



Integrated Management of Malaria Training

A Practical Guide For Health Workers

National Malaria Control Programme (NMCP)
Ministry of Health

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List of abbreviations and Acronyms

3TC	Lamivudine
ACT	Artemisinin-based Combination Therapy
AIDS	Acquired immunodeficiency syndrome
AL	Artemether/Lumefantrine
AMC	Average Monthly Consumption
ARDS	Adult respiratory distress syndrome
ART	Antiretroviral therapy
ARVs	Antiretroviral drugs
ATIC	AIDS Treatment Information centre
AZT	Zidovudine
BP	Blood Pressure
CDC	Centre for Disease Control
Cl ⁻	Chloride ions
CQ	Chloroquine
CSF	Cerebral Spinal Fluid
D4T	Stavudine
DHA	Dihydroartemisinin
DHO	District Health Officer/Office
DIC	Disseminated intravascular coagulation
ECF	Early clinical failure
EFZ	Efavirenz
EIR	Entomological Inoculation Rate
ENT	Ears / Nose / Throat
FTC	Emtricitabine
G6PD	Glucose 6 Phosphate Dehydrogenase
Hb	Haemoglobin
HBMF	Home Based Management of Fever
HBV	Hepatitis B virus

HC IV	Health Centre Four
HCO ₃	Bicarbonate
HIV	Human immunodeficiency virus/
HSSP	Health Sector Strategic Plan
IDI	Infectious Diseases Institute
IEC	Information Education Communication
IMM	Integrated Management of Malaria
IRS	Indoor Residual Spray
ITN	Insecticide Treated Nets
IUD	Intrauterine deaths
IUFG	Intrauterine foetal growth retardation
JUMP	Joint Uganda Malaria Training Programme
K ⁺	Potassium ions
LCF	Late clinical failure
LPF	Late parasitological failure
LPV/RTV	Lopinavir/Ritonavir
MOH	Ministry of Health
MU-UCSF	Makerere University –University of California San Francisco
Na ⁺	Sodium ions
NFV	Nelfinavir
NGT	Nasogastric tube
NV	Nevirapine
OPD	Outpatients' Department
PCP	Pneumocystis Carinii Pneumonia
PCR	Polymerase Chain Reaction
PCV	Packed cell volume
PEP	Post Exposure Prophylaxis
PLWHA	People Living with HIV/AIDS
PMTCT	Prevention of Mother to child transmission of HIV

PPQ	Piperaquine
SP	Sulfadoxine/Pyrimethamine
TDF	Tenofovir (Disopropyl fumarate)
TNF	Tumour necrosis factor
UMSP	Uganda Malaria Surveillance Programme
UTI	Urinary Tract Infection
VCT	Voluntary Testing and Counselling
WHO	World Health Organisation

JUSTIFICATION FOR THE IMM COURSE

The new national malaria control policy recommends new more efficacious medicines for the treatment of malaria. However, in the light of increasing costs for Artemisinin based Combination Therapy (ACT's) and limited resources, it is important to use new malaria medications in a sustainable manner. Unnecessary administration of antimalarials increases health-care costs, adds to risks of drug toxicity, may delay diagnosis of other causes of illness, and contributes to development of parasite drug resistance.

It also has been observed that clinical and laboratory staff often work in isolation. There is therefore, a need to develop a team approach to malaria case management at all health facilities. The clinical and laboratory staff need to be encouraged to work together in arriving at the correct diagnosis of malaria that will help in enhancing rational use of drugs in malaria case management

In addition to the strengthening of malaria control it is very important to actually determine the incidence, morbidity and mortality of malaria rather than that of fever. Data collection, utilization and reporting are therefore all key to management of malaria

It is against this background that this course curriculum has been developed with the aim of

- Establishing an exemplary malaria training programme that is based on a team approach to strengthen malaria case management at health facility level
- Developing a monitoring and evaluation system that will demonstrate the impact of training and capacity building on improved case management for malaria at health facility level

The content of this course is in line with the national policy guidelines. This program design should prove to strengthen the ability of Uganda's healthcare system to manage and prevent malaria.

This course seeks to promote proper management of patients with fever by advocating for improved evaluation and treatment of patients with fever. This course also aims at creating team spirit among health facility staff for effective management of patients with fever. Emphasis is also put on educating patients so that they adopt malaria preventive practices.

AIM AND OBJECTIVES OF THE MALARIA TRAINING CURRICULUM:

Aim of the malaria training curriculum:

The aim of the curriculum is to improve the quality of the management of patients with malaria through building the capacity of health workers in the diagnosis, treatment, and prevention of malaria.

Objectives of the malaria training curriculum:

☐ All categories of health facility staff (i.e. clinical, dispensing, nursing, laboratory and records):

By the end of the course, learners should be able to:

1. Describe the burden of Malaria in Uganda including its transmission, epidemiology, and control and policy framework.
2. Promote effective infection control in patient management.
3. Ensure proper record keeping and logistics management.
4. Observe ethical code of conduct for health workers

☐ Specifically the clinical staff should be able to:

1. Demonstrate proper evaluation of a patient suspected of having Malaria.
2. Assess patients with fever effectively
3. Identify cases of malaria correctly in those presenting with fever.
4. Prescribe appropriate treatment for a patient with malaria.
5. Give relevant education to a patient with malaria regarding prevention and care of Malaria.

Session 1: Introduction to Malaria

OBJECTIVES

By the end of this session, the participants should be able to:

- Describe the epidemiology of malaria in Uganda
- Describe the control and policy framework

Part 1: Malaria, Its Transmission and Disease Causation

1.1 What is Malaria?

- Malaria is an illness caused by infection with malaria parasites. Illness can range from mild disease to a severe life-threatening illness.



Question: What are the two forms of malaria?

Answer: The mild disease is referred to as 'uncomplicated malaria' while the severe life threatening illness is referred to as 'severe malaria'?

- There are four species of Malaria parasites which can cause infection in humans:
 - *Plasmodium falciparum*
 - *Plasmodium malariae*
 - *Plasmodium vivax*
 - *Plasmodium ovale*
 - *Plasmodium Knowlesi*
- The commonest cause of malaria in Uganda is *P. falciparum* and it is also responsible for the severe forms of the disease because:
 - It attacks all ages of red blood cells
 - Infected cells become sticky which affects their functioning
 - It has high multiplication capacity

1.2 How is Malaria Transmitted to Humans

- Human malaria is mainly transmitted by the females *Anopheles* mosquitoes. Malaria can also be transmitted through blood transfusion and mother to child (vertical route), however these modes of transmission are rare.
- The *Anopheles* species prefer to feed on human blood rather than animal blood. The mosquitoes acquire malaria parasites from an infected person which they transmit to other people. On average a mosquito survives for 2-3 weeks.

1.3 Consequences of Infection With Malaria Parasites

Infection with malaria parasites can lead to a wide range of consequences including:

- Parasites clear without causing disease: especially in patients with high levels of immunity
- Asymptomatic parasitaemia: occurs when malaria parasites are detected in the blood but the person is not sick
- Uncomplicated malaria: generally presents with constitutional symptoms like simple fever, headache, dizziness, myalgia etc. which are not life threatening
- Severe malaria: generally is a life threatening illness and requires urgent attention



Summary:

We have come to the end of our session on malaria, its transmission and disease causation. In this session, we learnt that malaria is a disease caused by a parasitic organism called Plasmodium and that malaria is transmitted to humans through the bite of an infective female Anopheles mosquito.

We also explained the clinical consequences of infection with malaria parasites and learnt that these vary greatly from asymptomatic infection to life-threatening illness. Repeated exposure to malaria parasites leads to increasing level of partial immunity; and the greater the level of partial immunity the lower the risk of illness and severe disease

Part 2: Epidemiology of malaria in Uganda

2.1 Importance of Epidemiology in the Control of Malaria

- Epidemiology of malaria is the study of the distribution and determinants of malaria in specified populations, and the application of this study to control malaria.
- If we know how common malaria is in a specific area we can focus on both treatment and prevention measures accordingly. If we understand what determines the transmission of malaria, we can then address specific issues to maximize the effect of control strategies.
- An important term is *endemicity*, which is the degree or frequency of occurrence of a disease. An endemic disease is one that is constantly present to a greater or lesser degree in people of a certain class or in people living in a particular location.

2.2 The Burden of Malaria in Uganda



Question: What is the largest cause of morbidity and mortality in Uganda?
Answer: Malaria!

- The most vulnerable people to malaria are:
 - Children aged less than 5 years
 - Pregnant women, especially primigravida
 - People living with HIV/AIDS

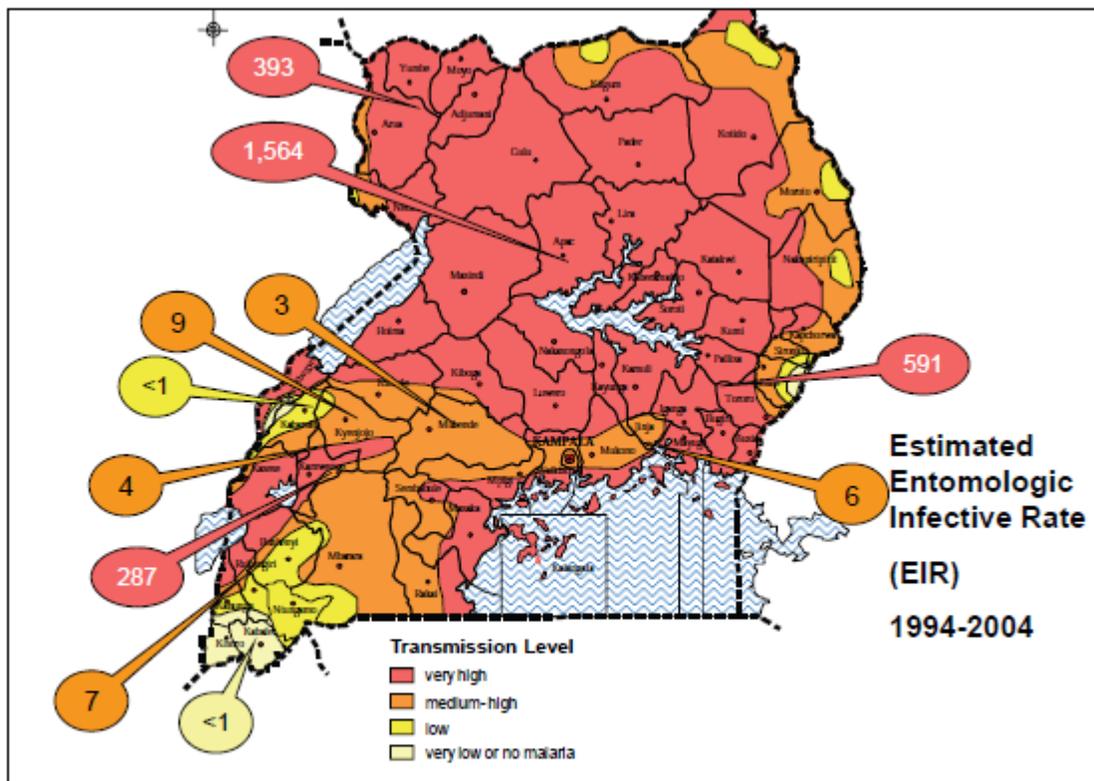
- Sicklers
- Travelers from areas where there is little or no malaria
- Malaria is found in tropical and subtropical areas where conditions are suitable for its transmission. It is primarily a disease of hot, humid countries at altitudes less than 2,000 meters above sea level



Question: Malaria is considered endemic in Uganda. Why is this the case?

Answer: Malaria transmission occurs throughout the year in 95% of the areas in Uganda below 1,800 meters above sea level. In about 5% of the areas malaria can be transmitted occasionally.

- See the figure below for an endemicity map of malaria in Uganda



Source: Malaria Control Program, Ministry of Health, Uganda. Available at <http://www.health.go.ug/mcp/distmaps.html>

Figure: Malaria Endemicity Map in Uganda



Summary:

We have come to the end of our session on the epidemiology of malaria in Uganda. We learned that the epidemiology of malaria is the study of the distribution and determinants of malaria in specific populations, and the application of this study to the control of malaria.

We have also learnt that malaria is found in tropical and sub-tropical areas, and that there is moderate to high endemicity of malaria in 95% of Uganda.

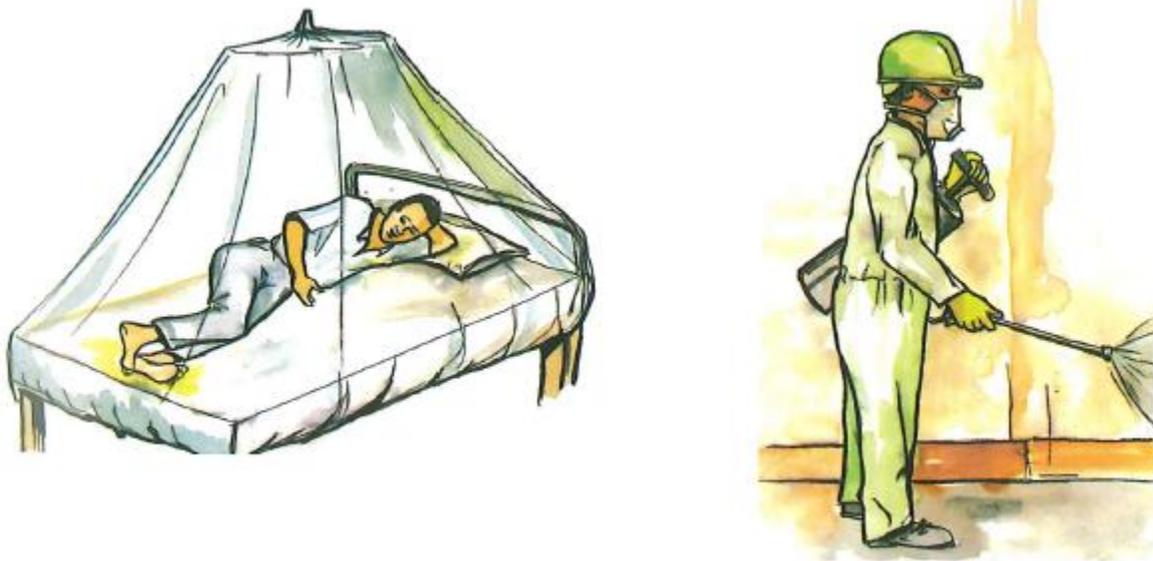
Part 3: Control and policy framework for malaria in Uganda

3.1 Control Strategies for Malaria in Uganda

There are four major ways that malaria can be controlled:

1. **Use of insecticide treated mosquito nets** - The best way to prevent mosquito bites is to sleep under insecticide treated mosquito nets. Such nets create a physical barrier which prevents human to mosquito contact. They also repel and kill mosquitoes. There is clear evidence that ITNs reduce morbidity and mortality due to malaria. Other measures such as screening of houses, insect repellents may be useful in addition to ITNs.
2. **Reduction of the mosquito population** - The reduction of the adult mosquitoes can be done through spraying of the internal walls of houses with residual insecticide.

Figure: Illustration of Insecticide Treated Net (ITN) and Indoor Residual Spray (IRS)



3. **Destruction of malaria parasites** – This can be achieved through case management and preventative treatment:
 - Case Management - Early diagnosis and effective prompt treatment of malaria eliminates the parasites in the blood. Therefore the transmission of malaria is reduced. The ACTs used in the treatment of malaria kill gametocytes the infective form for mosquitoes. In addition malaria treatment reduces the length of morbidity and risk of mortality.
 - Preventive Treatment
 - Intermittent preventive treatment of pregnant women (IPTp) reduces the risk of poor pregnancy outcomes such as maternal anaemia, maternal death, abortion and low birth weight babies

- Chemoprophylaxis for special risk groups for example; sicklers and non-immune visitors. However, frequent febrile convulsions in children are usually not an indication for chemoprophylaxis.
4. **Health education and community mobilization** - Provision of malaria control interventions requires aggressive advocacy among decision makers at all levels and the public at large. As health workers, we need to be committed not only to treating malaria but actively contribute to prevention messages and interventions. Health education and the active participation and mobilization of communities, the understanding of cultural perceptions and other potential barriers to preventive measures are essential in the control of malaria.
 5. **Surveillance, Epidemic Preparedness and Response –**



Summary:

We have come to the end of our session on the control and policy framework for malaria in Uganda. In this session, we learned that there are four major ways to control malaria. Specific strategies include:

- Case management (early diagnosis and prompt effective treatment)
- Intermittent preventive treatment of malaria in pregnancy (IPTp)
- Integrated vector management using ITNs and IRS, and mosquito larval control where applicable
- Early detection and response to malaria epidemics

Session 2: Evaluation of a Patient with Fever

OBJECTIVES

By the end of this session, the participants should be able to:

- Describe fever
- Take history in a patient with fever
- Describe how to carry out a physical examination in a patient with fever

REFERENCES AND RECOMMENDED READINGS

- Uganda Clinical Guidelines
- Handout - Checklist on History Taking and Physical Examination of a Patient

Part 1: Characteristics of Fever

1.1 Description of Fever

- In our local languages, patients and caretakers describe fever as a subjective feeling signaling that something is wrong in the body.
- Some of the local terms commonly used are *omusujja*, *omuliro*, *omuswija*, *gyoto*, *omutsusa* and *amwanus*. These terms may describe body hotness, general body pain, or feeling unwell.
- Note: malaria is typically an acute febrile illness. A fever that has persisted for more than 7 days may be due to another illness such as typhoid fever, or other infectious diseases.

1.2 Characteristics of Fever

- Fever can be described in three ways:
 - **Elevation in axillary temperature**
 - Normal body temperature: 36.5°C to 37.5°C
 - Fever: Temperature more than 37.5°C
 - High grade fever: Temperature greater than 39.5°C (hyperpyrexia)
 - **Fever pattern**
 - Fever can be intermittent or constant
 - **Duration of fever**
 - Can be of short duration (less than a week) or long duration (greater than a week)



Summary:

We have come to the end of our session on the characteristics of fever. We learned that in local languages, patients and caretakers describe fever as a subjective feeling signaling something is wrong in the body. There are many local terms used to describe fever.

We also learned that fever can be characterized four ways: (1) Elevation in axillary temperature, (2) Fever pattern, (3) Duration of fever and (4) Cause of fever.

To take a patient's history and conduct a physical assessment, there are several issues that should be considered. These will be explored in more detail in the next session.

Part 2: History and Physical Examination of a Patient

- **Taking a Patient's History:** When taking a history from a patient with fever or any other complaint it is important to consider several issues. Your goal is to find clues in the history that suggest a specific diagnosis. You need to look at the following:
 - Characteristics of the fever
 - Patient's recent activities
 - Past medical history
 - Prior treatment
 - Ask about the presence of other symptoms
 - Assess for presence of danger signs

- **Physical Assessment:** In the physical assessment of a patient with fever look for the following:
 - Measure the temperature
 - Assess for danger signs
 - Measure the vital signs
 - Take the weight
 - Carefully examine the following systems – General, Ears / Nose / Throat (ENT), Abdomen, Respiratory, Cardiovascular, Central Nervous System, Skin

History and Physical Examination of a Patient

Checklist for Role Play on Management of a Patient with Fever

Step 1: Take the History of the Patient

1. **Characteristics of the Fever**
 - When did the fever start?
 - How long has it lasted?
 - Is the fever associated with other symptoms?
 - Is there a pattern to the fever?

2. **Ask about presence of other symptoms**

- Chills and rigors** may occur in malaria and urinary tract infection (UTI) or other bacterial infections
- Headache**, although a common symptom in malaria may occur in meningitis, sinusitis, dental problems and ear infection
- Weakness or malaise** is a common symptom in malaria; however extreme weakness/prostration (floppy child) may be an indicator of severe malaria. In adults you need to consider other causes such as heart failure or severe anaemia.
- Body aches and joint pains** are common in malaria, but are also common in viral infections.
- Cough and flu** may indicate that the patient has a common cold, bronchitis or pneumonia
- Painful swallowing** may indicate that the patient has pharyngitis, tonsillitis or even candidiasis
- Ear pain** in older children and adults and/or discharge, indicates acute or chronic otitis media
- Loss of appetite, nausea, vomiting, abdominal pain, and diarrhoea** are common symptoms in malaria. Diarrhoea, however, may suggest infectious gastro-enteritis.
- Dysuria or painful micturition** There may be crying on micturition in young children and/or urinary frequency which may indicate urinary tract infection
- Localised bone pain or joint swelling** may indicate infection of bone or joint
- Localised, tender, and painful swellings** indicate abscess formation or cellulitis
- Lower abdominal pain** in women may indicate pelvic inflammatory disease, and a gynaecological history and examination are essential.
- Generalised or localised skin rash** is not a manifestation of malaria. Consider measles or chicken pox in children or HIV sero-conversion illness in adults.

