>Activities</b>   |
|-----------|---|---|---|---|---|---|
| Knowledge | <ul style="list-style-type: none"> <li>Define and describe causes and types of AFI</li> </ul> | <ul style="list-style-type: none"> <li>Define and describe causes and types of AFI</li> </ul> | <ul style="list-style-type: none"> <li>Define and describe causes and types of AFI</li> </ul> | <ul style="list-style-type: none"> <li>Define and describe causes and types of AFI</li> </ul> | <ul style="list-style-type: none"> <li>Define and describe causes and types of AFI</li> </ul> | Define AFI and characterize the differential diagnosis and types of fever   |
|           | <ul style="list-style-type: none"> <li>List the causes and risk factors for AFI</li> </ul>    | List different causes of AFI and their association with the different risk factors.           | List different causes of AFI and their association with the different risk factors            | List different causes of AFI and their association with the different risk factors.           | List different causes of AFI  | List the different causes of AFI and explain their association with the different risk factors. Differentiate the different causes using the clinical workup. |
|           | Describe the pathogenesis of AFI  | Elaborate the mechanisms of development of infection of different causes of AFI               | Elaborate the mechanism of development of infection of different causes of AFI                | -----   | -----   | Indicate the different steps existing in the development of infection or different cause of AFI   |

**Table 2.** Knowledge objects and specific tasks of the Health Center Team

|           | Learning objectives   | HO   | PHN   | MLT   | Sanitary  | Activities   |
|-----------|---|--|---|---|---|--|
| Knowledge | Describe the magnitude and contribution of AFI to over all health problems locally and nationally | Pin point the prevalence of AFI and its contribution to mortality and morbidity in the population locally (and nationally) | Pin point the prevalence of AFI and its contribution to mortality and morbidity in the population (locally and nationally). | Pin point the prevalence of AFI and its contribution to mortality and morbidity in the population (locally and nationally). | Describe the microscopic prevalence of causes of AFI.   | * Explain the burden of AFI morbidity and mortality in the population<br>* Describe the commonest etiologic agents of AFI locally and nationally.  |
|           | Describe the assessment of AFI and its investigation  | Enumerate the clinical manifestations and complications of AFI   | Describe the complications of AFI and their manifestations  | ----  | Describe the different methods of laboratory investigation for AFI  | .Perform subjective, objective assessment and plan (SOAP) notes for management of patients with AFI<br>. Investigate different specimens macroscopically and microscopically and record and report the result. |
|           | Describe the principle and treatment methods of AFI   | Explain how to treat a case with AFI and the principle underlying it   | Describe how to administer the treatment and advise the mother or caregiver.  | -----   | -----   | List the different methods of treatment of a case with AFI<br>Describe advice that should be given to the caregiver.   |
|           | Elaborate the methods of investigation and control of outbreaks of AFI as a team                  | Elaborate methods of investigation and control of outbreaks of AFI as a team   | Elaborate methods of investigation and control of outbreaks of AFI as a team  | Elaborate methods of investigation and control of outbreaks of AFI as a team  | Elaborate methods of macroscopic and microscopic investigation in the control of outbreaks of AFI as a team | Explain both laboratory and clinical investigation in the control of outbreaks of AFI in the community   |

|  |   |  |  |  |  |  |
|--|---|--|--|--|--|--|
|  | List the major information methods, and targets for health education in the control of AFI. | Describe methods of giving health education on the control and prevention of outbreaks of AFI. Identify target groups or areas of focus. | Describe methods of giving health education on the control and prevention of outbreaks of AFI. Identify target groups or areas of focus. | Describe methods of giving health education on the control and prevention of outbreaks of AFI. Identify target groups or areas of focus. | Describe methods of giving health education on the control and prevention of outbreaks of AFI. Identify target groups or areas of focus. | <ul style="list-style-type: none"> <li>• Identify current behavior</li> <li>• Identify target behavior</li> <li>• Identify target audience</li> <li>• List methods of communication</li> </ul> |
|--|---|--|--|--|--|--|