3. **Patient's recent activities**

- Where have they been? (Travel up-country?)
- What have they been doing? (Contact with animals?)
- Have they been in contact with any sick people?

4. **Past medical history**

- What other diseases has the patient had before?
- Does the patient have any chronic diseases for example HIV/AIDS or cancer?

5. **Prior treatment**

- What has been done to treat this illness?
- What other medications have been taken?
- Does the patient have any known allergies to medications?

Step 2: Conduct a Physical Assessment of the Patient

1. **Measure the temperature**

- Does the patient have fever?

2. **Take the weight**

- What is the weight?

3. Measure the vital signs

- What is the respiratory rate?
- Are signs of respiratory distress present?
- What is the pulse?
- What is the blood pressure?

4. Assess for danger signs

- Convulsions or fits within the last two days or at present
- Not able to drink or breast-feed
- Vomiting everything
- Altered mental state (lethargy, drowsiness, unconsciousness or confusion)
- Prostration or extreme weakness (unable to stand or sit without support)
- Severe respiratory distress (difficult breathing)
- Severe pallor
- Severe dehydration

5. Carefully examine the following systems:

• **General**

- Look for evidence of pallor or jaundice
- Assess for enlargement or tenderness of lymph nodes

• **Ears / Nose / Throat (ENT)**

- Look for inflamed throat or tonsils
- Assess for coating on the tongue and buccal area
- Check ears for inflammation and discharge

• **Central Nervous System**

- Evaluate for neck stiffness
- Look for a bulging fontanel in young children

• **Respiratory**

- Assess for cyanosis
- Look for nasal flaring and chest in-drawings
- Listen for any unusual sounds such as rhonchi, crepitations, or wheezes

• **Cardiovascular**

- Listen for any extra heart sounds such as murmurs, rubs, or gallops

• **Abdomen**

- Evaluate for enlargement of spleen or liver
- Assess for tenderness to palpation
- Evaluate for palpable masses

• **Skin**

- Look for skin rashes
- Evaluate for any tender swellings or abscesses

• **Musculoskeletal**

- Evaluate range of motion and reflexes
- Evaluate any pain and/or muscle weakness



Summary:

In this session, we have learned how to take the history of a patient with fever and also conduct a physical assessment of a patient with fever.

The five main components to consider when taking the history of a patient with fever include:

1. Characteristics of the Fever
2. Ask about the presence of other symptoms
3. Patient's recent activities
4. Past medical history
5. Prior treatment

The five main steps to conduct a physical assessment of a patient with fever include:

1. Measure the temperature
2. Take the weight
3. Measure the vital signs
4. Assess for danger signs
5. Carefully examine all other systems of the body (e.g. ears/nose/throat, abdomen, respiratory)



Question: If a health worker suspects a patient has malaria, what laboratory investigation should the health worker recommend?

Answer: Blood slide for malaria parasites or RDT, which will be covered in detail in the next session.

Session 3: Performing and Reading a Malaria RDT

OBJECTIVES

By the end of this session, the participants should be able to:

- Perform a Rapid Diagnostic Test
- Interpret RDT results

REFERENCES AND RECOMMENDED READINGS

- MOH RDT User's Manual (2011)
- WHO RDT Job Aid (2010)

Part 1: Description of malaria RDTs

3.1 Description of RDTs

- RDT stands for Rapid Diagnostic Test. They are called “rapid” because they give results within 10-20 minutes. Their main advantage is that they can be used outside the formal laboratory environment as they don't require specialized training, refrigeration or other laboratory equipment.

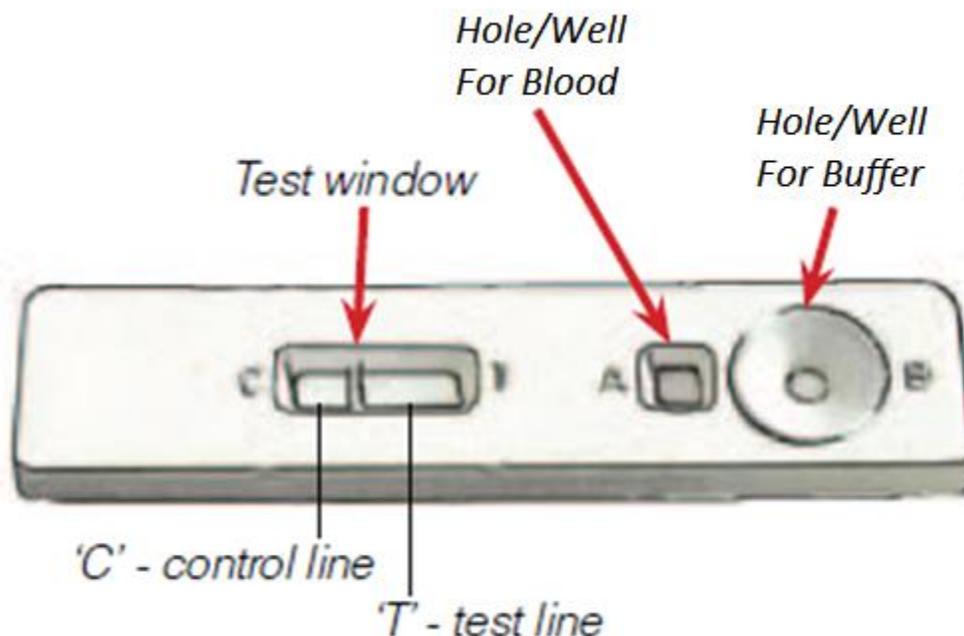
3.2 What do RDTs detect?

RDTs detect “antigens” that malaria parasites produce. If a person is infected by malaria, the parasites produce antigens, and the RDT result will be positive. If there are no parasites in the blood, there is no antigen, and the RDT result will be negative.

3.3 How do RDTs work?

- Inside the cassette is a strip made of filter paper and nitrocellulose. A drop of patient blood is collected and added to the RDT through one well (hole) onto the strip. Then a few drops (3-5) of a liquid called ‘buffer’ is added usually through another well. The buffer lyses the blood, rupturing the red blood cell membranes, releasing the contents including any parasite antigen, if present. The buffer also dilutes the blood, helping to carry it along the length of the strip.

Figure 3.1 – RDT design and mode of action



- The RDT has a red or purple **control line** that should appear at the point sometimes marked “**C**”. This should appear when the buffer and blood have reached the end of the test strip. The control line tells us whether the RDT has worked correctly.
 - If **the control line** is not seen, the RDT result is **invalid**. In this case, the patient’s test must be repeated with a new RDT.
 - If antigens are present in the blood, a red or purple coloured line will form at the **test line** (marked “**T**” or “**Pf**”) and **control line**. **This gives a positive RDT result.**
 - If there is no parasite antigen, no coloured **test line** is formed at T or Pf, but a **control line** will appear. **This gives a negative RDT result.**
- Note that it is possible to get a positive result even if the patient doesn’t really have malaria. If the patient has taken malaria medication in the last 14 days, he or she may test positive with some RDTs even if he or she no longer has malaria.
 - This is because an RDT works by detecting an antigen, a substance in the blood produced by malaria parasites that remains in the body for some time after the parasites have been killed.
 - The antigen can remain in the blood for 2 weeks or more after all the parasites have been killed.
 - **So before you use an RDT on a febrile patient, you must ask the patient whether he or she has taken malaria medication within the last 2 weeks. If so, you should refer the patient to a health centre with a microscope.**
- Below are some benefits and limitations of RDTs as compared to microscopy

Benefits of RDTs vs. Microscopy	Limitations of RDTs vs. Microscopy
<p>- RDTs are a simple and fast way for health workers to test for malaria parasites in a patient’s blood. They are more accurate than presumptive diagnosis and be used close to the patient’s home.</p> <p>- RDTs can give results in about 15 minutes. There is no need to wait for microscope results.</p> <p>- RDTs do not require expensive or complicated equipment. Most people can learn to use RDTs in just a few hours.</p>	<p>- RDTs cannot test how many malaria parasites are present in the blood. They can only test whether parasites are present or absent.</p> <p>- Since RDTs do not detect parasites (they detect antigens), a person who has taken anti-malarial medication within the last two weeks may test positive for malaria even if he/she no longer has parasites.</p> <p>- RDTs can be damaged by heat and humidity, so an RDT should not be removed from its sealed packet until right before you are ready to use it.</p>



Summary:

We have come to the end of our session on the description of malaria RDTs. RDTs give a rapid result, in 10-20 minutes, on the presence of antigens produced by malaria parasites in the blood.

An RDT works by putting a patient’s blood and ‘buffer’ solution into different holes in the RDT cassette.

- **Invalid Result:** The **control line** is not present
- **Positive RDT:** The **control line** and **test line** both appear, meaning malaria antigens are present in the blood
- **Negative RDT:** The **control line** is present, the **test line** does not appear, meaning no malaria antigens are in the blood

Part 2: Demonstrate how to perform a malaria RDT

2.1 Assemble all the supplies you will need (as shown on the job aid)

- A new, unopened test packet
- A new, unopened alcohol swab
- A sterile lancet (new and unopened)



- Buffer



- A watch or clock to use as a timer



- A new pair of disposable examination gloves



- Pencil



- A non-sharps disposal bin



- A sharps disposal container



2.2 Performing an RDT

Step 1: Check the RDT expiry date

- Point out the expiry date on the test packet, make sure the RDT has not expired. If RDT is expired **DO NOT USE**.

Step 2: Put on a pair of new examination gloves



Question: “Why is it important to wear gloves when doing this test?”

Answer: Wearing gloves protects both health workers and patients from possible infection with blood-borne diseases, including HIV/AIDS.

Step 3: Open the test packet and remove the contents

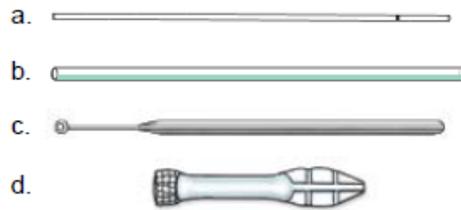
- Below are the key points on how each item is used

2.6.2 The desiccant sachet protects the test from humidity before the packet is opened.

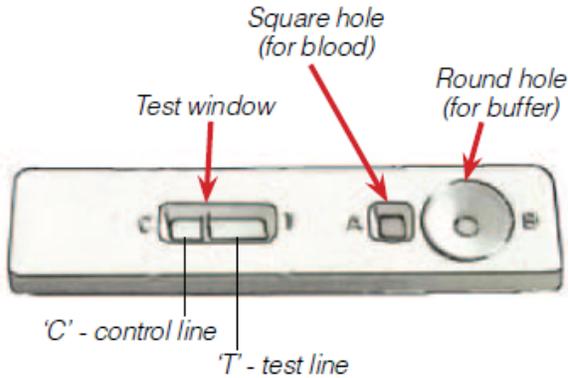


Once the packet is opened, the desiccant sachet serves no purpose and should be discarded. It may be harmful if swallowed, so it should be kept away from children.

2.6.1 The blood-transfer device — (a) capillary tube, (b) straw, (c) loop, (d) pipette or other — is used to collect blood and transfer it to the test cassette.



2.6.3 The test cassette is used to conduct the test. Pass the cassette around and ask everyone to look at it. Explain the holes and the markings and what each one means:



- The rectangular hole is the Results window where you read the test results. It is divided into two sections. The longer section near the letter 'T' is where you determine the diagnosis. If a line appears in this section, it means the patient has malaria. If no line appears here, it means malaria was not detected in the patient. The smaller section near the letter 'C' tells you whether the test is working correctly. A line **must** appear in this section for the test to be valid. If no line appears here, the test is not working properly and the results are **invalid**. If no line appears here, you must discard the cassette and test the patient again using a **new test packet** that has not been previously opened.

For example:

- The square hole labeled 'A' is where you add the blood.
- The round hole labeled 'B' is where you add the buffer.

Step 4: Write the patient's name on the cassette



Question: "Why is it important to write the patient's name on the cassette?"

Answer: It is important to write the patient's name on the cassette before beginning the test because there will probably be times when you have many patients waiting to be diagnosed. You won't be able to wait to get each patient's result before testing the next one. If you are testing several people one after another, you will need to have their names written on their cassettes so you don't run the risk of mixing up one person's results with those of another.

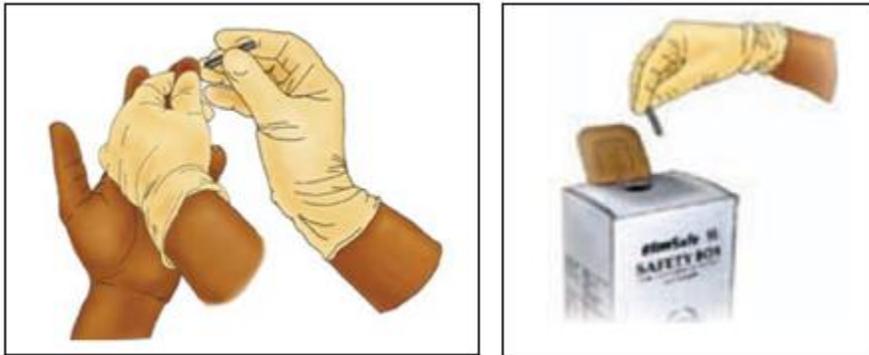
Step 5: Open the alcohol swab. Clean the patient's 4th finger

- Choose the patient's less dominant hand. For example, if the patient is right-handed, prick the left hand. The 4th finger is preferred because for most people it is the least-used finger.
- After cleaning the finger with the alcohol swab, allow the finger to **air dry**.



Step 6: Once the patient's finger is dry, open the lancet

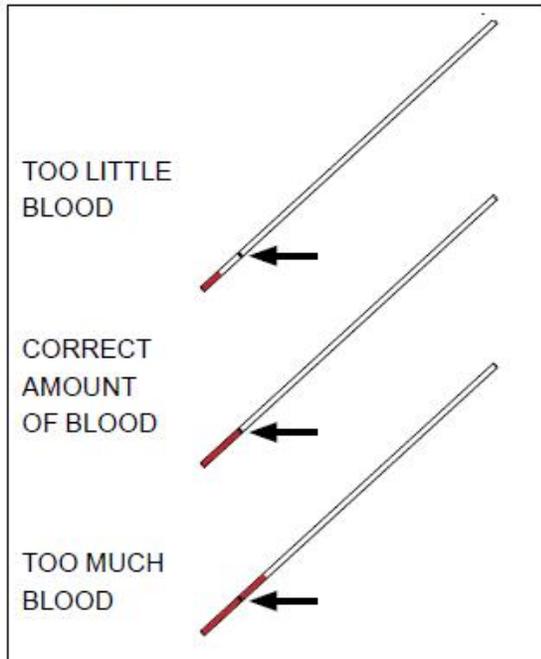
- Prick the patient's finger, preferably towards the side of the pulp (ball) of the finger (pricking the midline or tip is more painful)
- Check to be sure the finger-prick will produce enough blood
- Discard the lancet in the sharps container.
- Every time you use a lancet, you must take **all of the following precautions to ensure blood safety:**
 1. Discard the lancet in an appropriate sharps container **immediately** after using it.
 2. **Never** set the lancet down before discarding it.
 3. **Never** discard the lancet in a non-sharps container.
 4. **Never** use a lancet on more than one person.



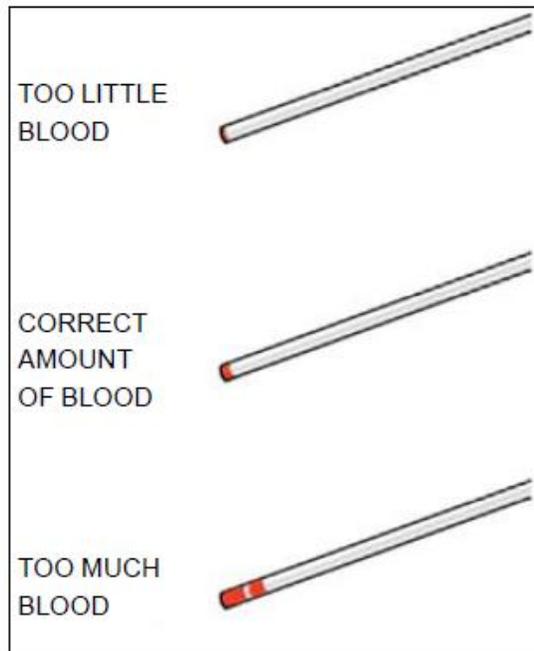
Step 7: Demonstrate how to collect the droplet of blood using the blood-collection device included with the RDT

- The blood-collection device could be a capillary, a straw, a loop or a pipette as shown below
- Collect the right amount of blood as shown in each picture

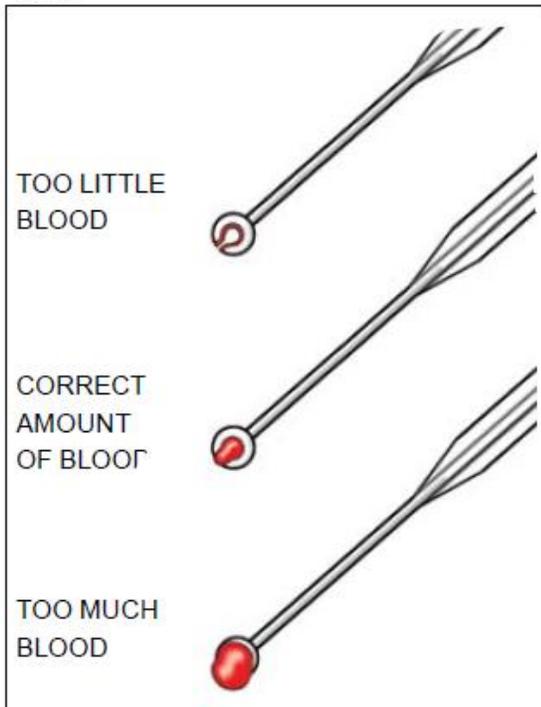
Capillary Tube



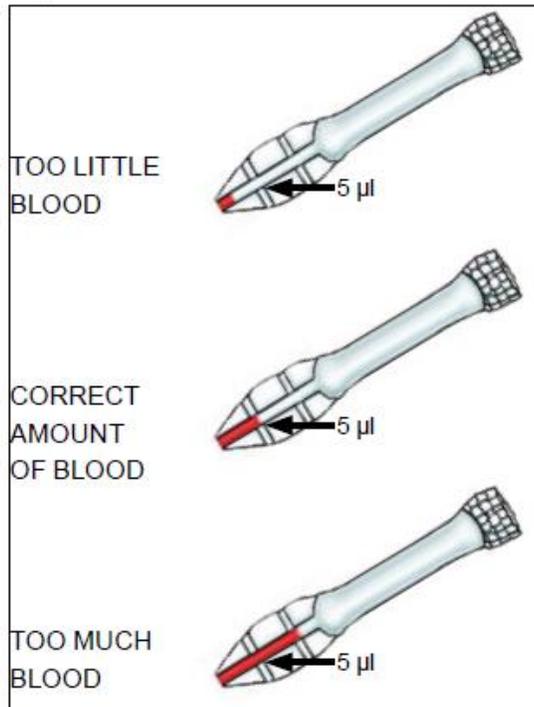
Straw



Loop



Pipette



Step 8: Deposit the blood into the sample well/hole on the cassette

- The blood needs to reach the bottom of the well/hole and be absorbed by the pad.
- If the blood is deposited on the plastic edges of the well/hole, and does not reach the pad, the test will not work correctly.



Step 9: Discard the blood-collection device after use

- You must discard the blood-collection device into the sharps box immediately after you transfer the blood to the test cassette.
- You should not set the blood-collection device down on the table or anywhere else to prevent any possible accidental pricks.



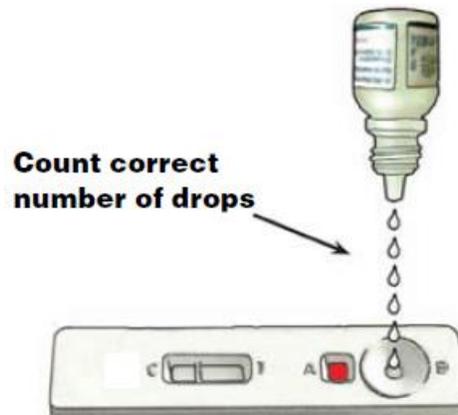
Step 10: Explain and demonstrate how to add buffer to the cassette



Question: "Where do we add the buffer?"

Answer: The buffer must be added to the correct well/hole.

- You need to add exactly the correct number of drops of buffer as per manufacturer's instructions.
- Hold the bottle vertically (see illustration below), this ensures the correct drop size.



Step 11: Wait for the correct duration of time (10-20 minutes) after adding the buffer before reading the test results

- Identify the correct amount of waiting time before reading the results, as per manufacturer's instructions.
- The duration of time to wait for the results (10-20 minutes, depending on manufacturer's instructions).



- Once you have recorded the current time and the end time to read the test results, look at the cassette:
 - See how the blood is beginning to move up the strip, disappearing from the well/hole where it was added and beginning to appear in the results window.
 - The blood will eventually disappear from the results window as well, leaving only the **control line** and the **results line** (if the patient is positive).

Step 12: Reading & Recording the results.

- After reaching the time, as per manufacture's instruction, read the RDT result:
 - **Invalid Result:** The **control line** is not present
 - **Positive RDT:** The **control line** and **test line** both appear, meaning malaria antigens are present in the blood
 - **Negative RDT:** The **control line** is present, the **test line** does not appear, meaning no malaria antigens are in the blood
- Record the RDT result on the patient lab request form..

Step 13: Remove and discard the RDT and your gloves

- After reading and recording the RDT result, discard the cassette and remove your gloves





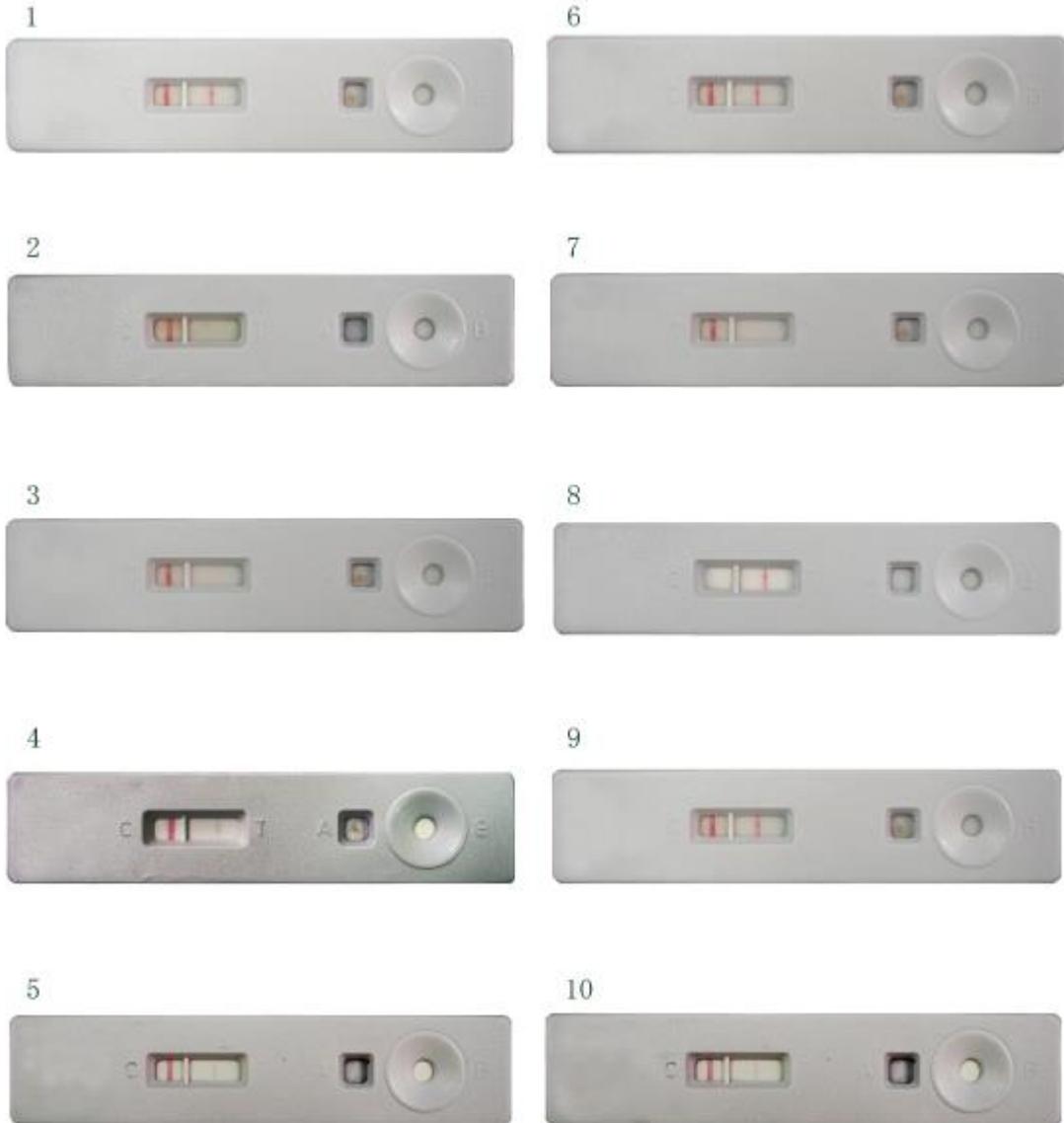
Summary:

Here is a summary of the steps on performing an RDT:

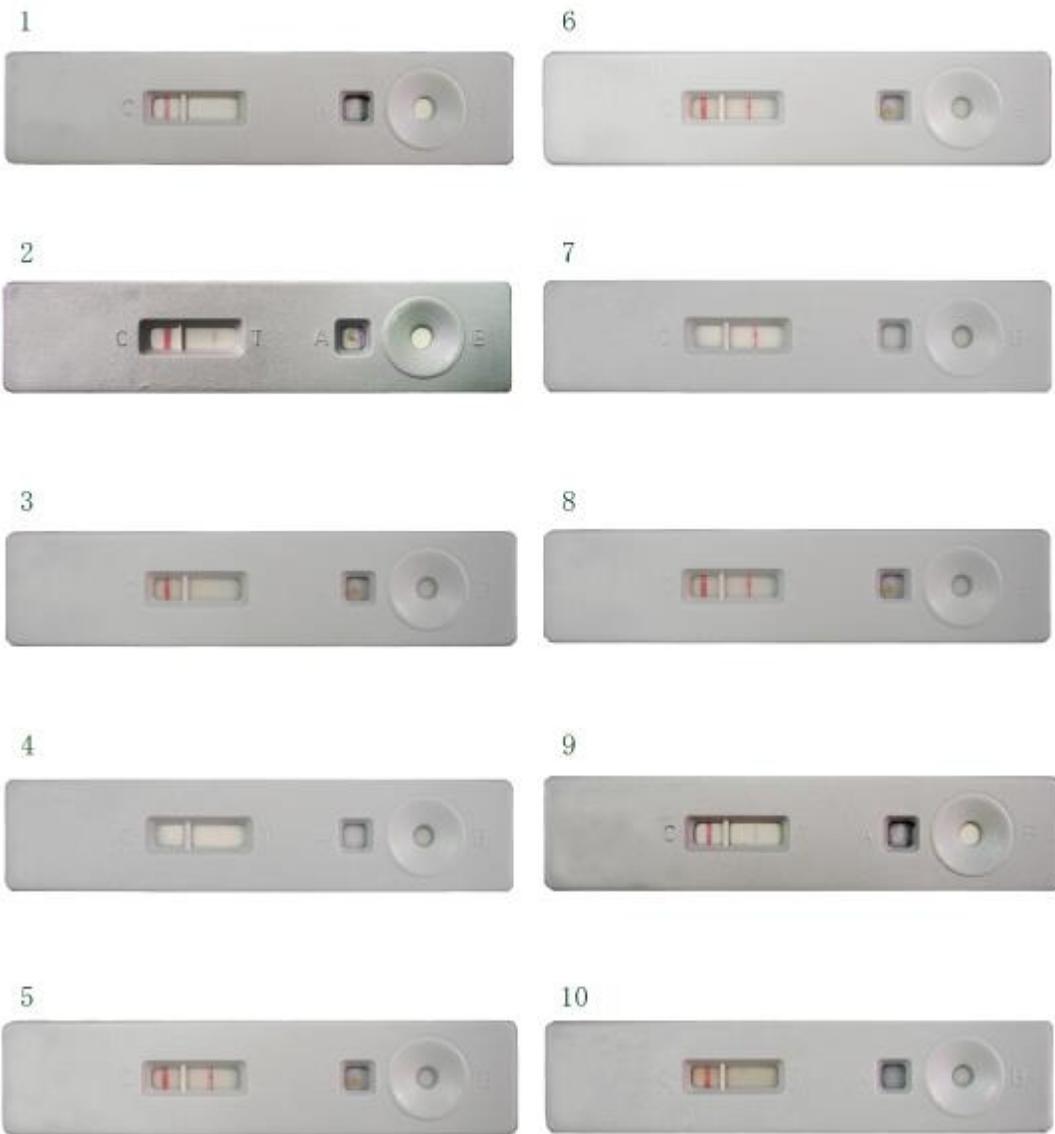
1. Check the RDT expiry date
2. Put on a pair of new examination gloves
3. Open the test packet and remove the contents
4. Write the patient's name on the cassette
5. Open the alcohol swab. Clean the patient's 4th finger
6. Once the patient's finger is dry, open the lancet.
7. Demonstrate how to collect the droplet of blood using the blood-collection device included with the RDT you are using for demonstration
8. Deposit the blood into the sample well/hole on the cassette.
9. Discard the blood-collection device after use.
10. Explain and demonstrate how to add buffer to the cassette.
11. Wait for the correct duration of time (10-20 minutes) after adding the buffer before reading the test results.
12. Reading & record the results.
13. Remove and discard the RDT and your gloves.

Sample Test 1

Generic Pf RDT Quiz ver.1



Sample Test 2
Generic Pf RDT Quiz ver.2



Sample Test 3
Generic Pf RDT Quiz ver.3

1



6



2



7



3



8



4



9



5



10



Answer keys for sample tests

Sample test #1
Generic Pf RDT

	Positive (+)	Negative (-)	Invalid
1.	✓		
2.		✓	
3.		✓	
4.	✓		
5.	✓		
6.	✓		
7.		✓	
8.			✓
9.	✓		
10.	✓		

Sample test #2
Generic Pf RDT

	Positive (+)	Negative (-)	Invalid
1.		✓	
2.	✓		
3.		✓	
4.			✓
5.	✓		
6.	✓		
7.			✓
8.	✓		
9.	✓		
10.		✓	

Sample test #3
Generic Pf RDT

	Positive (+)	Negative (-)	Invalid
1.			✓
2.		✓	
3.	✓		
4.	✓		
5.	✓		
6.		✓	
7.	✓		
8.	✓		
9.	✓		
10.			✓



Summary:

We have come to the end of the session on how to read an RDT.

In this session, we learned that there are three possible RDT test results:

- **Invalid Result: The control line is not present**
- **Positive RDT: The control line and test line both appear, meaning malaria antigens are present in the blood**
- **Negative RDT: The *control line* is present, the *test line* does not appear, meaning no malaria antigens are in the blood**

We also practiced reading RDT results using quizzes. Here, we saw that even faint lines near the test line “T” or “Pf” mean that an RDT is positive.

Session 4: Evaluation of a Patient with Fever and a Negative Blood Smear or Rapid Diagnostic Test (RDT)

Fever is a common symptom of many infectious diseases. The presumptive practice of equating fever with malaria, and treating accordingly, is common in Uganda. However, the WHO recommends that this practice should be stopped. The introduction of RDTs greatly improves the ability to achieve a definitive diagnosis of malaria. A negative RDT (or negative blood smear) does not, however, mean that the patient is not ill – it only means that he or she is unlikely to be suffering from malaria. The purpose of this module is to equip health workers with a simple framework to continue the effective treatment of patients who had presented with fever, but for whom the RDT or blood smear produced a malaria-negative result.

OBJECTIVES

By the end of this session, you should be able to:

- Identify correctly patients with fever who may or may not have malaria
- Assess patient with fever for other differential diagnosis
- Manage appropriately patient with other conditions

Part 1: Ruling out Malaria as the Cause of Fever

It is important to note that if patient has fever, regardless of a positive or negative RDT result; the patient should be evaluated for presence of other illnesses (pneumonia, diarrhea, respiratory tract infections, urinary tract infections, and viral infections, etc.) (Refer to ***Session 4-Part 2: Management of Most Common Childhood Illnesses – Pneumonia and Diarrhea***, ***Session 4-Part 3: Management of Other Illnesses / Conditions***, and ***Session 8: Malaria and HIV/AIDS Co-Infection***)

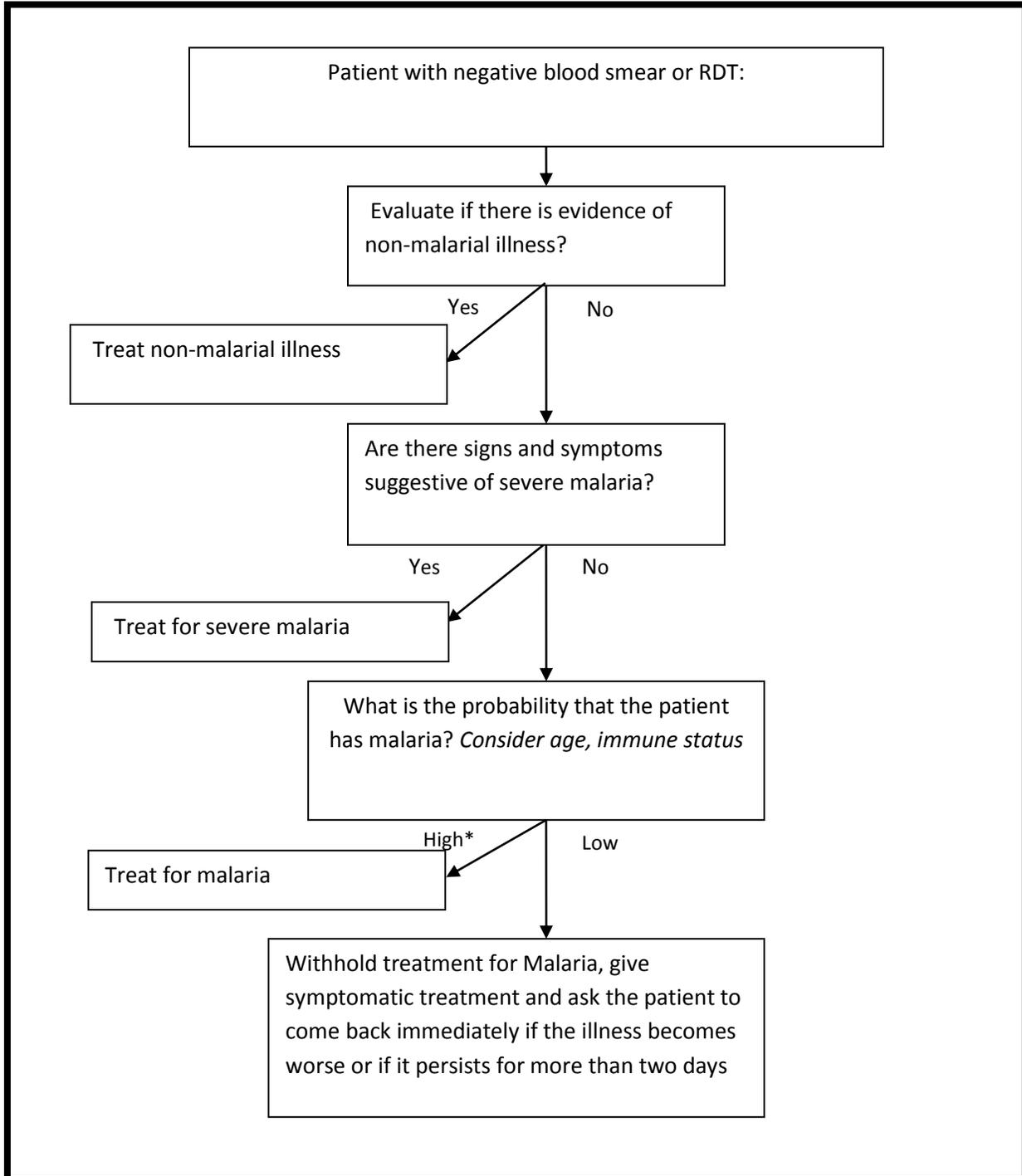
4.1 Ruling out Malaria as the cause of fever

- It is possible that a patient with a negative RDT or blood smear may still have malaria. Possible reasons for parasites being missed include:
 1. Low peripheral parasitemia,
 2. Sequestration of parasites in the internal organs
 3. Partially effective antimalarial
 4. Inadequate doses of an effective drug
 5. Technical error or incompetence
 6. Using prophylactic treatment for malaria

Steps to take to verify patient does not have malaria

- Re-assess patient history, clinical signs and laboratory results in accordance with **Session 2: Evaluation of a patient with fever (Page 10)**
- If malaria is still suspected, investigate using diagram

Figure 4.1.1 – Verifying root cause of patient illness



4.2 Possible diagnoses of a patient with fever and a negative malaria smear or RDT:

- Having ruled out malaria, it is important to diagnose and treat the underlying cause of the fever.
- There are many different infections that can cause fever, but some are more common and/or more dangerous – **these must be prioritized**

Part 2: Management of Most Common Childhood Illnesses other than Malaria: **Pneumonia and Diarrhea**

The WHO recommends giving special priority to *pneumonia* and *diarrhea* in children, each of which health workers should be able to diagnose and manage.

- **Pneumonia** is one of the most dangerous and common diseases for children, especially young children and infants. Without proper treatment pneumonia can lead to death in a few days.
- **Diarrhea** is also a very common illness in children, which can cause death if the child becomes severely dehydrated.



Quiz:

Question 1: what is the most important cause of fever in children, other than malaria?

Answer: Pneumonia

Follow up Question: What is the other next most important childhood illness?

Answer: Diarrhea

Assessing Children for Pneumonia or Diarrhea, two common causes of death among children in addition to Malaria

PNEUMONIA: SYMPTOM RECOGNITION & DISEASE MANAGEMENT					
PHYSICAL EXAM & SIGNS	CLASSIFICATION		TREATMENT		
			Antibiotic	Adults	Children
Cough or difficult breathing and <ul style="list-style-type: none"> Any general danger sign or Chest wall in drawing or Stridor in a calm child 	SEVERE PNEUMONIA OR VERY SEVERE DISEASE	Will require: <ul style="list-style-type: none"> Oxygen injectable treatment 	Benzyl penicillin <i>(x-pen)</i>	2 mu IV or IM daily every 4-6 hours x 5 days	50,000 - 100,000 IU/kg per dose every 6 hours x 7 days
		If treatment not available give pre-referral treatment and refer URGENTLY to HCIV or Hospital	OR	Chloramphenicol (oral or IV)	1g every 6 hours IV or IM then orally x 7 days
<ul style="list-style-type: none"> Fast Breathing <ul style="list-style-type: none"> <i>Child Under 2mo:</i> ≥ 60 breaths per minute <i>Child 2- 12mo:</i> ≥ 50 breaths per minute <i>Child 12 mo- 5 yrs:</i> ≥ 40 breaths per minute 5 yrs+: ≥ 30 breaths per minute 	PNEUMONIA	<ul style="list-style-type: none"> Give oral antibiotic for 5 days Give supportive treatment to soothe throat, relieve cough and reduce fever Give Vitamin A for children you did not receive within the last month If condition worsens treat as for severe pneumonia If illness doesn't respond to standard antibiotic therapy or coughing for more than 30 days - consider tuberculosis Check for HIV infection Advise when to return 	Antibiotic	Adults	Children
			Amoxicillin OR	500 mg every 8 hours x 5 days	15-25 mg / kg every 8 hours x 5 days
			Cotrimoxazole (Septrin) OR	960 mg every 12 hours x 5 days	24 mg / kg every 12 hours x 5 days
			Erythromycin tablets	500 mg every 6 hours x 5 days	10 - 15 mg/kg per dose every 6 hours x 5 days



Quiz on Pneumonia:

Question 1: What is the key symptom for diagnosing pneumonia in children?

Answer: Fast breathing

Question 2: What are the cut-offs for fast breathing in children aged

(a) 0 – 2 months?

(b) 2-12 months?

(c) 12 months – 5 years?

Answer:

(a) ≥ 60 breaths per minute

(b) ≥ 50 breaths per minute

(c) ≥ 40 breaths per minute

Question 3: What is the 1st line treatment for pneumonia in children?

Answer: Amoxicillin

Follow up question: What is the dose you should give to children?

Answer: Amoxicillin 15-25 mg / kg, every 8 hours x 5 days

Question 4: What should you do if a patient presents with any pneumonia general danger sign?