**Table 3. Attitude objects and specific tasks of the Health Center Team**

|          | Learning Objective (Expected outcome)   | HO   | PHN   | EH  | MLT   | Activities  |
|----------|---|--|---|---|---|---|
| Attitude | Advocate for the utilization of health services in reducing morbidity and mortality due to AFI.         | Instruct community health workers (CHW) mothers and caregivers the importance of visiting health services in reducing morbidity and mortality due to AFI | Instruct CHW mothers and caregivers the importance of visiting health services in reducing morbidity and mortality due to AFI | Instruct CHW mothers and caregivers the importance of visiting health services in reducing morbidity and mortality due to AFI | Instruct CHW mothers and caregivers the importance of visiting health services in reducing morbidity and mortality due to AFI | - Advise CHW to educate mothers and caregivers (patients) for utilization of health services (HS) for early treatment and prevention of mortality due to AFI.<br>-Advise (care givers) and patients the role of early visiting of HS in the prevention of mortality and disability from AFI |
|          | Promote feeding of patients/ children with AFI  | Advocate continued feeding of a patient with AFI   | Advocate continued feeding of a patient with AFI  | Advocate continued feeding of a patient with AFI.   | Advocate continued feeding of a patient with AFI  | -Educate mothers (caregivers) / patients and community health agents, about the importance of proper feeding of a patient with AFI  |
|          | Promote utilization of prescribed drugs for the treatment and control of AFI                            | Advise mothers caregivers, and CHW to promote proper utilization of prescribed drugs for the treatment and control of AFI                                | Advise mothers caregivers, and CHW to promote proper utilization of prescribed drugs for the treatment and control of AFI     | Advise mothers caregivers, and CHW to promote proper utilization of prescribed drugs for the treatment and control of AFI     | Advise mothers caregivers, and CHW to promote proper utilization of prescribed drugs for the treatment and control of AFI     | Teach about the importance of taking prescribed drugs in the treatment and control of AFI   |
|          | Uphold the idea that AFI is caused by microorganisms and not by evil eye or curse from gods or spirits. | Educate mothers, caregivers and CHWs that AFI is caused by microorganisms  | Educate mothers caregivers and CHWs that AFI is caused by micro organisms   | Educate mothers caregivers and CHWs that AFI is caused by microorganisms  | . Educate mothers caregivers and CHWs that AFI is caused by microorganisms  | Educate the mothers, caregivers and CHWs that AFI is caused by different microorganisms.  |

**Table 4.** Practice objects and specific tasks of the Health Center Team

|                         | <b>Learning Objective (Expected outcome)</b>  | <b>HO</b>   | <b>PHN</b>  | <b>EH</b>  | <b>MLT</b>  | <b>Activities</b>  |
|-------------------------|---|---|---|--|---|--|
| <b>Practice (skill)</b> | Demonstrate the process of assessing a patient with AFI and identify its complications.   | Take an appropriate history and perform a proper physical examination. Order relevant laboratory investigations for a case with AFI and assess conditions that herald the rise of outbreak. | Assess vital signs and determine the existence of fever and other complications of AFI.   | Assess environmental and social risk factors for the development of AFI and possible outbreaks                                     | Assess the specimen from a case with AFI for the existence of pathogenic microorganisms incriminated as the causes of AFI | -Ask about relevant symptoms<br>- Look, and feel for relevant signs and decide the lab Investigation needed for the proper diagnosis for AFI<br>-perform the relevant laboratory tests |
|                         | Demonstrate how to treat the patient with different cases of AFI                          | Use different modalities for the treatment of a case of AFI and an outbreak of AFI. Indicate the modalities for the follow up and surveillance  | Use nursing care and follow-up mechanisms appropriate for the case of AFI   |  |   | -----<br>order appropriate antibiotic<br>carry out proper nursing care<br>conduct proper follow up and surveillance  |
|                         | Demonstrate proper communication methods in delivering health education pertaining to AFI | Display effective communication skills in giving health education to mothers/ caregivers and CHWs on treatment and control of AFI.  | Display Effective communication skills in giving health education to mothers / caregivers and CHWs on treatment and control of AFI. | Display effective communication skills in giving health education to mothers/ care givers and CHW on treatment and control of AFI. |   | -----<br>Identify practical ways of educating mothers / caregivers and CHW on treatment prevention and control AFI.  |