Answer: Give them the first dose of amoxicillin, and refer them immediately to hospital

DIARRHEA: SYMPTOM RECOGNITION & DISEASE MANAGEMENT

PHYSICAL EXAM & SIGNS	CLASSIFICATION	TREATMENT				
DIARRHEA and Two or more of: <ul style="list-style-type: none"> • General condition is lethargic/unconscious • Sunken eyes • When offered fluid, patient drinks poorly / not at all • Skin pinch of the abdomen goes back very slowly (less than 2 seconds) 	SEVERE DEHYDRATION	Your capabilities		Treatment		
		1. Can you give IV fluids?	Correct dehydration using PLAN C Give IV Ringer’s Lactate Solution (Give ORS as soon as patient can drink)		IV: 30 ml/kg for 1st hour, then 70 ml/kg for 5 hours	IV: 30 ml/kg for 1st 30 mins, then 70 ml/kg for 2.5 hours
		2. Is IV available < 30 mins?	REFER urgently to hospital Give ORS by mouth on way		Once referred, as above	
		3. Can you place naso-gastric tube?	Give ORS by tube. Observe for 6 hours		20 ml/kg/hour for 6 hours	
		4. Can the patient drink?	Give ORS by mouth in frequent small sips. Observe for 6 hours		20 ml/kg/hour for 6 hours	
5. If none of the above possible, REFER URGENTLY to hospital for IV treatment						
DIARRHEA and Two or more of: <ul style="list-style-type: none"> • General condition is restless/irritable • Sunken eyes • When offered fluid, patient drinks eagerly / is thirsty • Skin pinch of the abdomen goes back slowly 	SOME DEHYDRATION	Treatment		Patient age (weight)		
		Correct dehydration using PLAN B		<ul style="list-style-type: none"> • < 4 months - 5 years = 75ml/Kg body weight over 4 hours • > 5 years = as much as possible 		
		ORS (minimum to be given over 4 hours): Zinc (tablet = 20 mg) Show mother how to dissolve in milk/ORS or chewed	<ul style="list-style-type: none"> • 2 – 6 months = ½ tablet daily for 14 days • 6 months or more = 1x tablet daily for 14 days 			
Re-assess after 4 hours and show mother how to make more ORS as required; follow up in 5 days. If signs of severe dehydration treat using PLAN C , if no signs of dehydration treat using PLAN A (fluid, feeding, follow up)						
DIARRHEA and No signs of dehydration	NO DEHYDRATION	Treatment		Patient age		
		Treat using PLAN A ORS Teach the mother how to make and give ORS at home (in ADDITION) to usual fluid intake Give mother 2 sachets of ORS for later use. Council mother about how to give (frequent small sips; wait 10 mins if child vomits)		<ul style="list-style-type: none"> • < 2 years = 50 – 100 ml after each loose stool • 2 – 5 years = 100 – 200 ml after each loose stool • As much as the patient will take • Continue until diarrhea stops 		

		Zinc (tablet = 20 mg). Show mother how to dissolve in milk/ORS or chewed	<ul style="list-style-type: none"> • 2 – 6 months = ½ tablet daily for 14 days • 6 months or more = 1x tablet daily for 14 days
		Continue feeding	If < 6 months advise exclusive breastfeeding Breastfeed frequently and for longer at each feed (in addition to ORS)
		Follow-up in 5 days if not improving	



Quiz on diarrhea:

Question 1: What is most important thing to look for when a patient has diarrhea?

Answer: Signs of dehydration

Signs of dehydration include thirst, sunken eyes, and loss of skin elasticity

Question 2: What should you do if a patient has diarrhea with blood in their stool?

Answer: Treat for dehydration and refer them immediately to hospital.

Question 3: What is the most important treatment for diarrhea with no dehydration?

Answer: ORS and zinc

Part 3: Management of Other Illnesses / Conditions

CENTRAL NERVOUS SYSTEM									
PHYSICAL EXAMINATION & SIGNS	CLASSIFICATION	TREATMENT							
<ul style="list-style-type: none"> • Fever, headache, vomiting • Photophobia • Convulsions • Failure to feed (babies) or confusion (adults) • Child - bulging anterior fontanel • Stiff neck 	BACTERIAL MENINGITIS	<ul style="list-style-type: none"> • Requires injectable antibiotic treatment immediately and REFER IMMEDIATELY to HCIV or Hospital • Do not wait for RDT result before starting treatment • Give appropriate pre-referral treatment for any signs (e.g. fever, convulsions) 	<table border="1"> <thead> <tr> <th>Antibiotic</th> <th>Adults</th> <th>Children</th> </tr> </thead> <tbody> <tr> <td>Chloramphenicol</td> <td>1 g every 6 hours IV or IM then orally (when patient is able to take medicine orally) x 14 days</td> <td>25 mg / kg every 6 hours IV or IM then orally x 14 days</td> </tr> </tbody> </table>	Antibiotic	Adults	Children	Chloramphenicol	1 g every 6 hours IV or IM then orally (when patient is able to take medicine orally) x 14 days	25 mg / kg every 6 hours IV or IM then orally x 14 days
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EARS NOSE AND THROAT																					
PHYSICAL EXAMINATION & SIGNS	CLASSIFICATION	TREATMENT																			
<ul style="list-style-type: none"> • Fever • Throat pain, mild cough • Red throat and tonsils 	PHARYNGITIS	<ul style="list-style-type: none"> • Give supportive treatment to soothe throat, relieve cough and reduce fever • Warm saline gargles 3-4 times daily 	NO ANTIBIOTIC																		
<ul style="list-style-type: none"> • Fever • Throat pain, mild cough • Red throat and tonsils AND • Swollen lymph nodes in anterior neck • White coating over the throat 	STREPTOCOCCAL PHARYNGITIS	<ul style="list-style-type: none"> • Give antibiotic • Give supportive treatment to soothe throat, relieve cough and reduce fever • Advise when to return 	<table border="1"> <thead> <tr> <th>Antibiotic</th> <th>Adults</th> <th>Children</th> </tr> </thead> <tbody> <tr> <td>Amoxicillin OR</td> <td>500mg every 8 hours x 5 - 7 days</td> <td>15 mg / kg every 8 hours x 5 - 7 days</td> </tr> <tr> <td>Benzathine penicillin OR</td> <td>1.2 million units (MU) x 1 injected IM dose</td> <td>If child weighs less than 30 kg: 30,000 units / kg x 1 injected IM dose</td> </tr> <tr> <td>PPF OR</td> <td>20,000 IU / kg injected daily x 10 days</td> <td>20,000 IU / kg injected daily x 10 days</td> </tr> <tr> <td>Phenoxymethylpenicillin OR</td> <td>500 mg every 6 hours x 10 days</td> <td>12.5 mg / kg every 6 hours x 10 days</td> </tr> <tr> <td>Erythromycin (if allergic to penicillin)</td> <td>500 mg every 6 hours x 10 days</td> <td>12.5 mg / kg every 6 hours x 10 days</td> </tr> </tbody> </table>	Antibiotic	Adults	Children	Amoxicillin OR	500mg every 8 hours x 5 - 7 days	15 mg / kg every 8 hours x 5 - 7 days	Benzathine penicillin OR	1.2 million units (MU) x 1 injected IM dose	If child weighs less than 30 kg: 30,000 units / kg x 1 injected IM dose	PPF OR	20,000 IU / kg injected daily x 10 days	20,000 IU / kg injected daily x 10 days	Phenoxymethylpenicillin OR	500 mg every 6 hours x 10 days	12.5 mg / kg every 6 hours x 10 days	Erythromycin (if allergic to penicillin)	500 mg every 6 hours x 10 days	12.5 mg / kg every 6 hours x 10 days
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<ul style="list-style-type: none"> • Fever • Ear Pain and / or • Pus discharge • Tender swelling behind the ear • Bulging, irritated tympanic membrane with or without pus discharge on examination with otoscope <p>Always look in the ears of every child with fever</p>	OTITIS MEDIA	<ul style="list-style-type: none"> • Give antibiotic • Give supportive treatment • Advise to dry ear by wicking 3 times a day • Advise to return in 5-7 days • If tympanic membrane damaged or patient returns repeatedly with signs of ear infection - REFER 	Antibiotic		
			Adults	Children	
Amoxicillin OR	500mg every 8 hours x 5 days	15 mg / kg every 8 hours x 5 days			
Cotrimoxazole	960 mg every 12 hours x 5 days	24 mg / kg, every 12 hours x 5 days			

RESPIRATORY TRACT					
PHYSICAL EXAMINATION & SIGNS	CLASSIFICATION	TREATMENT			
<ul style="list-style-type: none"> • Fever • Runny nose with clear mucous and mild cough 	COUGH OR COLD	<ul style="list-style-type: none"> • Supportive treatment to soothe throat, relieve cough and reduce fever 	NO ANTIBIOTIC		
<ul style="list-style-type: none"> • Fever • Irritating, productive cough • Shortness of breath • Wheezing • Chest tightness • Yellow or green mucous sometimes • scanty blood in sputum 	ACUTE BRONCHITIS	<ul style="list-style-type: none"> • Viral and mild • Give supportive treatment plenty of oral fluids If wheezing present • Give salbutamol 100 micrograms (0.1mg)/kg every 8 hours until wheezing stops 	NO ANTIBIOTIC		
		Antibiotics			
		Adults	Children		
Amoxicillin OR	500 mg every 8 hours x 5-7 days	15 mg / kg, every 8 hours x 7 days			
Cotrimoxazole (Septrin)	960 mg every 12 hours x 5-7 days	24 mg/kg, every 12 hours x 5 -7 days			

ALIMENTARY, GENITAL AND URINARY TRACT		
PHYSICAL EXAMINATION & SIGNS	CLASSIFICATION	TREATMENT

<ul style="list-style-type: none"> • Dysuria • Frequent urination • Possible haematuria • Urgency • Lower abdominal tenderness 	URINARY TRACT INFECTION	<ul style="list-style-type: none"> • Give antibiotic • Advise to drink a lot of fluids Advise to return within 3-5 days If illness doesn't respond to standard antibiotic therapy, • REFER 	<table border="1"> <thead> <tr> <th data-bbox="1297 190 1501 228">Antibiotic</th> <th data-bbox="1501 190 1751 228">Adults</th> <th data-bbox="1751 190 2024 228">Children</th> </tr> </thead> <tbody> <tr> <td data-bbox="1297 228 1501 329">Amoxicillin OR</td> <td data-bbox="1501 228 1751 329">500 mg every 8 hours x 5-7 days</td> <td data-bbox="1751 228 2024 329">15 mg / kg, every 8 hours x 7 days</td> </tr> <tr> <td data-bbox="1297 329 1501 444">Cotrimoxazole (Septin)</td> <td data-bbox="1501 329 1751 444">960 mg every 12 hours x 5-7 days</td> <td data-bbox="1751 329 2024 444">24 mg/kg, every 12 hours x 5 -7 days</td> </tr> </tbody> </table>			Antibiotic	Adults	Children	Amoxicillin OR	500 mg every 8 hours x 5-7 days	15 mg / kg, every 8 hours x 7 days	Cotrimoxazole (Septin)	960 mg every 12 hours x 5-7 days	24 mg/kg, every 12 hours x 5 -7 days
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<p>Symptoms above</p> <p>AND</p> <ul style="list-style-type: none"> • Diarrhoea and convulsions (common in children) • Renal angle tenderness 	PYELONEPHRITIS	<ul style="list-style-type: none"> • Ensure adequate intake of fluid (oral or IV) • Ensure perianal hygiene • Ensure regular complete emptying of the bladder • Give paracetamol for pain and fever • Give antibiotic as for UTI, if no improvement in 48 hours give injectable antibiotic and • REFER to higher level health facility 	<table border="1"> <thead> <tr> <th data-bbox="1297 444 1501 483">Antibiotic</th> <th data-bbox="1501 444 1751 483">Adults</th> <th data-bbox="1751 444 2024 483">Children</th> </tr> </thead> <tbody> <tr> <td data-bbox="1297 483 1501 915">Ampicillin <i>plus</i> Gentamicin</td> <td data-bbox="1501 483 1751 915">1-2g IV or IM every 6 hours x 7-14 days 5 mg/kg IV or IM every once a day for 7 days (reduce dose in renal impairment)</td> <td data-bbox="1751 483 2024 915">50 mg/kg per dose every 6 hours x 7-14 days 5 mg/kg IV or IM every once a day for 7 days</td> </tr> </tbody> </table>			Antibiotic	Adults	Children	Ampicillin <i>plus</i> Gentamicin	1-2g IV or IM every 6 hours x 7-14 days 5 mg/kg IV or IM every once a day for 7 days (reduce dose in renal impairment)	50 mg/kg per dose every 6 hours x 7-14 days 5 mg/kg IV or IM every once a day for 7 days			
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ALIMENTARY, GENITAL AND URINARY TRACT

PHYSICAL EXAMINATION & SIGNS	CLASSIFICATION	TREATMENT													
In Women <ul style="list-style-type: none"> • Fever • Abnormal vaginal discharge that may be smelly • Irregular periods, bleeding between periods or having heavier periods than usual • Lower abdominal tenderness • Dysuria • Uncomfortable or painful sex 	PELVIC INFLAMMATORY DISEASE	<ul style="list-style-type: none"> • Give antibiotics • Give supportive treatment • Advise if no improvement within 7 days, • REFER for specialist management 	<table border="1"> <thead> <tr> <th>Antibiotic</th> <th>Adults</th> <th>Children</th> </tr> </thead> <tbody> <tr> <td> Ciprofloxacin plus Doxycycline plus Metronidazole </td> <td> 500mg every 12 hours x 3 days (contraindicated in pregnancy) 100mg every 12 hours x 10 days 400mg every 12 hours x 10 days </td> <td></td> </tr> </tbody> </table>	Antibiotic	Adults	Children	Ciprofloxacin plus Doxycycline plus Metronidazole	500mg every 12 hours x 3 days (contraindicated in pregnancy) 100mg every 12 hours x 10 days 400mg every 12 hours x 10 days							
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Ciprofloxacin plus Doxycycline plus Metronidazole	500mg every 12 hours x 3 days (contraindicated in pregnancy) 100mg every 12 hours x 10 days 400mg every 12 hours x 10 days														
<ul style="list-style-type: none"> • Fever (temperature rises in steps) • Gradual onset of chills and malaise, headache, anorexia, epistaxis, backache and constipation - usually occurring 10-15 days after infection • Abdominal pain and tenderness are prominent features • Relative bradycardia is common • Delirium and stupor (common) • Tender splenomegaly (common) 	TYPHOID FEVER (enteric fever)	Give antibiotic	<table border="1"> <thead> <tr> <th>Antibiotic</th> <th>Adults</th> <th>Children</th> </tr> </thead> <tbody> <tr> <td> Chloramphenicol OR </td> <td> 1 g every 6 hours x 10 - 14 days </td> <td> 25 mg / kg every 6 hours x 10 - 14 days </td> </tr> <tr> <td> Cotrimoxazole OR </td> <td> 960 mg every 12 hours x 14 days </td> <td> 24 mg / kg every 12 hours x 14 days </td> </tr> <tr> <td> Ciprofloxacin tablets </td> <td> 500-750mg every 12 hours x 5-14 days <i>Contraindicated in pregnancy</i> </td> <td> 10-15mg/kg per dose every 12 hours x 5-14 days Contraindicated in children below 1 year </td> </tr> </tbody> </table>	Antibiotic	Adults	Children	Chloramphenicol OR	1 g every 6 hours x 10 - 14 days	25 mg / kg every 6 hours x 10 - 14 days	Cotrimoxazole OR	960 mg every 12 hours x 14 days	24 mg / kg every 12 hours x 14 days	Ciprofloxacin tablets	500-750mg every 12 hours x 5-14 days <i>Contraindicated in pregnancy</i>	10-15mg/kg per dose every 12 hours x 5-14 days Contraindicated in children below 1 year
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<ul style="list-style-type: none"> • Fever • Abdominal discomfort, nausea, diarrhoea • Tiredness/weakness • pain over the liver area • Anorexia • Joint pains • Urticaria • Jaundice • Enlarged liver and tenderness, 	HEPATITIS	<ul style="list-style-type: none"> • Admit (only if patient condition is poor) • Ensure effective infection control measures • Diet: high in carbohydrates and vitamins, no animal proteins • Avoid drugs generally, but especially sedatives and hepatotoxic drugs 	Give supportive treatment												

		<ul style="list-style-type: none"> • REFER if patient has features of liver failure or decompensated liver disease. 	
<p>Demonstration of 1 or more opportunistic infections</p> <ul style="list-style-type: none"> • Cardinal features - presence of any one of these is diagnostic of underlying HIV infection: <ul style="list-style-type: none"> – Kaposi’s sarcoma – Cryptococcal meningitis – Oesophageal candidiasis – Herpes zoster in patients <50 years – Oral thrush in patients <50 years (if no antibiotics taken in the past month) – Pneumocystis carinii pneumonia (Pneumocystis jiroveci) – Toxoplasmosis infection – Cytomagalovirus retinitis • Other findings/risk factors: presence of any two or more of these <ul style="list-style-type: none"> <input type="checkbox"/> characteristic findings: 	Human Immuno-deficiency Virus (HIV)	<p>By use of Cotrimoxazole prophylaxis</p> <p>By treating opportunistic infections as they occur</p> <p>By treating symptoms, such as pain, diarrhoea, skin problems, as they develop</p> <p>Encouraging the patient & family to help themselves by:</p> <ul style="list-style-type: none"> – eating a balanced diet – taking regular exercise – keeping active and resting well – going for treatment promptly if unwell – spending quality time with family and friends – obtaining support from a counsellor 	

<p>- severe pruritic maculopapular skin rash (prurigo)</p> <p><input type="checkbox"/> associated findings:</p> <ul style="list-style-type: none"> - weight loss >10% - recurrent fevers for >1 month - recurrent diarrhoea for >1 month - generalised lymphadenopathy <p><input type="checkbox"/> For children under 5 years of age, if the child has two or more of the following:</p> <ul style="list-style-type: none"> - Pneumonia - Persistent diarrhoea - Very low weight-for-age - Oral thrush - Ear discharge - Generalized lymphadenopathy - Parotid enlargement - Mother is HIV positive - Positive HIV Antibody test in a child less than 18 months <p>Confirm diagnosis with HIV test in both adults and children</p>		<ul style="list-style-type: none"> - abstaining from sex, or being faithful to one partner - using a condom to help ensure safe sex - Antiretroviral Therapy (ART) if patient is eligible 	
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			Antibiotic	Adults	Children
<ul style="list-style-type: none"> • Fever/chills • Persistent mucoid/bloody diarrhea • Abdominal pain • Nausea, vomiting • Tenesmus • Less frequent diarrhea compared to bacillary dysentery 	AMEOBIC DYSENTRY	Correct any dehydration	Metronidazole OR	800mg every 8 hours x 8-10 days ; taken after food <i>Contraindicated in pregnancy</i>	10mg/kg per dose every 8 hours x 8-10 days; taken after food
			Tinidazole	<i>2g daily for 5 days</i> Contraindicated in pregnancy	50mg/kg per dose for 5 days
<ul style="list-style-type: none"> • Fever/chills • Persistent mucoid/bloody diarrhea • Abdominal pain • Nausea, vomiting • Tenesmus with rectal prolapsed in some children • Reiter's syndrome - urethritis, conjutivitis and arthritis. • Pus cells in stool 	BACILLARY DYSENTRY (Shigellosis)	Correct any dehydration REFER to Hospital			

SKIN					
PHYSICAL EXAMINATION & SIGNS	CLASSIFICATION	TREATMENT			
<ul style="list-style-type: none"> ▪ Fever ▪ Generalized rash and any of: ▪ Cough, runny nose or red eyes 	MEASLES	<ul style="list-style-type: none"> • Give supportive treatment • Advise mother when to return immediately • Recommend isolating patient at home (or in hospital if necessary), • vaccinate contacts 			
above Symptoms AND <ul style="list-style-type: none"> ▪ Any general danger sign ▪ Clouding of cornea or pus draining from eye <ul style="list-style-type: none"> ▪ Deep mouth ulcers 	SEVERE MEASLES	<ul style="list-style-type: none"> • Give Vitamin A for treatment • Give first dose of cotrimoxazole • Give tetracycline eye ointment if have eye conditions • REFER URGENTLY to hospital 	Antibiotic Cotrimoxazole (Septrin)	Adults 960 mg every 12 hours x 5-7 days	Children 24 mg/kg, every 12 hours x 5 -7 days
<ul style="list-style-type: none"> • Fever, sore throat • Appearance of rash on head and torso • History of contact (patient with chicken pox) • Rash is an area of redness with a small, superficial blister in the centre, that erupts and then forms a crust 	CHICKEN POX	<ul style="list-style-type: none"> • Supportive treatment for fever and itching • Recommend isolating the patient 			
Varied can include <ul style="list-style-type: none"> • Small localized skin rash itchy eyes, face bumps, or all over, as in a whole body rash • Fever • History of drug use 	DRUG SIDE EFFECT OR ALLERGIC REACTION STEVEN JOHNSON SYNDROME (SEVERE FORM OF DRUG REACTION)	<ul style="list-style-type: none"> • Discontinue suspected allergen • Supportive care with an antihistamine • Advise when to return 			
<ul style="list-style-type: none"> • Fever • Acute localised pain, 	CELLULITIS (always remember every	<ul style="list-style-type: none"> • Elevate the affected limb • Give an analgesic as required. 	Antibiotic PPF	Adults 1.5 MU IM daily x 7 days	Children 50,000 IU / kg IM daily x 7 days

<ul style="list-style-type: none"> • Swelling • Affected area is warm/hot • Skin becomes tense and shiny in advanced stages 	suspected cellulitis in children should be treated as osteomyelitis until definitive diagnosis is made	<ul style="list-style-type: none"> • Give Antibiotic therapy: (7-10 day course) Once condition improves change to oral therapy 	Benzyl penicillin (x-pen)	1-2 MU IV or IM every 6 hours x 7 days	50,000 - 100,000 IU/kg per dose, every 6 hours x 7 days
			Once condition improves change to <i>Amoxicillin</i>	500 mg every 8 hours	15-25 mg / kg every 8 hours
			Once condition improves and if allergic to penicillin Erythromycin tablets	250 mg every 6 hours	7.5 mg/kg per dose every 6 hours



Quiz on causes of fever that are not malaria, nor pneumonia or diarrhea:

Question 1: What should you suspect if your patient has painful urination as well as a fever?

Answer: Urinary tract infection (UTI)

Question 2: What are the main symptoms of meningitis (apart from fever)?

Answer: Headache; Painful stiff neck; Photophobia (light sensitivity); Vomiting; Convulsions



Summary:

- Not all fevers are malaria.
- **Always** confirm malaria with an RDT or blood smear.
- If RDT or blood smear is negative, **check for other illnesses or conditions!**
- Treat appropriately!

Session 5: Treatment of Uncomplicated Malaria

OBJECTIVES

By the end of this session, you should be able to:

- Define the term uncomplicated malaria
- Define antimalarial combination therapy
- Describe the management of a patient with uncomplicated malaria

Part 1: Uncomplicated Malaria and Antimalarial Combination Therapy

4.1 What is Uncomplicated Malaria?

- Uncomplicated malaria is symptomatic malaria without signs of severity.

4.2 Antimalarial Combination Therapy (ACT)

- Combination therapy is the simultaneous use of two or more drugs with independent modes of action that work together to kill all parasites.



Question: What are the benefits of combination therapy?

Answer: There are two major benefits of Antimalarial Combination Therapy

1. They are more efficacious than mono therapies
2. They prevent or delay the emergence of resistance

- The current efficacious combination therapy used in Uganda is:
 1. **Artemisinin-based combination therapy (ACT)** is the one recommended in the current malaria treatment policy for uncomplicated malaria. It is a combination therapy in which one of the components is an Artemisinin derivative. Examples of ACTs are shown in table below:

ACT	Trade Name	Manufacturer
Artemether plus Lumefantrine (AL)	Luminer	Macleods
	Artefan	Ajanta
	Coartem	Norvatis
	Lumartem	Cipla
Artesunate plus Amodiaquine (AS-AQ)	Larimal	Ipca
	Falcimon	Cipla
	Arsucam	Marphar
	Amonate	Erfa Sa
	Amqunate	Cosmos
Dihydroartemisinin plus Piperaquine (DP)	Duocotecxin	Jiaying Nanhu

- **Non-artemisinin based combination therapies** are **NOT** recommended for use in Uganda. Examples include *Sulfadoxine Pyremethamine plus Chloroquine (SP + CQ)* and *Sulfadoxine Pyremethamine plus Amodiaquine (SP + AQ)*. These drugs are not effective in treating malaria in Uganda! Using monotherapies e.g. chloroquine, artemisinin derivatives, SP alone do not work to treat uncomplicated malaria.

4.3 Artemisinin derivatives

- Artemisinin is a natural extract derived from a plant called *Artemisia annua*. Crude extracts from this plant have been used in China to treat malaria and other diseases for many centuries. Artemisinin derivatives are rapidly acting antimalarials with a short half-life. In artemisinin based combination therapies, the artemisinin derivative is combined with a longer acting partner drug. While the Artemisinin derivative rapidly clears the vast majority of parasites, the partner drug “mops up” the remaining parasites. Examples of Artemisinin derivatives are the following:
 - Artemether
 - Artesunate
 - Dihydroartemisinin



Summary:

We have come to the end of our discussion on treatment of uncomplicated malaria. In this session we defined uncomplicated malaria as symptomatic malaria without signs of severity. We discussed the recommended treatment of uncomplicated malaria in Uganda which is Artemisinin based combination therapy. Monotherapies are not effective.

Part 2: Management of a Patient with Uncomplicated Malaria

- Management of uncomplicated malaria involves specific and supportive treatment.

2.1 Specific treatment for uncomplicated malaria

- Specific treatment means the use of effective antimalarial drugs.



Question: What is the recommended 1st line medicine for malaria in Uganda? What is the alternative 1st line medicine?

Answer: Artemether/Lumefantrine is the 1st line medicine and the alternative 1st line is Artesunate plus Amodiaquine. The second line drug for uncomplicated malaria cases that fail to respond to the first line is Dihydroartemisinin Piperazine.

- **1st Line Treatment - Artemether/Lumefantrine (AL):** AL is a co-formulated drug (two drugs in one tablet). Each tablet contains 20mg Artemether and 120mg Lumefantrine. A full course of treatment comprises of a total of 6-doses. A dose is given twice a day (12 hourly) over a period

of 3 days. The number of tablets per dose depends on the weight of the patient. 1st line treatment is the main medicine for the treatment of uncomplicated malaria in all health facilities both government and public, and at community level.

Table 2.1: Treatment schedule for Artemether/Lumefantrine (AL)

Weight (Kg)	Age	Day 1	Day 2	Day 3
5-14	From 4 months up to 3 years	1 tablet twice a day 12 hourly	1 tablet twice a day 12 hourly	1 tablet twice a day 12 hourly
15-24	From 3 years up to 7 years	2 tablets twice a day 12 hourly	2 tablets twice a day 12 hourly	2 tablets twice a day 12 hourly
25-34	From 7 years up to 12 years	3 tablets twice a day 12 hourly	3 tablets twice a day 12 hourly	3 tablets twice a day 12 hourly
>35	From 12 years and above	4 tablets twice a day 12 hourly	4 tablets twice a day 12 hourly	4 tablets twice a day 12 hourly

- **1st Line Alternative Treatment - Artesunate + Amodiaquine:** This treatment may be available as separate tables or co-formulated tablets. The recommended dose is 4mg/kg Artesunate and 10mg base/kg Amodiaquine given once a day for a total of three days. Ensure you check the packing for the correct dose of the formulation before administering to the patient.

Table 2.2: Treatment schedule for brands containing Artesunate (50mg) + Amodiaquine (153mg)

Age	Dose in mg (No. of tablets)					
	Artesunate (50mg)			Amodiaquine (153 mg)		
	Day 1	Day 2	Day 3	Day 1	Day 2	Day 3
5-11months	25 (1/2)	25(1/2)	25 (1/2)	76 (1/2)	76 (1/2)	76 (1/2)
≥ 1-6 yrs	50 (1)	50 (1)	50 (1)	153 (1)	153 (1)	153 (1)
≥ 7-13 yrs	100 (2)	100 (2)	100 (2)	306 (2)	306 (2)	306 (2)
>13 yrs	200 (4)	200 (4)	200 (4)	612 (4)	612 (4)	612 (4)

- As a health worker using other brands you should follow the manufacturers' instructions
- **Contra-indications of Amodiaquine** – Avoid using Amodiaquine in patients with the following characteristics:
 - Known hypersensitivity (side effect) to Amodiaquine

- History of hepatitis
 - Evidence of low blood cell counts (agranulocytosis) during a previous treatment with Amodiaquine,
 - History of previous drug induced agranulocytosis and liver disorders following the use of any other drugs
- **2nd Line Treatment - Dihydroartemisinin plus Piperaquine:** This is a co-formulated tablet containing 40mg of Dihydroartemisinin (DHA) and 320mg of Piperaquine (PPQ). 2nd line treatment is given when the 1st line treatment or alternative 1st line treatment fails to cure or cannot be given for other reasons.

Table 4.3: Treatment schedule for Dihydroartemisinin/Piperaquine (Duo-cotecxin)

Day	Adults	Children 11 -16 years*	Children 6 – 11 yrs
1	3 tabs	2 tabs	1.5 tab
2	3 tabs	2 tabs	1.5 tab
3	3 tabs	2 tabs	1.5 tab
Total	9 tabs	6 tabs	4.5 tabs

**Note: Any child that is above 40kg should be given an adult dose*

2.2 Supportive treatment for uncomplicated malaria



Question: What is supportive treatment for uncomplicated malaria intended to do?

Answer: It is intended to relieve symptoms such as fever, headache, malaise, body aches and joint pains. It also includes nutritional support and fluid maintenance which enhances recovery.

- **Relief of fever** - Antipyretics are recommended for axilla temperatures above 38.5°C. Where a thermometer is not available, and the body feels very hot, an antipyretic should be given. If uncontrolled, fever may cause convulsions in young children. Other measures to relieve fever include removal of clothes, tepid sponging, fanning and fluid intake.
 - Any of the following antipyretics are acceptable:
 - Paracetamol (Panadol) 10mg/kg every 6 hours
 - Ibuprofen 5mg/kg
 - You should not:
 - Use antipyretics for more than 3 days, as they might mask symptoms of other diseases



Summary:

We have come to the end of our session on management of a patient with uncomplicated malaria. We learned that there are two types of treatment for uncomplicated malaria:

1. Specific treatment – Treatment with an effective antimalarial
2. Supportive treatment – Treatment to relieve symptoms of malaria (e.g. fever, headache, malaise)

We also learned that ACTs (artemisinin-combination therapy) are the recommended treatments for malaria. Artemether/Lumefantrine is the 1st line treatment with Artesunate/Amodiaquine is the 1st line alternative treatment. Dihydroartemisinin/Piperaquine is the 2nd line treatment for patients that fail to respond to the 1st line treatment.

Session 6: Management of a Patient with Severe Malaria

OBJECTIVES:

By the end of this session, you should be able to:

- Define severe malaria
- Outline the high risk groups likely to get severe malaria
- Describe the different presentations of severe malaria.
- Explain how to make a diagnosis of severe malaria
- Describe the management of a patient with severe malaria

Part 1: Severe Malaria Introduction and Diagnosis

1.1 Introduction

Severe malaria is a common life threatening condition in Uganda that if not managed appropriately frequently causes death.

- In Uganda,-approximately 5% of cases of Malaria result into severe Malaria.
- Approximately 9-14% of all deaths are attributed to malaria.

To properly manage a patient with severe malaria you need to know the persons at increased risk, the different presentations, the specific complications, and how to make a diagnosis severe malaria

1.2 What is Severe Malaria?

Severe malaria is a malaria illness that is serious enough to be an immediate threat to the life of the patient. You should regard a patient as having severe malaria if there are asexual forms of *P. falciparum* on a blood film or positive RDT and show any of the complications outlined in Table below.



Question: What are the complications that indicate severe malaria?

Answer: You should regard a patient as having severe malaria if the patient has any of the complications as outlined in table below

Table: Classical definition of severe malaria

COMPLICATION	CRITERION FOR DIAGNOSIS
Defining manifestations	
Cerebral malaria	Deep coma (unable to localize a painful stimulus), Normal CSF, <i>parasitaemia</i> .
Severe anaemia	Hb < 5g/dl with <i>parasitaemia</i>
Respiratory distress	Tachypnea, nasal flaring and intercostal recession in a patient with <i>parasitaemia</i>
Hypoglycaemia	Blood glucose < 40 mg/dl (2.2 mmol/L) with <i>parasitaemia</i>
Circulatory collapse	Clinical shock (systolic pressure <50 mmHg for children and < 80mmHg for adults, with cold peripheries, clammy skin) with <i>parasitaemia</i>
Renal failure	Urine output < 12 ml/kg/24hrs and plasma creatinine > 3.0mg/dl, with <i>parasitaemia</i>
Spontaneous bleeding	<i>Parasitaemia</i> with unexplained spontaneous bleeding
Repeated convulsions	2 or more convulsions in 24 hours, with <i>parasitaemia</i>
Acidosis	Deep (acidotic) breathing, Plasma bicarbonate < 15 mmol/L, with <i>parasitaemia</i>
Haemoglobinuria	<i>Parasitaemia</i> , haemoglobin in urine (dark colored' urine but no RBC's)
Pulmonary Oedema	deep breathing,fast breathing,laboured breathing (nasal flaring, intercostal recession and chest in-drawing), Cheyne stokes breathing
Supporting manifestations (some other signs in addition to above complications)	
Impaired consciousness	<i>Parasitaemia</i> with depressed level of consciousness but can localize a painful stimulus
Jaundice	<i>Parasitaemia</i> with unexplained jaundice
Prostration	Unable to sit in a child normally able to do so or unable to drink in one too young to sit
Hyperpyrexia	Temperature > 39.5 ^o C, with <i>parasitaemia</i>
Hyperparasitaemia	Parasite count > 250,000 /ul

Table: Indicating the parasite load on blood slide

+	=1 or no parasites per 100 thick film fields
++	=2-11 parasites per 100 thick film field
+++	= > 20 parasites per one thick film field (hyperparasitaemia)

(Source: WHO; Severe *P. falciparum* malaria. Transactions of the Royal Society of Tropical Medicine and Hygiene; Vol 94 supplement 1 2000)

1.3 Complications of Severe Malaria

Description of Cerebral Malaria

Cerebral malaria is defined as unarousable coma not attributable to any other cause in a patient with falciparum malaria. (World Health Organization 2000) The Cerebral Spinal Fluid (CSF) is normal. The blood smear is positive for *P. falciparum* or RDT is positive for malaria.



In clinical practice, you should urgently treat any degree of impaired consciousness

Cerebral malaria in adults

An adult with cerebral malaria will present with

- Unarousable coma with a Glasgow coma scale of less than 10/1 and a positive blood smear (asexual parasites of *P. falciparum*) or RDT

Any of the following may also occur:

- Convulsions which are a common presentation
- Abnormal posturing
- Abnormalities of eye movements (nystagmus)
- Abnormal gaze (disconjugate gaze)
- Abnormalities of jaw movements known as bruxism
- Neurologic sequelae occur in < 5%

Description of Cerebral malaria in children

In addition to coma and a positive malaria smear or RDT, the following features are common in children with cerebral malaria:

- Unarousable coma with a Blantyre coma scale of less than 3/5
- Convulsions
- Abnormal posturing
- Altered respirations
- Disconjugate gaze (abnormal gaze)

About 10% of children who survive cerebral Malaria have neurologic sequelae which persist into the convalescent period. With time there is further improvement but still half of them end up with permanent partial brain damage.



Emphasize: Typically, in a patient with cerebral malaria

- Nuchal rigidity also known as neck stiffness is usually absent
- Photophobia referring to avoidance of light is usually absent

If the above are present think of meningitis

Description of Severe anaemia

The patient presents with severe pallor and has a low haemoglobin (Hb) level of less than 5g/dl or a haematocrit of less than 15% with parasitemia

Hypoglycemia

- A patient with a low blood sugar of less than 40 mg/dl (2.2 mmol/L).
- The patient may have mental confusion, extreme weakness, sweating, convulsions and may be in coma. The patient's condition may rapidly deteriorate inspite of antimalarial treatment. Appropriate treatment for hypoglycaemia should therefore be given immediately.

Circulatory collapse

The patient presents in shock with a systolic pressure of less than 80mmHg in adults or 50 mmHg in children with cold extremities and clammy skin.

Renal failure:

The patient presents with failure to pass urine for several hours and the urine output of less than 0.3 ml/kg/hr for children and less than 17ml/hr for adults despite adequate correction of dehydration or hypotension. The plasma creatinine and blood urea are usually raised indicating acute renal failure (Normal ranges: Creatinine 0.5-1.2 mg/dl, Blood urea 8-18mg/dl).

Spontaneous bleeding

Bleeding tendency such as bleeding from the gums, nostrils, under the skin and sub-conjunctival hemorrhages may occur in severe malaria. However, this is a very rare manifestation and occurs in non-immune such as immigrants.

Repeated convulsions

The patient presents with a history of 2 or more convulsions in 24 hours.



Take note of subtle convulsions such as nystagmus, fixed conjugate gaze and frothing of saliva and treat them as if they are full convulsions

Description of fluid and electrolyte abnormalities

Patients with severe falciparum malaria may often present with hypovolaemia and clinical signs of dehydration. These signs include dry mucous membranes and a slow skin pinch. Acidosis is a major

electrolyte disturbance and presents with low plasma bicarbonate of less than 15mmol/L, hyperventilation and deep breathing.

Description of Haemoglobinuria:

The patient presents with, haemoglobin in urine that is characterised by 'dark coloured' urine normally described as tea coloured urine) with positive uristicks test for blood but no red blood cells on microscopy. This is due to the haemolysed cell by the parasites but sometimes it may be due to massive intravascular haemolysis which is induced by drugs such as quinine especially in patients with glucose 6 phosphate dehydrogenase (G6PD) deficiency.

Other/supportive manifestations of severe malaria include;

- Jaundice more common in adults than in children and is due mainly to haemolysis and liver dysfunction. It occurs at the same time as the fever unlike in hepatitis where it occurs after the fever.
- Prostration, whereby the patient is extremely weak and unable to sit, walk or feed orally. However, this is not specific to malaria and can occur in any serious illness.
- Hyperpyrexia where the patient presents with a temperature more than 39.5°C. It is common in pregnancy.
- Hyperparasitaemia where the patient presents with a parasite count of more than 250,000/ul

Description of Respiratory distress in children

The patient may present in different ways:

- deep breathing (Acidotic breathing, acidotic fetor or sweet smell of the breath)
- fast breathing as a result of high temperature or anaemia.
- laboured breathing (nasal flaring, intercostal recession and chest in-drawing)
- Cheyne stokes breathing



Question: What do you think are some of the differences in complications in children and adults with severe Malaria?

Answer: See table below

Differences between severe malaria in adults and children (World Health Organization 2000)

Decisive factor	Adults	Children
History of cough	Uncommon	Common
Convulsions	Common	Very common
Duration of illness	5-7 days	1-2 days
Resolution of coma	2-4 days	1-2 days
Neurological sequelae	< 5%	> 10%
Jaundice	Common	Uncommon
Pre-treatment hypoglycaemia	Uncommon	Common
Pulmonary oedema	Uncommon	Rare
Renal failure	Common	Uncommon
CSF opening pressure	Usually normal	Usually raised
Respiratory distress (acidosis)	Sometimes	Common
Bleeding/clotting disorders	Up to 10%	Rare
Abnormality of brain stem reflexes	Rare	More common



The breathing pattern in severe malaria may be affected by other factors such as heart failure, pneumonia, high fever, anemia, adult respiratory distress syndrome (ARDS) and pulmonary oedema.

<i>If the child is:</i>	<i>Fast breathing is:</i>
<i>- 2 months up to 12 months</i>	<i>- 50 breaths per minute or more</i>
<i>- 12 Months up to 5years</i>	<i>- 40 breaths per minute or more</i>

1.4 Groups at high risk of getting severe malaria:



Quiz: List the high risk groups for severe malaria

Answer: There are people in different communities who are at a higher risk of getting severe malaria than others. These are people whose immunity to malaria infection is low. They include the following:

- Children aged 6 months to 5 years in areas of high malaria endemicity
- People of all ages in areas of low malaria endemicity
- Pregnant women especially during first and second pregnancies
- Travellers from non-endemic areas
- People returning to endemic areas after a long (more than 6 months) stay in a non Malaria area
- People with HIV/AIDS
- Persons with sickle cell anemia

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- People with HIV/AIDS
- Persons with sickle cell anemia

1.5 Making a diagnosis of severe malaria

You should be able to make a diagnosis of severe malaria by doing the following three things:

1. Taking a detailed history of the illness,
2. Performing a thorough clinical examination and
3. Carrying out the relevant and essential laboratory investigations to confirm diagnosis and complications

The most important aspects of diagnosis are the presence of one or more of the manifestations listed in the table above of severe malaria and a positive blood smear demonstrating the presence of asexual forms of *P. falciparum* .

Elements to include in a detailed history in a patient with suspected severe malaria

A complete history has two important aims.

1. Identifying other possible diagnosis.
2. Assess for complications

In taking history in a patient suspected of severe malaria, you should make an effort to probe the points given in table 5/4 below:

History and Physical Examination of a Patient – Role Play Case Study A **(30 minutes total)**

History Taking and Physical Examination of a Patient (Severe Malaria) - Checklist

Step 1: Take the History of the Patient

a) Understand the Symptoms

Fever

- When did the fever start? Two days ago.
- What other symptoms are associated with the fever? General weakness
- Is there a pattern to the fever? Answer: No

Change of Behavior (can be asked to relatives or guardians)

- Has the behaviour of the patient changed in the last 4 weeks? Answer: General weakness

Altered state of consciousness

- Is there an altered state of consciousness? For example, is there drowsiness or a deteriorating level of consciousness or coma? Answer: Deteriorating level of consciousness

Convulsions

- Have there been convulsions? What type, when, how many, and how long? Answer: Yes, one in the last twenty four hours.
- Is there abnormal movements and posture? Try to distinguish from unconsciousness for which the same word is used in many languages. No

Urine

- Is there passing of dark urine, little or no urine? Dark urine looks like dry tea. Answer: The patient's urine is dark.