**Table 5.** Knowledge objects and specific tasks of the community health workers and caregivers

|                  | <b>Learning Objective<br/>(Expected out come)</b>   | <b>Community Health Workers</b>  | <b>Caregiver</b>   | <b>Activity</b>   |
|------------------|---|--|--|---|
| <b>Knowledge</b> | Describe the principles and treatment methods for AFI   | Describe drugs used in treatment of AFI and their administration   | Describe care for the child with AFI and administer the prescribed drugs                             | <ul style="list-style-type: none"> <li>- Explain how to give drugs used in the treatment of AFI( CHW)</li> <li>- Explain when to administer drugs and how to store drugs ordered for a case with AFI (care giver)</li> </ul>                  |
|                  | List the major information, methods and targets for health education in the prevention and control of AFI | Describe methods of rendering health education on AFI and identify target groups and areas of focus (mothers/ caregivers patients) | - Explain major points that the caregiver/ mother need to tell to the family members and the patient | <ul style="list-style-type: none"> <li>- List main methods used to communicate information on AFI for the different targets (CHW)</li> <li>- Enumerate main points that the caregiver needs to instruct the family and the patient</li> </ul> |
|                  | List causes and risk factors for AFI  | List the different causes of AFI and their association with health risk factors.   | - Explain the cause of AFI in general and what behaviors contribute to its occurrence.               | <ul style="list-style-type: none"> <li>- Explain the interface between the risk factor and causes of AFI (CHW)</li> <li>- Describe that AFI is caused by germs of different kinds which come from poor health behaviors</li> </ul>            |

**Table 6.** Attitude objects and specific tasks of the community health workers and caregivers

|                 | <b>Learning Objective<br/>(Expected outcome)</b>                          | <b>CHW</b>   | <b>Caregiver</b>   | <b>Activity</b>   |
|-----------------|---|--|--|---|
| <b>Attitude</b> | Promote utilization of health service facilities for the treatment of AFI | Advise caregivers to bring a child with AFI to the health service units to consult health worker                   | Advise friends and families to visit health workers the health service units in case of AFI  | <ul style="list-style-type: none"> <li>• Educate caregivers on the importance of taking children with AFI to health service institutions</li> <li>• Encourage a case with AFI to visit health service units</li> </ul>                                |
|                 | Advocate utilization of prescribed drugs in reducing mortality due to AFI | Instruct mothers or caregivers on the importance of prescribed drug administration in reducing mortality from AFI. | Advise family, friends and neighbors to comply to the health workers' instruction in administration of the drugs prescribed for a case of AFI. | <ul style="list-style-type: none"> <li>• Advocate / Promote utilization of prescribed drugs in the treatment of AFI( CHW )</li> <li>• Encourage utilization of prescribed drugs by neighbors, family and friends in the treatment of AFI.</li> </ul>  |
|                 | Promote continued feeding of a case with AFI                              | Advocate and encourage proper feeding of a case with AFI by mothers / caregivers.                                  | Feed the patient with AFI properly and encourage friends, neighbors and family members to continue to do so                                    | <ul style="list-style-type: none"> <li>• Demonstrate the importance of feeding a case with AFI to mothers /caregivers (CHW )</li> <li>• Feed the case of AFI properly and advise friends and family members, friends or relative to do so.</li> </ul> |

**Table 7.** Knowledge objects and specific tasks of the community health workers and caregivers

|                 | <b>Learning Objective<br/>(Expected outcome)</b>                                      | <b>CHW</b>  | <b>Caregiver</b>   | <b>Activities</b>   |
|-----------------|---|---|--|---|
| <b>Practice</b> | Demonstrate assessment of case of a AFI.  | Demonstrate assessment of a case with AFI at his level  | Demonstrate how to pick signs of AFI, which warrant her to visit health facilities.  | -Demonstrate how to pick the pertinent signs and symptoms of AFI<br>- Demonstrate which signs and symptoms are indicators of AFI and its severity |
|                 | Demonstrate proper communication methods in giving health education pertaining to AFI | Display efficient communication skill in giving health education pertaining to AFI to mothers or caregivers | Demonstrate how to effectively communicate with the other family members in influencing them to care for the case of AFI in the family | Demonstrate ways of educating mothers/ caregivers.<br>Demonstrate the best communication methods in the family in caring for the case of AFI      |