Other symptoms:

- Is there general weakness, inability to eat or drink, to talk, to sit, to stand or to walk? Answer: Yes – the patient is weak, and has not been able to eat or drink.
- Is there a feeling of extreme hunger or cold sweats? Answer: No
- Is there paleness, easy fatigability, palpitations, dizziness? Answer: No
- Is there vomiting? Answer: No
- Is there any spontaneous bleeding? For example, from the gums or prolonged bleeding from venipuncture sites etc. Answer: No .
- Is there yellowing of the eyes or skin? Answer: No

b) Understand the drugs taken for current illness

- What antimalarials and other drugs is the patient currently taking for this illness or other illnesses? Answer: No
- What have been the dosages and the duration?
- Have there been any adverse reactions to drugs taken in the past?

c) Previous illnesses and treatment

- Have there been previous episodes of malaria or febrile illnesses and how they were treated? Probe to find out whether the current sickness may be a recrudescence, a new infection or a complication of the previous disease. Answer: No.
- Does the patient have any chronic illnesses? For example, sickle cells disease, diabetes mellitus, HIV/AIDS and other co morbidities. Answer: No
- What current medications is the patient on? For example. ARVs, anti-epileptics, anti-hypertensives, anti-psychotics Answer: None
- Has the patient been admitted previously and why? Answer: No
- Has the patient received a blood transfusion in the past? When? Remember that: Blood transfusion can be a mode of transmission of hepatitis, HIV, and even malaria . Hepatitis and acute HIV infection may resemble clinical malaria. Answer: No

d) Geographical, travel and family social history

- Where have they been? (Travel up-country?) Answer: No travel
- What have they been doing? (Contact with animals?) Answer: No contact with animals
- What has been their type of housing / sleeping arrangements? Answer: No mosquito net
- Have they been near heavy vegetation, water bodies and possible breeding sites for mosquitoes? Answer: No
- How many people live in their home, what do they do, and what is their diet like? Answer: Approximately 9 – 12 people who all work on the farm.
- What is their family history of illness? Illnesses in a close relative or contact may suggest an alternative diagnosis, for example. Parent with HIV/AIDS, meningococcal meningitis, measles, mumps, chicken-pox, tuberculosis. Answer: Patient is unsure of family history of disease

e) Pregnancy

- Establish if a female patient is pregnant or not. If pregnant, establish the trimester, whether patient is on IPT and whether she sleeps under an ITN. ¹ If the patient is between the ages of 15 – 45, it should be assumed that the patient is pregnant. Male patient

Step 2: Conduct a Physical Examination of the Patient

Like the history, a complete physical examination aims at

1. Identifying other possible diagnosis.
2. Assess for complications

a) Record the vital signs

- These include temperature, pulse rate, blood pressure, respiratory rate, level of consciousness (coma score) and hydration status.

b) Assess for danger signs

- Severe pallor of mucous membranes and palms
- Jaundice
- Bleeding tendency: Look for spontaneous bleeding from the gums in the skin sub-conjunctival or prolonged bleeding at venipuncture sites.
- Extreme weakness or prostration: The patient cannot sit or stand without help from others. Young children with prostration will be floppy and unable to feed or drink.

c) Carefully examine the following systems:

Central Nervous system

- Establish the level of consciousness (coma score). Refer to annex for coma score grading scheme.
- Assess the mental status, including confusion, orientation, delirium, agitation, somnolence, hallucinations and psychosis. There may also be coma and subtle/atypical convulsions.

¹ Every woman aged 15-45 years is presumed pregnant until proved otherwise. A pregnant patient is at special risk both from malaria and its treatment

- Is there neck stiffness and Kernig's sign?
- What are their reflexes like?
- Are there any craniopathies etc.

Respiratory system

- What is the respiratory rate and type? For example, deep breathing with acidotic fetor characterised by a sweet smell, or chest indrawing.
- Listen to the breath sounds for air entry, abnormal sounds such as crepitation.

Cardio Vascular System

- Measure the pulse rate, blood pressure, listen to the heart sounds
- Look for signs of congestive cardiac failure
- Shock: The patient presents with a low systolic blood pressure of below 80 mmHg in adults and below 50 mmHg in children, a feeble pulse, and impaired tissue perfusion with cold, clammy skin and peripheral cyanosis. Note that Quinine, lumefantrine, mefloquine and halofantrine have cardiotoxic effects.

Abdomen

- Examine the abdomen and look for; enlargement of the spleen, liver, and kidneys
- Establish areas of tenderness
- Listen to the bowel sounds
- Palpate for the urinary bladder and uterus
- Perform a detailed obstetric examination if necessary.

Step 4: Carry out relevant laboratory investigations in a patient with severe Malaria



Question: What do you think is the objective of carrying out laboratory investigations?

Answer: A complete laboratory examination aims at

- Confirming the diagnosis and establishing the severity of malaria and its complications.
- To guide the selection of appropriate treatment for example blood grouping, Hb estimation etc.
- To monitor progress.
- To identify other diagnoses

You should make an effort to investigate every patient suspected of severe malaria.

The following are among the investigations you should request for:

Essential Laboratory investigations

- Thick blood film or RDT and thin blood film for malaria parasites². The thick smear or RDT is for screening for the malaria parasites and the thin film is for typing the plasmodium.
- Blood glucose determination is necessary in any patient with altered consciousness, confusion or convulsions.
- Hemoglobin level (Hb) and packed cell volume (PCV) estimation should be done in all patients suspected of having severe anaemia.
- Lumbar puncture to exclude meningitis. The diagnosis of cerebral malaria requires amongst other things the exclusion of other causes of coma like meningitis which can best be done by doing a lumbar puncture. A clear cerebrospinal fluid does not rule out meningitis since fluid may look clear with up to 300 cells/mm³. Remember that a lumbar puncture may be contraindicated if the following are present:
 - Sepsis at the site of the puncture
 - Symptoms and signs of increased intracranial pressure such as vomiting without nausea (projectile vomiting) or papilloedema (seen on fundoscopy)
 - The patient is deeply unconscious and has a weak or very irregular breathing.

In these patients the clinician should simply go ahead and treat on clinical grounds and plan to do the lumbar puncture later when the patient has stabilized

Other laboratory investigations if possible

These are not essential to management, but if available may be helpful or of prognostic usefulness.

- Plasma creatinine; (urea is an alternative, but there is no need to measure both, as creatinine is more useful).
- Electrolytes may occasionally show a correctable abnormality such as hyponatraemia. Both creatinine and electrolytes are of most value when acute renal failure threatens or develops.
- Blood culture, because septicaemia may complicate severe falciparum malaria and cause shock or unresolving fever.
- Full blood cell count and differential white cell count may indicate the possibility of an additional diagnosis, for example. leucocytosis for pyogenic infections, leucopenia for typhoid and viral diseases, profound thrombocytopenia for disseminated intravascular coagulation, etc.
- Blood gases, pH and anion gap help to identify acidosis and adult respiratory distress syndrome (ARDS). The main electrolytes routinely measured in plasma are sodium ions (Na⁺), chloride ions (Cl⁻), potassium ions (K⁺), and bicarbonate ions (HCO₃⁻). The sum of the measured cations (Na⁺ and K⁺) normally exceeds that of the measured anions by about 14 mmol/l (reference range 10 to 18 mmol/l). This difference is known as "anion gap" and is attributable largely to negatively

² For complete reference on how to prepare thick and thin blood films, staining techniques and examination of blood films for malaria parasites: *Basic Malaria Microscopy, Part I: Learner's Guide, Part II: Tutor's Guide, Geneva, World Health Organization, 1994.*

charged proteins but also to phosphate, sulphate, and some organic acids. Calculation of the anion gap is principally of value in the differential diagnosis of metabolic acidosis and in following the progress of therapy. Acidosis is an indicator of severe disease, in both conscious and unconscious patients.

- Chest X-ray may identify pneumonia, pulmonary oedema, adult respiratory distress syndrome and other cardiorespiratory abnormalities
- Plasma and cerebrospinal fluid lactate concentrations are raised in lactic acidosis. High levels (>6 mmol/litre or above) are associated with a poor prognosis.
- Liver function tests may be useful in distinguishing severe malaria from acute hepatitis.
- HIV serology and viral studies may be done to rule out acute HIV infection and viral encephalopathies.
- Haematological tests to rule out haemoglobinopathies like sickle cell anaemia, G6PD deficiency and coagulation profiles to rule out coagulatory disorders.
- Radio-imaging studies like abdominal ultrasound, echocardiography.



Question: Do you need to repeat investigations during management?

Answer: It depends on the type of investigation.

- Some investigations will be equally, or more, valuable if repeated during the course of treatment, according to clinical indications, for example. Blood glucose for deepening coma or convulsions, creatinine and electrolytes if renal failure is suspected, or chest X-ray for possible pulmonary oedema.
- Some tests nearly always need repeating at intervals for example. Blood films and packed cell volume (PCV) or haemoglobin concentration.
- Emphasize: Parasitaemia usually remains positive for the first 12 - 24 hours of treatment even if drugs are fully effective and then it falls.

Investigations during management

Some investigations will be equally, or more, valuable if repeated during the course of treatment, according to clinical indications. For example, blood glucose for deepening coma or convulsions, creatinine and electrolytes if renal failure is suspected, or chest X-ray for possible pulmonary oedema. Some tests nearly always need repeating at intervals for example. blood films and packed cell volume (PCV) or haemoglobin concentration. Repeat investigations should also use the judgement of the clinician. Often, repeat investigations will not be needed if the patient's status is improving.



Summary:

- Start the patient on specific antimalarial treatment for severe malaria without delay as you await the blood smear or RDT results.
- Proceed through a thorough diagnosis. Use the checklist above. Carry out the appropriate laboratory investigations
- Diagnose the complications of severe malaria – they are often what will kill the patient

Part 2: Treatment and Management of a Patient with Severe Malaria

In this section, we shall learn about the principles of management of severe malaria. Management of severe malaria is a team effort and involves the clinicians, nurses, pharmacists/dispensers, laboratory staff and the administration.

We shall next discuss the management of severe malaria along the following sub sections:

1. Priority Triage
2. Antimalarial chemotherapy
3. Management of complications
4. Regular Monitoring
5. Continual treatment

2.1 Triage

- Triage is the process of rapidly sorting ill patients in priority groups depending on severity of illness and need for attention.
- This is the first thing you do when patients arrive at any health facility.
- Many deaths can be prevented if very sick patients and often children are identified soon after their arrival and management started immediately.
- Before registration of a patient, you as a trained health worker should be able to categorize the patient according to the severity of the illness. The patient is provided with a coloured card or the medical form is marked using a coloured pen according to the following three colour categories:
 - **Category 1:** Emergency cases. These are critically ill patients who require emergency resuscitation. For example all patients with any danger sign will be in this category. These patients should be identified by a **red colour code**
 - **Category 2:** Priority cases. The patients in this category present with priority signs that require some specific treatment but are not necessarily an emergency. These should be assigned the **Blue colour code**
 - **Category 3:** Non-urgent cases. The patients in this category present with neither of the above signs. These patients are Non-urgent cases and could be assigned the **Green colour code**.

Most of the severe malaria patients will fall in Category 1

Emergency and priority signs in severe malaria

Emergency signs (Red Code)	Priority signs (Blue Code)
<ul style="list-style-type: none"> - Obstructed breathing , - Central cyanosis - Severe respiratory distress - Rapid weak pulse - Cold and blue hands (cold extremities) - Feet capillary refill more than 3 seconds - Lethargy or unconsciousness - Sunken eyes - Very slow skin pinch - Convulsions now - Severe anaemia (severe pallor of palms and mucous membranes) 	<ul style="list-style-type: none"> - General danger signs <ul style="list-style-type: none"> • Convulsions or fits in the last 2 days • Not able to drink or breast feed • Vomiting everything • Altered mental state (lethargy, drowsiness or confusion) • Prostration or extreme weakness (unable to stand or sit without support) • Respiratory distress • Dehydration (coated tongue, lethargy, inability to drink) • Severe malnutrition • A sick young infant (less than 2 months) - Cases that have been assessed and referred from another health facility. - Temp. (very hot) - Trauma - Poisoning - Restless - Burns - Oedema of both feet

2.2 Treating using Antimalarial chemotherapy in severe malaria

In this sub-section, we shall learn about the drugs you should use in the management of severe malaria.



Question: What is the first line antimalarial treatment for severe malaria? Is it:
a) Quinine
b) Artemether
c) Artesunate

Answer: Artesunate! Quinine is no longer the first line treatment for severe malaria. Quinine and Artemether are the alternatives to be used when Artesunate is not available.

Specifically, we shall learn about the following:

Parenteral Artesunate as the recommended drug of choice for the treatment of severe malaria.

- Parenteral Quinine or Artemether as the alternatives to be used when Artesunate is not available.



Parenteral artesunate is the recommended drug of choice for the treatment of severe malaria in adults and children. Intravenous injection is the preferred route of administration:

- *Publication of the AQUAMAT and SEAQUAMAT trials has provided sufficient evidence to recommend artesunate in preference to quinine or artemether. Both were large randomized controlled trials that showed a significant mortality reduction (22.5% and 34.7%, respectively) when compared to quinine.*
- *The studies also showed the incidence of convulsions, coma, and hypoglycaemia developing after hospitalization was also significantly reduced.*
- *Additionally, Artesunate offers a number of programmatic advantages over quinine in terms of not requiring rate-controlled infusion or cardiac monitoring and takes a shorter time for health workers to administer*

ARTESUNATE INJECTION FOR SEVERE MALARIA

How do you administer parenteral artesunate?

WHO RECOMMENDED TREATMENT

PRODUCT DESCRIPTION
 Artesunate powder, 3 different strengths (30mg, 60mg or 120mg);
 1 ampoule sodium bicarbonate, 1 ampoule saline solution.
Dose: 2.4 mg/kg
 Can be given by Intravenous route (IV) or Intramuscular route (IM)

5 CHECK DOSE
 Use IV route.
 Only use IM route if IV route is not feasible.
For children less than 14 kg
 Dilute to 10mg artesunate per mL for IM and IV

Intravenous route (IV: 10mg/mL)		Intramuscular route (IM: 10 mg/mL)	
Weight	Dose	Weight	Dose
kg	mL	kg	mL
<5	15	<5	15
5-7	20	5-7	20
8-9	25	8-9	25
10-11	30	10-11	30
12-13	35	12-13	35

Intravenous route (IV: 10mg/mL)		Intramuscular route (IM: 20 mg/mL)	
Weight	Dose	Weight	Dose
kg	mL	kg	mL
14-17	40	14-17	40
18-21	50	18-21	50
22-25	60	22-25	60
26-29	70	26-29	70
30-33	80	30-33	80
34-37	90	34-37	90
38-41	100	38-41	100
42-45	110	42-45	110
46-49	120	46-49	120
50-53	130	50-53	130
54-57	140	54-57	140
58-61	150	58-61	150
62-65	160	62-65	160
66-69	170	66-69	170
70-73	180	70-73	180
74-77	190	74-77	190
78-81	200	78-81	200
82-85	210	82-85	210
86-89	220	86-89	220
90-93	230	90-93	230
94-97	240	94-97	240
98-101	250	98-101	250

* lower strength vial reduces wastage

Strength	Weight less than 12 kg	13-25 kg	26-37 kg	38-50 kg	51-62 kg	63-75 kg	76-87 kg	88-100 kg
30 mg	1	2	3	4	5	6	7	8
60 mg	1*	1	2	2	3	3	4	4
120 mg	1*	1	1	1	2	2	2	2

1 WEIGH THE PATIENT

2 CHECK VIALS NEEDED

3 RECONSTITUTE
 Artesunate powder + bicarbonate ampoule

1 Inject contents of bicarbonate ampoule into artesunate vial.

2 Shake gently until dissolved. Solution will be cloudy.

3 Shake gently until dissolved. Solution will be cloudy.

4 The reconstituted solution will be clear in about a minute.

IMPORTANT

- Follow sterile procedures for all steps.
- Reconstitute the correct number of vials needed.
- Use full content of bicarbonate vial.
- Do not shake too vigorously.
- Reconstitute immediately before use.
- Label with date and time.
- Discard if solution does not clear.

4 DILUTE
 Reconstituted artesunate + saline solution (or dextrose 5%)

5 Check table below for volume of saline required for dilution of one vial.

Strength	IV	IM
30 mg	2.5 mL	1 mL
60 mg	5 mL	2 mL
120 mg	10 mL	4 mL

Concentration 10mg/mL (20mg/mL)

6 Inject required volume of saline into the reconstituted solution.

7 Artesunate solution is now ready for use.

IMPORTANT

- Don't forget to withdraw air from vial before injecting saline solution.

6 ADMINISTER
 Withdraw the required dose (mL) from the prepared vial(s) and inject.

Intravenous route (IV)
 Use 3-4 mLs per minute.

Intramuscular route (IM)
 Use a different site for each dose greater than 3-5 mLs.

IMPORTANT

- Prepare the correct size syringe to withdraw the correct mLs from the vial/vials.
- Double check dose required (mLs) for patient's weight (kg) before injecting.
- Inject immediately after preparation.
- Discard any solution not used within 1 hour.
- Prepare a fresh solution for each administration.

7 DOSING SCHEDULE

IMPORTANT

Give a minimum 3 parenteral doses even if the patient can take oral medication:

- On admission, time = 0 hrs, then at 12 hrs and 24 hrs.
- After 3 parenteral doses:
 - If the patient cannot take oral medication, continue with parenteral treatment every 24hrs, for a maximum of 7 days, until oral medication can be given.
 - If the patient can take oral medication, prescribe a full 3-day course of oral Artemisinin Combination Therapy (ACT).
- Evaluate the patients' progress regularly.

For patient more than 101 kg

Example for (IV) for a 105 kg patient:

105 kg = 100 kg + 5 kg	
100 Kg = 250 mg	25 mL
+ 5 Kg = 20 mg	2 mL
105 Kg = 270 mg	27 mL



Parenteral Artesunate as the recommended drug of choice for the treatment of severe malaria.

- How to use artesunate for intravenous (IV) injection:
 - 1) Each vial of 60mg injectable artesunate must be reconstituted with 1 ml of sodium bicarbonate which is supplied together with the vial of artesunate. Shake 2-3 minutes until solution is completely dissolved and clear.
 - 2) Dilute with 5ml of 5% dextrose solution or water for injection.
 - 3) Dose = 2.4 mg/kg body weight, or 0.24 ml/kg body weight (round up to nearest ml)
 - 4) Withdraw into syringe and inject intravenously over 5 minutes

Note: The solution should be prepared freshly for each administration and should not be stored.

How to use artesunate for intramuscular (IM) injection – *Only if the IV route is not feasible:*

- 1) Each vial of 60mg injectable artesunate must be reconstituted with 1 ml of sodium bicarbonate which is supplied together with the vial of artesunate. Shake 2-3 minutes until solution is completely dissolved and clear.
 - 2) Dilute with 2ml of 5% dextrose solution or water for injection.
 - 3) Dose = 2.4 mg/kg body weight, or 0.12 ml/kg body weight (round up to nearest ml)
 - 4) Withdraw into syringe and inject slowly. Should be injected into the upper, outer quarter of the anterior of the thigh. Do not inject artesunate into the buttocks!
- The solution should be prepared freshly for each administration and should not be stored.

Dosing schedule

- Artesunate 2.4mg/kg Intravenous (IV) is given on admission (time =0), then at 12hr and 24hr, then once a day until patient is able to take oral medication. When patient is able to take oral medication, complete the treatment by giving a full course of the first line treatment for uncomplicated Malaria (currently Artemether/Lumefantrine).

Artesunate 2.4mg/kg Intravenous (IV) is given (0 hr,12 hr,24 hr):

- 1) On admission (time = 0),
 - 2) Then twelve hours later (time = 12)
 - 3) Then 24hr after first dose (time = 24)
- There should be an interval of at least 8 hours between the last dose of artesunate and the first dose of Artemether/lumefantrine.

Using parenteral Quinine or Artemether as the alternatives to be used when Artesunate is not available

Step 1: Give the first dose

- Quinine dihydrochloride 10 mg salt/kg of body weight (initial dose) diluted in 10 ml/kg body weight of isotonic fluid given by IV infusion over 4 hours.

Step 2: Provide Continuation dose

- Then 8 hours after the start of the initial dose, give a maintenance dose of quinine, 10 mg salt/kg of body weight over 4 hours. This maintenance dose should be repeated every 8 hours, from the beginning of the previous infusion, until the patient can tolerate oral treatment. The isotonic fluids which may be used include: 5% dextrose, and Normal Saline (0.9% Sodium Chloride).

Step 3: Complete treatment by giving quinine tablets

- Then complete the treatment by giving quinine tablets, 10 mg salt/kg of body weight 8-hourly to complete a 7-day course of treatment from the start of the first infusion of quinine.
- Alternatively, you may complete the treatment by giving a full course of the first line treatment used for uncomplicated Malaria (currently Artemether/ Lumefantrine). There should be an interval of at least 8 hours between the last dose of quinine and the first dose of Artemether/Lumefantrine.



A loading dose of Quinine is not recommended in Uganda because:

- *The outcome of treatment with Quinine is the same with or without the loading dose.*
- *Giving a loading dose may increase the risk of cardio toxicity in patients especially those who have taken medicines and herbal remedies that may be related to quinine.*
- *In children, it is not recommended to put all three doses in the same bottle of fluids.*

- If IV infusion is not possible, quinine can be given by the IM route. Quinine dihydrochloride can be given in the same dosages by IM injection in the anterior thigh (not in the buttock). If the total volume of solution to be injected is more than 3 ml, divide it in two and inject one half in each thigh. For IM use, quinine should be diluted as described in the box below.
- Do not inject Quinine into the buttocks. This is to avoid potential injury to the sciatic nerve that may lead to prolonged pain and paralysis of the lower limb.

Dilution of Quinine for I.M. injection

- A 2ml ampoule of Quinine contains 600mg of quinine (300mg/ml). Add twice the volume of water for injection or normal saline (4ml) to get 600mg of quinine in 6 ml of solution. Each ml of the solution will contain 100 mg of Quinine
- Calculate the volume (ml) of the diluted quinine needed (you require 0.1ml/kg). The dose of the diluted quinine required = 0.1ml x body weight in Kg
- If the total solution to be injected is more than 3 ml, split the volume in two and inject one half in each thigh. Do not inject into the buttock!

Contraindications to the use of quinine

- Quinine should be used with caution in patients with G6PD deficiency, hypotension, cardiac disorders (for example. atrial fibrillation, heart block, and conduction defects). Quinine should also be used with caution in patients with hearing defects.
- Quinine is contraindicated in patients with haemoglobinuria, optic neuritis, and myasthenia gravis
- Avoid concurrent use of quinine with Artemether/lumefantrine or mefloquine. There should be an interval of at least 8 hours between the last dose of quinine and the first dose of Artemether/lumefantrine.

The use of Artemether

- Artemether injection is always given by the IM route.

Step 1: Provide the loading dose

- 3.2 mg/kg

Step 2: Provide the maintenance dose

- Maintenance dose at 1.6 mg/kg once everyday till the patient is able to tolerate oral treatment.

Step 3: Complete treatment with A/L

- Then complete the course of treatment by giving the full course of the first line antimalarial used for uncomplicated malaria (currently AL)

2.3 Management of complications of severe malaria

It is important to note that the complications present higher risk of death, and as a result, it is important to manage the complication immediately.

General treatment

For every patient you diagnose as having severe malaria, you should do the following:

1. Start immediate resuscitation measures using the ABCD (Airway, Breathing, Circulation, Drugs) procedure.
2. Position the patient in the left lateral position if unconscious.
3. Establish I.V access, if possible, for rehydration and administration of drugs.
4. Take the necessary blood samples for investigations
5. Manage immediate complications appropriately
6. Start definitive treatment for severe malaria



Take the patient's weight to guide correct dosing with antimalarials and other medicines.

7. Ensure proper nursing care;
 - Keep the patient warm,
 - Correctly position if unconscious and turn regularly to prevent bed sores.
 - Monitor and record the vital signs, fluid input and output, level of consciousness and convulsions.
 - Insert NG tube for feeding and administration of drugs
 - Timely and safe administration of drugs

- Ensure appropriate bladder care and general body hygiene
- Report any changes in the vital signs or general condition of the patient.

2.4 Treatment of specific complications of severe malaria



Question: A patient has severe malaria with signs and symptoms of low blood sugar (less than 40 mg/dl (2.2 mmol/L)). How do you treat this patient?

Answer:

Correct hypoglycaemia.

- Give 2 mls per Kg of 25% dextrose IV slowly over 3-5 minutes (as a bolus) OR
- Give 5 mls per kg of 10% dextrose by slow IV infusion over 5 – 7 minutes.
- If 25% is not available, mix 1 ml of 50% dextrose diluted with an equal volume of normal saline or water for injection to get 25% dextrose. If 10% dextrose is not available, mix 1 ml of 50% dextrose into 4 ml of normal saline or water for injection
- Avoid giving 50% dextrose undiluted due to the risk of thrombophlebitis
- If unable to give I.V dextrose prepare a sugar solution and give it orally if conscious or by Naso-gastric (NG) tube if unconscious.
- Re-check blood glucose 2-4 hourly during the course of treatment, particularly in the comatose patient.
- In case the patient presented with coma and there is no improvement after treatment in 20 minutes, consider another cause.
- NB. 5% dextrose should not be used for correction of hypoglycaemia due to the small proportion of glucose to the overall volume that can lead to fluid overload.

Note: if a patient is in coma, assume there is hypoglycaemia and treat accordingly as above.

Hypoglycaemia:

Correct hypoglycaemia if it is present. If a patient is in coma, assume there is hypoglycaemia and treat accordingly by any of the following in order of priority.

- Give 2 mls per Kg of 25% dextrose IV slowly over 3-5 minutes (as a bolus) OR
- Give 5 mls per kg of 10% dextrose by slow IV infusion over 5 – 7 minutes.
- If 25% is not available, mix 1 ml of 50% dextrose diluted with an equal volume of normal saline or water for injection to get 25% dextrose. If 10% dextrose is not available, mix 1 ml of 50% dextrose into 4 ml of normal saline or water for injection
- Avoid giving 50% dextrose undiluted due to the risk of thrombophlebitis and rebound hypoglycaemia
- If unable to give I.V dextrose prepare a sugar solution and give it orally if conscious or by Naso-gastric (NG) tube if unconscious.

- Re-check blood glucose 2-4 hourly during the course of treatment, particularly in the comatose patient.
- In case the patient presented with coma and there is no improvement after treatment in 20 minutes, consider another cause.
- NB. 5% dextrose should not be used for correction of hypoglycaemia due to the small proportion of glucose to the overall volume that can lead to fluid overload.
- Continue to monitor patient 4-6 hourly.
- Leave the IV line running with 5% Dextrose.

Note: if a patient is in coma, assume there is hypoglycaemia and treat accordingly as above.



Question: If a severe malaria patient has severe pallor, how do you treat the anemia?

Answer: If PCV is below 15% or Hb is below 5g/dL, the patient has severe anaemia and give whole blood transfusion or packed cells.

Question: How much blood do you infuse?

Answer: The amount of blood to transfuse is usually 20ml/kg body weight of whole blood or 10 ml/kg of packed cells.

Severe Anaemia:

- If PCV is below 15% or Hb is below 5g/dL, the patient has severe anaemia and give whole blood transfusion or packed cells. Transfuse in 2 hours.
- If the parasitaemia is so high that you can predict a critical drop in haemoglobin level, give blood transfusion even when the Hb is between 5 – 7 g/dL.
- The amount of blood to transfuse is usually 20ml/kg body weight of whole blood or 10 ml/kg of packed cells.
- In cases of scarcity of blood, transfuse only those children with severe Malaria and: - HB is 4g/dl or below, HB between 4 and 5g/dl with cardiac failure and hyperparasitaemia. Indications for transfusion in adults with Malaria:
 - Hb Less than 6g/dl with hyperparasitaemia
 - Any Hb level with heart failure secondary to anaemia
 - Hb level of less than 5 g/dl with any complication of severe Malaria (for example. Algid Malaria, hypoglycaemia, cerebral malaria, pulmonary oedema, shock)
 - URGENTLY refer all patients with severe anaemia where there are no adequate facilities. Give appropriate pre-referral treatment before referral.

Convulsions:

- Ensure safety
- Quickly assess ABCD (start oxygen as appropriate)
- Give intravenous injection of Diazepam slowly over 1 minute; 0.2mg/kg of body weight OR rectal diazepam 0.5mg/kg. Repeat the dose if convulsions have not stopped after 10 mins.

- Don't give more than three doses of diazepam within 24 hours because of the danger of respiratory suppression. So for all patients on diazepam monitor the breathing carefully.
- If convulsions persists, other anticonvulsants than can be used in order of preference are
 - Phenobarbitone: 15mg/kg given slowly I.V. as a loading dose OR



For any convulsions, always look for associated factors like hypoglycaemia, and hyperpyrexia and treat accordingly.



Also remember to investigate and treat for the underlying causes like hypoxia, cerebral malaria and infections such as meningitis, viral encephalitis etc.

Coma:

Ensure that the airway is clear, the patient is breathing and that the circulation is normal (ABC).



Question: Sometimes, a patient with severe malaria will be in a coma. What are the eight steps you take to treat this complication?

1. Ensure that the airway is clear, the patient is breathing and that the circulation is normal.
2. Establish an intravenous line.
3. Give a bolus of 2 mls per Kg of 25% dextrose IV slowly over 3-5 minutes (as a bolus). ;
4. insert a naso-gastric tube for feeding and administration of drugs
5. administer appropriate drugs (for example. IV artesunate)
6. In adults insert a urinary catheter to monitor fluid output,
7. Turn the patient every 2hours and keep the body clean and dry.
8. Nurse in left lateral position.

Shock:

- Correct haemodynamic disturbances using intravenous fluids.
- Give intravenous normal saline if there is hypovolemia (low systolic BP below 80mmHg in adults, below 50mmHg in children with thin thready pulse and cold clammy extremities). If normal saline is not available ringer's lactate can be used.
- Dose: Give a bolus of 20ml/kg slowly over 15 minutes, then reassess. You can give up to 3 doses.
- Shock due to malaria commonly known as algid malaria may also be associated with a gram-negative septicaemia. Therefore also start antibiotic therapy.



Question: How do you treat dehydration in a patient with severe malaria?

Answer: Rehydrate the patient using Ringer's Lactate or normal saline or half strength Darrows according to the fluid deficit. Assess the hydration status of the patient in order to determine the appropriate type, and amount of fluids to give.

1. For Children 2-12 months with severe dehydration give 30ml/kg in the first 1 hour then 70 ml/kg in the next 5 hours.
2. For children older than 12 months and adults give 30 ml/kg in the first ½ hour then 70 ml/kg in

the next 2½ hours.

3. Keep monitoring the hydration status and act accordingly.



Over enthusiastic IV infusion may be harmful to the patient and lead to fluid overload and pulmonary oedema and death.



Question: How do you treat acidosis?

Answer:

- Severe metabolic acidosis may benefit from resuscitation with bolus of intravenous fluid like normal saline. If IV access cannot be achieved, use a nasogastric (NG) tube.
- Oxygen is often required;
- sodium bicarbonate is given if serum lactate is high
- It is important to exclude hypoglycaemia, hypovolaemia and septicaemia.

Aspiration pneumonia:

- Aspiration pneumonia is often associated with coma. If aspiration occurs, clear the airway by suction, position the patient in the left lateral position, give oxygen if necessary and cover with broad spectrum antibiotics.

Pulmonary oedema:

- Prop up the patient in bed at 45°. Give oxygen and a diuretic such as Frusemide 1-2 mg/kg/24hours in 3 divided doses. Restrict I.V fluids.



Question: A patient with severe malaria also has High grade fever (Temp > 38.5. How do you treat it?

Answer: Give Paracetamol 10/kg 6hourly for 24 hours, remove the patient's clothes and tepid sponge with lukewarm (tepid) water.

Haemoglobinuria:

- Rehydrate patients with haemoglobinuria, to avoid the accumulation of haemoglobin in the renal tubules, which may lead to acute renal failure.

- Certain drugs such as Quinine and primaquine trigger off massive haemolysis in patients with glucose 6 phosphate dehydrogenase (G6PD) deficiency, so they should be avoided. It is therefore important to exclude G6PD deficiency.
- Assess for anaemia and transfuse with blood if necessary.

2.4 Regular Monitoring

The following vital signs should be checked/measured and recorded at short intervals to determine the levels and patterns of the parameters.

Breathing:

- Check the rate or laboured breathing

Temperature:

- If the temperature is above 38.50C, treat accordingly

Pulse rate and volume

- If the pulse is weak and thready, assess the patient for shock and treat with Intravenous Normal saline infusion

Fluid balance (in-put and out-put: vomitus, diarrhoea and urine)

- For oliguria (urine out put <17 mls/hour in adults; < 0.3 mls/kg/hour in children) review adequacy of infusion and hydration and correct the deficit if necessary. Refer to hospital if acute renal failure is present.

Level of consciousness

- If the coma score shows deterioration, check blood glucose to rule out hypoglycaemia, consider other diagnosis such as meningitis.

Convulsions

- Note that subtle convulsions can be easily missed. Convulsions can recur or develop for the first time during treatment. If present manage accordingly.

Blood pressure

- If the systolic BP is below 80 mm Hg in an adult or below 50 mmHg in a child, the patient is considered to be in shock.

Spontaneous haemorrhage.

- This is demonstrated by prolonged bleeding from vein puncture sites. It is usually due to disseminated intravascular coagulation (DIC). Cross match the blood and give fresh whole blood transfusion or if available, platelet infusion.

Laboratory investigations including blood glucose, haemoglobin and parasitemia

- If the blood glucose falls below 2.2 mmol/L or 40 mg/dL, correct hypoglycaemia.
- If PCV is below 15% or Hb is below 5g/dL, transfuse.
- If parasitaemia** remains positive for 2-3 days, review the adequacy of antimalarial drug and dosage, consider an alternative.

Ability to drink, eat, talk, sit, stand and walk

- Prostration (inability to drink, eat, talk, sit, stand and walk) is a sign of severe illness and calls for urgent treatment and closer monitoring

2.5 Continuing treatment

Some of the important observations during treatment and their implications are shown in the following table.

Important observations during treatment and their implications

	Regular observations	Possible abnormality	Appropriate actions
	A. Clinical		
1.	Coma score	Deterioration	Check blood glucose to rule out hypoglycaemia. Consider other diagnoses such as meningitis.
2.	Breathing	Increased rate or difficulty Deep breathing in children	Review urine output and fluid balance to rule out fluid overload. Examine lung, heart and liver to rule out pulmonary oedema, heart failure, aspiration pneumonia and acidosis and treat appropriately. Chest X-ray if available.
3.	Axillary temperature	>38.5°C	Give paracetamol (rectal or oral) if not given within the past 4 hours. Do tepid sponging
		If temperature remains high or rises despite 24 hours of adequate antimalarial therapy	Reconsider your diagnosis, while continuing treatment

	Regular observations	Possible abnormality	Appropriate actions
4.	Blood pressure	Falls: <80 mm Hg systolic in an adult, or <50 mm Hg in infants and children. In children, BP is not always reliable: check for reduced peripheral perfusion, i.e. delayed capillary (nail bed) refill time to more than 3 seconds.	Review fluid balance, urine output, quinine infusion rate (if being administered) and haematocrit. Give saline infusion (i.e. if hypovolaemic). Look for haemorrhage. Take blood for bacteriological culture if facilities are available. Give broad spectrum antibiotic for possible sepsis.
5.	Fluid balance (use input and output chart); Especially in patients with pulmonary oedema and/or acute renal failure	Oliguria: <17 ml/hour in an adult (< 400 ml in 24 hours) or <0.5 ml/kg/hour in children	Review adequacy of hydration and infusion. Correct deficit if necessary. Prevent or manage acute renal failure if present.
6.	Convulsions (Subtle convulsions can be easily missed)	These can recur, or develop for the first time during treatment. They may be due to malaria, to high fever, abnormal blood glucose levels, electrolyte imbalance, or be part of the disease spectrum Often convulsions are accompanied by reduced levels of consciousness.	Check axillary temperature and if >38.5°C, manage as above. Check blood glucose to rule out hypoglycaemia Check, fluid balance Check electrolytes if possible. There is a risk of hyponatraemia. Correct any cause and give anticonvulsant medicine.
7.	Prolonged bleeding from vein puncture sites or spontaneous haemorrhage	Disseminated intravascular coagulation (DIC) Bleeding time greater than 7 minutes	Cross match blood. Give whole fresh blood or platelet infusion.

	Regular observations	Possible abnormality	Appropriate actions
B. Laboratory			
1.	Blood glucose ³	Hypoglycaemia. Blood glucose falls below 2.2 mmol/l (40 mg/dl)	Review infusion. A child will become hypoglycaemic if deprived of glucose for more than 12-24 hours. Correct hypoglycaemia
2.	Packed cell volume or haemoglobin concentration ⁴	PCV <15% Hb < 5 g/dl	Consider need for transfusion. Group and cross-match blood but give only if clinically indicated. Repeat PCV or Hb at regular intervals.
3.	Parasitaemia	Remains high for 2-3 days, or remains positive for > 5 days.	Review adequacy of antimalarial medicine and dosage. Consider alternative or give an additional medicine.

2.6 Management of severe malaria in pregnancy – refer to Session 7: Management of Malaria in Pregnancy



Summary:

- Intravenous Artesunate (IV AS) is the preferred treatment for severe malaria. If IV AS is not available, then use IV or IM quinine. Remember, dosages are different than quinine. When the patient can tolerate oral medication, finish treatment with A/L.
- Treat the complications of Severe Malaria – they are often the reason for death
- Continue to regularly monitor the patient

³ 18 mg = 1 mmol/L

⁴ PCV = Hb x 3

Part 3: Follow up of Patients with Severe Malaria (Time = 30 minutes)

3.1 Management of Follow Up

It is important to follow up patients who have recovered from severe malaria to assess for possible sequelae of the disease or the treatment. About 5% of adults and 10% of children who survive cerebral Malaria have neurological and cognitive sequelae. Most of the neurological sequelae are transient and resolve after 6 months. You should therefore have a follow up plan to review these patients. Follow up is recommended as follows: day 7, day 14, day 28 and then monthly for six months after discharge.

All follow ups:

Perform a neurological examination.

- Assess the patient's functional capacity to hold and use objects, ability to feed, gait and posture. (NB assess whether the patient was able to do these previously)
- Assess vision and hearing

Refer to appropriate specialists such as the physiotherapists and other therapists, ear nose and throat (ENT) surgeons, neurologists and neuropsychiatrists, ophthalmologists) for further management where necessary.

Follow up at day 7 and 14, and 28:

- 1) Repeat packed cell (PCV) and blood films

3.2 What do you do when there are inadequate resources to manage severe malaria?

You may find yourself in a health facility that has limited resources for managing a patient with severe malaria. You should give pre-referral treatment and immediately refer the patient to a health facility with the necessary resources.

Provide pre referral treatment

- Control temperature by undressing, tepid sponging and giving Paracetamol.
- Control convulsions if present
- Give Dextrose to any patient who has had convulsions or is drowsy. Where dextrose is not available, prepare sugar and water by mixing 20 gm of sugar (equivalent to 4-level tea spoons) with 200 ml of clean and safedinking water. Give 50 ml of this solution orally or by nasogastric tube if the patient is unconscious.
- Insert 10 mg/kg body weight of artesunate suppository (rectal artesunate) up to a maximum dose of 200 mg. In the event that the suppository is expelled within 30 minutes of insertion, a second suppository should be inserted and, especially in young children, the buttocks should be held together for 10 minutes to ensure retention of the rectal dose of artesunate.
- You may also give 10 mg/kg body weight quinine I.M. after dilution if artesunate suppositories are not available. Give the patient oral fluids if she/he is dehydrated and if necessary, give oral fluids through a nasogastric tube.
- Counsel the patient or caretaker on the need for referral;
- Write a referral note stating the treatment given and the time.



The following are not recommended for treatment of a patient with severe malaria:

- ***Corticosteroids***
Other anti inflammatory agents.
- ***Other agents given for cerebral oedema (urea, invert sugar)***
Low molecular weight dextran
- ***Adrenaline (Epinephrine)***
Heparin
- ***Hyperbaric oxygen***



Common errors in management of severe Malaria:

- ***Delayed resuscitation***
- ***Failure or delay to refer a patient who needs referral.***
- ***Inadequate nursing care.***
- ***Failure to pass a naso-gastric tube when needed.***
- ***Failure to recognise and control minor convulsions.***
- ***Delay in starting antimalarials***
- ***Unjustified withholding of the antimalarial medicines.***
- ***Incorrect calculations of the dosages.***
- ***Inappropriate route of administration.***
- ***Failure to elicit a history of recent chemotherapy.***
- ***Failure to identify and treat hypoglycaemia.***
- ***Failure to identify and treat metabolic acidosis.***
- ***Failure to switch patients from parenteral to oral therapy as soon as they can take orally.***
- ***Failure to recognise and treat severe anaemia.***
- ***Use of potentially dangerous therapies.***
- ***Failure to cover with antibiotics where it is indicated***

Summary:

- Ensure adequate follow up with the patient. The patient should be followed up with at day 7, day 14, day 28 and then monthly for six months after discharge.
- If your facility cannot treat Severe Malaria, please provide pre-referral treatment. The preferred pre-referral treatment is rectal artesunate.