## UNIT FIVE

### GLOSSARY

1. **Agent:** A biological, physical, or chemical entity capable of causing diseases.
2. **Acute:** Sharp, severe used to describe illness having a rapid onset, short course, and pronounced symptoms.
3. **Antipyretic:** Agent, which reduces the possibility of damage to body cells by lowering body temperature in case of high fever. Also relieves pain associated with fever and illness.
4. **Bactericide:** An agent, which kills bacteria.
5. **Carrier:** In epidemiology, a person who is well (exhibits no sign or symptoms of an infection) but harbors microorganisms and spreads infection.
6. **Chemoprophylaxis:** The administration of a chemical (including antibiotics) to prevent the development of an infection or the progression of an infection to clinical disease.
7. **Chronic:** Of long duration or frequent recurrence.
8. **Decubitus ulcer:** Inflammatory breakdown of the skin and subcutaneous tissue due to prolonged, unrelieved pressure on bony prominences.
9. **Delusion:** Fixed, demonstrable, false beliefs that are not amenable to logical persuasion and are not attributable to a client's culture or religion.
10. **Endemic:** Peculiar to a specific region or people in epidemiology used to describe disease that occurs continually in a given community or geographic area.
11. **Enteric barrier:** Mechanism for preventing transmission of infection by direct or indirect contact with infected feces.
12. **Epidemic:** Unusual increase in the incidence of diseases from a baseline for that population.

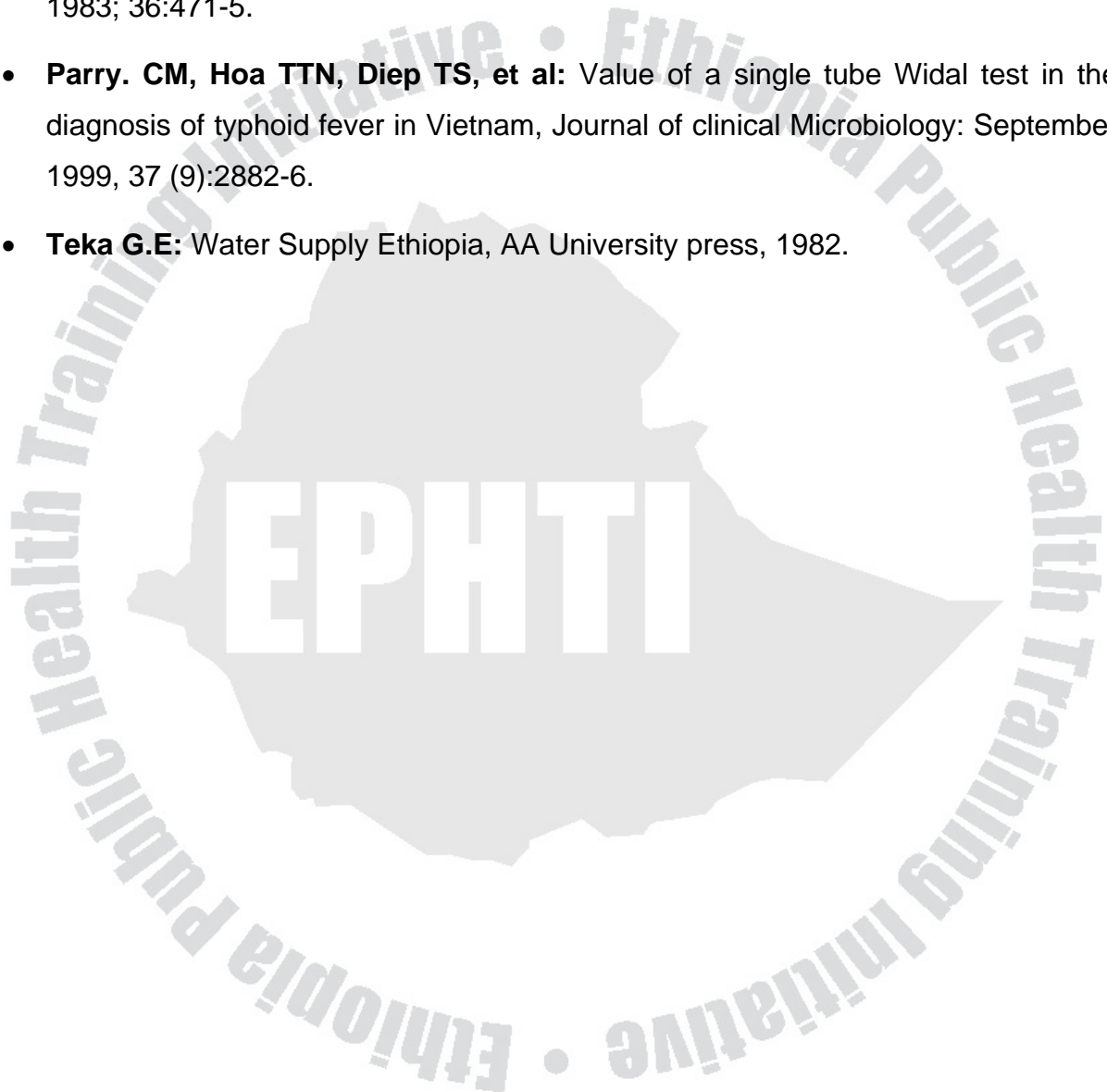
13. **Etiology:** Cause of a disease that could be a biological, chemical or physical agent.
14. **Fever:** High body temperature considerably above the normal range usually above 37.5<sup>0</sup>c.
15. **Host:** An organism that harbors and provides life to another organism. In epidemiology the patient is described as host.
16. **Petechiae:** A small red or purple spot on the skin due to tiny areas of inflammation or bleeding under the skin. Collection of petechaie looks like bruises.
17. **Prognosis:** Outcome of a disease, which could be cure, disability or death.
18. **Respiratory barrier:** Procedure designed to prevent the transmission of organisms by droplets nuclei. For example, wearing of masks when in proximity to the patient.
19. **Susceptible:** A person or animal lacking sufficient resistance to a particular pathogenic agent to prevent diseases if or when exposed.
20. **Virulence:** The degree of pathogenicity of an infectious agent.

## UNIT SIX

### BIBLIOGRAPHY

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## UNIT SEVEN

### ANNEXES

#### 7.1. Keys for Health Officers

Q.No. 1. C

Q.No. 2. A

Q.No. 3. B

Q.No. 4. E

Q.No. 5. E

Q.No. 6. B

Q.No. 7. A

Q.No. 8. A

Q.No. 9. E

Q.No. 10. E

Q.No. 11. D

Q.No. 12. B

#### 7.2. Public Health Nurse

Q.No.1. Any of the three

- A. Accurately diagnosis of the case
- B. Prompt provision of treatment
- C. Evaluating patient prognosis
- D. Precise recording and reporting skill
- E. Mobilize the community for some intervention activities
- F. Provision of accurate feed back
- G. Organize essential logistics

Q.No.2. D

Q.No.3.

- A. Encourage parents to visit the patient and help in his care and provide them the opportunity to express their feels and anxiety.
- B. Discuss `complications
- C. Give specific instructions.

Q.No.4. C

Q.No.5. C

Q.No.6. E

Q.No.7. E

### **7.3. Medical Laboratory**

Q.No.1. E

Q.No.2. D

Q.No.3. A

Q.No.4. D

Q.No.5. C

Q.No.6. C

Q.No.7.D

Q.No.8.E

Q.No.9. B

Q.No.10.A

### **7.4. Answer keys for sanitarians**

Q.No. 1. B

Q.No. 2. C

Q.No. 3. A

Q.No. 4. B

Q.No. 5. B

Q.No. 6. A

Q.No. 7. A

Q.No. 8

- A. Over crowded living conditions
- B. Poor personal hygiene
- C. Poor environmental hygiene
- D. Poorly ventilated living conditions

Q.No. 9.

- A. Personal hygiene
- B. Environmental sanitation
- C. Avoid overcrowded living conditions
- D. Steam clothing
- E. Ventilate your houses

Q.No. 10.

- A. Contact with meningitis patient
- B. Living in an overcrowded condition
- C. Not being vaccinated for meningitis

Q.No. 11.

- A. Avoid over crowded living condition
- B. Take meningitis vaccination
- C. Isolate the meningitis patient

Q.No. 12.

- A. Soil type
- B. Distance from water point
- C. Distance from the residence house
- D. Gradient to the water point

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