Session 7: Management of Malaria in Pregnancy

OBJECTIVES

By the end of this session, you should be able to:

- Outline the effects of malaria on pregnancy
- Explain the ways of preventing malaria in pregnancy
- Describe the treatment of uncomplicated malaria in pregnancy
- Describe the management of severe malaria in pregnancy

Part 1: Effects of Malaria on Pregnancy (Time = 10 minutes)

1.1 Why is 'Malaria in Pregnancy' a Special Topic?

- Malaria and its complications are more common in pregnant women compared to the general population
- Malaria in pregnancy tends to be atypical
- Parasitaemia is ten times higher than in non-pregnant adult women
- Mortality due to malaria is also higher than in the general population
- The primigravida is more susceptible to the complications of malaria

Maternal effects of malaria	Foetal/infant effects of malaria
Anaemia	Intra-uterine growth restriction
Abortion	Pre-term delivery
Cerebral malaria	Intrauterine foetal death
Other forms of severe malaria	Congenital malaria (very rare)
Increased risk of maternal death	Low birth weight
	Anaemia of the baby
	Growth retardation



Summary:

We have come to the end of our session on the effects of malaria on pregnancy. It is important to test for malaria in pregnant woman because malaria and its complications are much more common in pregnant women – parasitaemia is ten times higher and mortality is also higher than in the general population.

There are many dangerous effects of malaria on both the mother and fetus/infant.

Part 2: Prevention of Malaria in Pregnancy



Question: What are the two major ways to prevent malaria in pregnancy?

Answer: The two major ways are:

1. The provision of intermittent preventive treatment (IPT)
2. Every woman should sleep under an insecticide treated mosquito net

2.1 Intermittent Preventive Treatment (IPT)

- This treatment is given to pregnant women starting in the second trimester of pregnancy.
- Currently the treatment involves giving two doses of Sulfadoxine + Pyrimethamine (SP/Fansidar) one month apart starting in the second trimester.
- There are some important things to note about IPT treatment
 - Health workers should ensure that IPT is given as directly observed therapy
 - For pregnant women who are HIV positive and are not on spetrin prophylaxis (cotrimoxazole), three doses of SP are recommended
 - Patients who for one reason or another cannot take SP are advised to use mosquito nets consistently and to seek malaria treatment promptly as soon as they fall sick with fever.

2.2 Insecticide Treated Mosquito Nets

- ITN's are the backbone of malaria prevention for pregnant mothers.



It is important that the antenatal clinic is insisting that pregnant mothers use ITN's. All health workers should speak to health workers in the ANC at their health facility to make this point.



Summary:

We have come to the end of our session on prevention of malaria in pregnancy. We have learned there are two major ways to prevent malaria in pregnancy. The first is Intermittent Preventive Treatment (IPT), which involves giving two doses of SP starting the second trimester of pregnancy.

The second is the regular use of Insecticide Treated Mosquito Nets (ITNs).

Part 3: Treatment of Uncomplicated Malaria in Pregnancy and Management of Severe Malaria in Pregnancy

3.1 Overview of Treatment of Malaria in Pregnancy

- If a pregnant mother presents with fever, we always need to consider malaria as a possible differential diagnosis. Therefore, all pregnant women with a fever should have a blood smear or RDT done for malaria parasites.
- Cases of severe anaemia in a pregnant mother should be fully investigated to find out the cause of anaemia.
- Pregnant women should be given deworming tablets and haematinics routinely at antenatal clinics.



Quiz: Organize health workers into groups of four people. In each group, the participants need to brainstorm what the differences are between treatment for uncomplicated and severe malaria in pregnant woman vs non pregnant adults.

Answer:

Differences in Treatment of Uncomplicated Malaria. Both *specific treatment* and *supportive treatment* need to be considered.

Part 1 – Specific Treatment

	Uncomplicated Malaria in Pregnancy	Uncomplicated Malaria in adults
1 st Trimester	Quinine tablets	ACT
2 nd and 3 rd Trimester	ACTs like Artemether/Lumefantrine or Quinine Tablets	ACT
Dosing	The doses of ACTs and Quinine during pregnancy are the same as those for adults who are not pregnant.	

Part 2 – Supportive Treatment

- In addition to antimalarial treatment, patients with malaria in pregnancy should be given the usual supportive treatment:
 - Antipyretics and tepid sponging for the relief of fever
 - Fluids and food to prevent dehydration and hypoglycaemia and maintain strength
 - Analgesics for the relief of headache, body aches and joint pains

Differences in Treatment of Severe Malaria.

- Severe malaria in pregnancy is treated with IV Artesunate. Please refer to the severe malaria module (Session 6) for treatment instructions on how to administer IV Artesunate.
- In principle, the management of severe malaria in pregnancy is the same as in other adults. The presentation of severe malaria in pregnancy is the same as severe malaria in all adults.
- Hyperpyrexia (temperature above 39.5°C) is a common cause of intrauterine foetal death and must be lowered promptly. The convulsions in pregnancy are more commonly due to eclampsia but they also occur as a manifestation of severe malaria.
- In addition to the general management, the following should be noted:
 - Pregnant women with severe malaria should be managed in a health facility with capacity for assisted delivery.
 - Malaria may lead to threatened abortion or premature labour despite treatment. It is important to keep monitoring for foetal and maternal distress.
 - Recurrence of hypoglycaemia is more frequent in pregnant women who have presented initially with hypoglycaemia. The blood glucose levels in these individuals should be monitored very frequently especially in the first 24 hours so as to treat it early.
 - Pregnant women with HB less than 7g/dl should receive a slow transfusion of blood (packed cells or whole blood) with 20mg of IV frusemide.

Note: discussions on what should be the first line for treatment of severe malaria in the 1st trimester not conclusive.

Otherwise, benefits versus risks warrant that the mothers safety be taken as a clinical priority.



Summary:

We have come to the end of our session on malaria in pregnancy. We have learned that malaria in pregnancy tends to be common and complicated due to a number of factors. We learned that prevention and control of malaria can be done through prompt and effective case management, ITN use and Intermittent Preventative Therapy (IPT).

We also learned that in uncomplicated malaria, the only difference in treatment of pregnant women and normal adults is that pregnant women in the 1st trimester should get Quinine tablets (pregnant women in the 2nd and 3rd trimesters can get either an ACT or Quinine tablets).

In severe malaria, pregnant women are treated with IV Artesunate just as normal adults are. However, there are a number of complications that pregnant severe malaria patients face that must be considered.

Session 8: Malaria and HIV/AIDS Co-Infection

OBJECTIVES

By the end of this session, you should be able to:

- Explain the significance of malaria and HIV/AIDS interaction
- Explain the effect of HIV/AIDS and malaria co-infection on pregnancy
- Explain the management of patients with malaria and HIV/AIDS co-infection
- Describe the distinctive preventive measures against malaria in an individual with HIV co-infection

REFERENCES AND RECOMMENDED READINGS

- The Integrated National Guidelines on Antiretroviral Therapy, Prevention of Mother to Child Transmission of HIV and Infant & Young Feeding

Part 1: Significance of Malaria and HIV Interaction



Question: Why do we need to study malaria and HIV/AIDS co-infection?

Answer:

- Malaria and HIV/AIDS are both common diseases in Uganda and major causes of morbidity and mortality
- Patients living with HIV/AIDS are more prone to malaria due to the compromised immune system and therefore need special attention by health workers in terms of both treatment and prevention

1.1 Effects of HIV on Malaria

- Malaria infection rates are increased for people living with HIV/AIDS, especially those with low CD4 counts and/or high viral loads.
- HIV positive patients take a longer time to clear parasitaemia
- HIV infection is associated with more severe disease and malaria-related deaths due to severity of disease, incidence of malaria is higher in HIV positive individuals.
- Anti-malarial therapy is less effective in HIV infected patients.
- In pregnant women HIV infection is associated with even more episodes of malaria, higher grades of fever, more severe disease and more adverse birth outcomes across all parities.

- In children, there are also indications that HIV infection leads to increase rates of malaria and parasite density.

1.2 Effects of Malaria on HIV

- During a malaria attack in an HIV infected person there is a risk in acceleration of HIV disease progression and increased risk of HIV transmission to others
- Transient elevation of viral load with malaria infection and thus increase in HIV infection
- Increased viral load increases chances of disease progression to HIV disease

Table 1.1: Effects of HIV on malaria infected persons

	HIV positive	HIV negative
Malaria present	<ul style="list-style-type: none"> • Frequency of episodes above average • More severe attacks • High malaria-related death rates • High risk of HIV transmission • High risk of HIV progression to AIDS • Less response to anti-malarial treatment • Poor pregnancy outcomes 	<ul style="list-style-type: none"> • Average frequency of episodes • Mostly uncomplicated attacks of malaria • Average death rates • Normal response to anti-malarial treatment
Malaria absent	<ul style="list-style-type: none"> • Opportunistic infections are present • More non-malaria related fevers 	<ul style="list-style-type: none"> • Normal person



Summary:

We have come to the end of our session on the significance of malaria and HIV interaction. We learned that patients with HIV/AIDS are more prone to malaria, have more severe attacks and have a lower response to anti-malarial treatment.

Health workers should take extra care when assessing a patient with HIV/AIDS and suspected or confirmed malaria.

Part 2: Effect of Malaria on HIV Positive Pregnant Mothers

2.1 Introduction to Malaria and HIV/AIDS co-infection and Pregnancy

- Pregnant women lose some of their immunity to malaria and are therefore more susceptible to malaria in the first pregnancy and to a lesser extent in their second pregnancy
- Studies have revealed that HIV infected pregnant women are even more susceptible to malaria, anaemia and poor birth outcomes. In HIV infected pregnant mothers:

- Maternal anaemia is more severe
 - Clinical episodes of malaria are more frequent and more severe
 - Birth outcomes are adversely affected
 - Risk of infant death is increased
- The Gravity-related pattern of malaria is altered by HIV/AIDS
 - Without HIV, pregnant women are most at risk of malaria infection in the first and to a lesser extent second pregnancies
 - However, with HIV, all pregnancies (beyond just the first and second) face an increased risk of malaria
- Therefore, women living with HIV need special attention by health workers when they are pregnant

2.2 Prevention of Malaria in Pregnant Women with HIV



Question: What prevention treatments should be offered to pregnant women with HIV to reduce the risk of infection with malaria?

Note to trainer: Emphasize that pregnant women with HIV on Cotrimoxazole should remain on this treatment to reduce the risk of malaria. Only those pregnant women who are not on Cotrimoxazole should receive IPT. All pregnant women (even those that are not HIV positive) should use an Insecticide Treated Net.

Answer:

1. Cotrimoxazole Prophylaxis for pregnant women living with HIV or Intermittent Preventive treatment (IPT) for malaria
2. Insecticide Treated Nets (ITNs)

Cotrimoxazole Prophylaxis

- Cotrimoxazole is used to prevent opportunistic infections in People Living with HIV/AIDS (PLWHA). All HIV infected individuals, regardless of whether they are on ART treatment or not, should be taking Cotrimoxazole.
- HIV positive pregnant women who are on Cotrimoxazole as prophylaxis should continue on this treatment to reduce the risk of infection of malaria. They should not receive Cotrimoxazole and Sulfadoxine/Pyrimethamine (SP) together as there is evidence that this increases the risk of adverse drug reactions.
- HIV positive pregnant women who are not on Cotrimoxazole prophylaxis should receive Intermittent Preventive treatment (IPT) for malaria

Intermittent Preventive treatment (IPT) for malaria

- Mothers who are not infected with HIV receive two doses of Sulfadoxine/Pyrimethamine (SP) for their IPT treatment.
- However, pregnant women infected with HIV require more frequent dosing with SP, preferably monthly but at least three times during pregnancy (starting in the second trimester)
 - Remember this is not required if the woman is on Cotrimoxazole prophylaxis

Insecticide Treated Nets (ITNs)

- All pregnant women, regardless if they are infected with HIV or not, should sleep under an ITN every night

Malaria and Mother-to-Child transmission of HIV

- Overall one in three babies gets infected with HIV through mother to child transmission, either through pregnancy, labour or breastfeeding if no preventive measures are taken. This risk can be increased by malaria.
- It is important to aggressively treat and prevent malaria in pregnant women, especially those living with HIV
 - To reduce the risk of malaria: Use ITN's and either Cotrimoxazole or IPT
 - To reduce the risk of transmission of HIV to the child: Utilize Prevention of Mother-to-Child Transmission (PMTCT) ARV regimens as recommended by MOH PMTCT guidelines.
- HIV infection also leads to increased rates of malaria in children. Therefore, children born to HIV infected mothers need to be protected from malaria. This should include Cotrimoxazole prophylaxis starting at 6 weeks after delivery and the use of ITNs.



Summary:

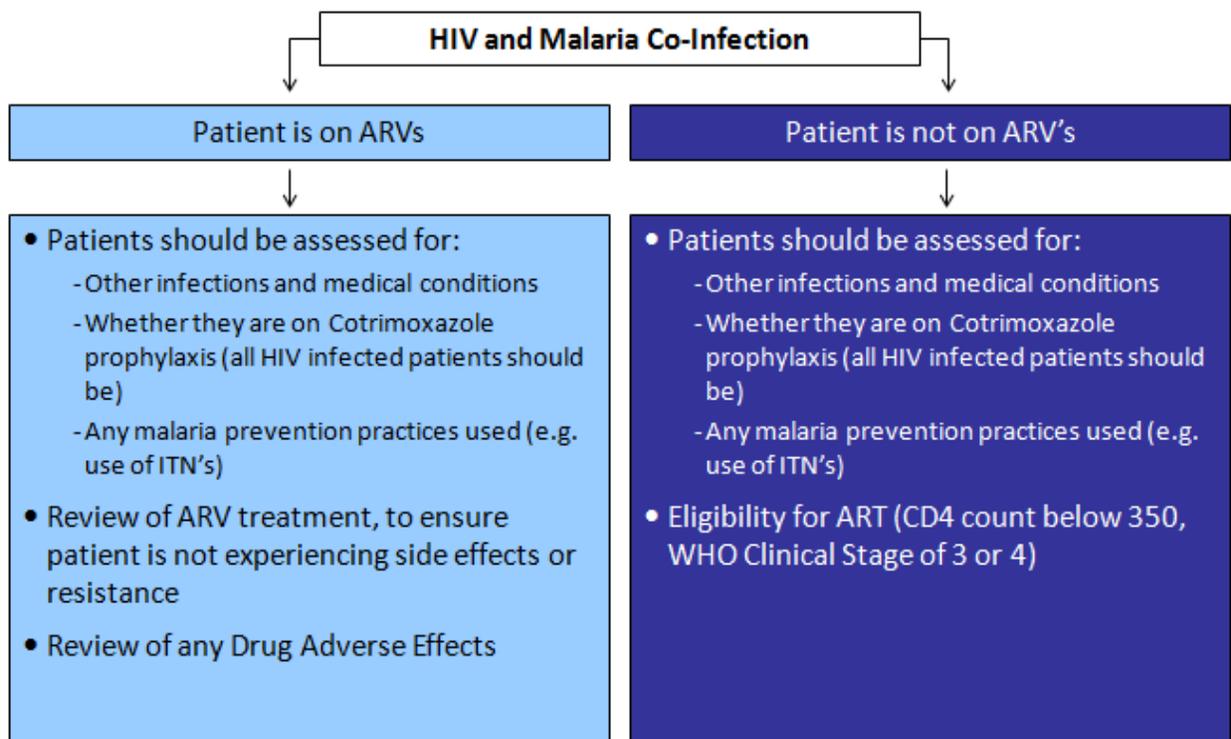
We have come to the end of our session on the effect of malaria on HIV positive pregnant mothers. We learned that these mothers should either continue to receive Cotrimoxazole prophylaxis (if they are already on it) or should receive three doses minimum of Intermittent Preventive Treatment (IPT) if they are not on Cotrimoxazole.

In addition, all pregnant women should use Insecticide Treated Nets (ITN) and those with HIV should also access a Prevention of Mother-to-Child Transmission (PMTCT) ARV regimen.

Part 3: Treatment of Patients Co-Infected with HIV and Malaria

- Malaria treatment in an HIV infected patient is not different than treatment for a non-infected patient.
- However, malaria can be more severe in an HIV infected patient and therefore health workers need to be vigilant and also recognize the need for a patient with HIV to be managed in a holistic manner.
- Amodiaquine containing drugs have bone marrow/heamatological effects
- HIV infected patients on ART need to be closely monitored when on malaria treatment
 - Patients on ART should not receive ACTs with Amodiaquine as this could lead to adverse drug reactions
- In addition, patients that are HIV infected but not on ART should be evaluated for whether they are eligible for ART (either CD4 count <350 or WHO Clinical Stage 3 or 4)
 - Patients that are eligible for ART but not on treatment are at risk of death

Diagram 3.1 – Flow Chart to Guide Health Workers in the management of Malaria and HIV/AIDS Co-Infection



3.2 When to Refer Patients Co-Infected with HIV and Malaria

- Patients who are severely ill and their symptoms cannot be clearly explained by malaria, ART or adverse effects of the drugs should be referred to the next level of care.
- If a patient cannot be assessed for eligibility of ARVs, treat for malaria and refer to the next level for appropriate assessment for ART
- Be aware that the National Drug Authority requests all health workers to report any adverse event in a patient using ACTs, ART or any other drugs



Summary:

We have come to the end of our session on treatment of patients co-infected with HIV and malaria. In the session, we learned that treatment for malaria is no different in patients who are infected with HIV vs. not infected, but that malaria tends to be more severe in patients with HIV.

In addition, patients that are HIV positive but not on ART treatment should be assessed for eligibility for treatment.

Part 4: Distinctive Preventive Measures against Malaria in an Individual with HIV Co-Infection

- As all HIV infected persons, both adults and children, are at high risk for malaria, preventive measures are essential and need to be integrated in the treatment of patients with malaria
- The following messages should be emphasized by health workers:
 - Use Insecticide Treated Nets (ITN) at all times
 - All HIV positive persons (children, adults, HIV infected mothers) should receive Cotrimoxazole prophylaxis
 - Those HIV infected pregnant woman who are not on Cotrimoxazole prophylaxis should receive Intermittent Preventive Therapy (IPT) with at least three doses
 - Children born to an HIV infected mother should receive Cotrimoxazole prophylaxis from 6 weeks after birth
 - Immediate diagnosis and treatment of malaria is important

Session 9: Management of Fever After Malaria Treatment

OBJECTIVES

By the end of this session, you should be able to:

- Describe the meaning and causes of “antimalarial treatment failure”
- Assess a patient presenting with fever after malaria treatment
- Manage antimalarial treatment failure

Part 1: Forms and Meaning of Antimalarial Treatment Failure

1.1 Forms and meaning of Antimalarial Treatment Failure

- Antimalarial treatment failure is when a patient remains parasiteamic with or without being symptomatic after completion of antimalarial treatment.
- In order to make a conclusion of antimalarial treatment failure, the patient must have:
 - Had a positive blood slide or RDT before starting therapy
 - Been prescribed a complete course of an effective malaria medication such as an ACT
 - Been 100% compliant to treatment given or prescribed
- In such circumstances, the term antimalarial treatment failure may mean any of the following:
 1. Clinical failure
 2. Parasitological failure
 3. Recrudescence
 4. Re-infection
 5. Mixed infection



Summary:

We have come to the end of our session on the meaning and causes of antimalarial treatment failure. In this session, we learned that **antimalarial treatment failure** is when a patient remains parasiteamic with or without being symptomatic after completion of antimalarial treatment.

There are five ways that antimalarial treatment failure can occur, each of them caused by something different.

Part 2: Assessment of Patients Presenting with Fever After Malaria Treatment

- For a health worker to assess a patient who had an antimalarial treatment and is presenting with fever, due consideration needs to be given to patient evaluation



Question: How would you assess a patient with fever who has taken an antimalarial treatment? What steps need to be completed?

Answer: There are three aspects to evaluating a patient

1. History taking
2. Physical Examination
3. Laboratory Investigation

2.1 How to Assess a Patient with Fever who has Taken an Antimalarial Treatment

- There are three steps to assess a patient
 - History taking
 - Physical examination
 - Laboratory investigation

1. History Taking –

- The following is a checklist of questions to ask patients to assess for treatment failure
 - Cough, difficulty in breathing, chest pain
 - Signs of flu or cold
 - Diarrhea
 - Ear discharge (in children)
 - Skin rash
 - Symptoms of UTI or other systemic diseases
 - Persisting symptoms of malaria
 - Development of symptoms of complicated/severe malaria
- Was the antimalarial treatment taken correctly and completely?
- Which antimalarial drug was taken?
- How was the drug taken? Was there any vomiting within 30 minutes of taking the drug? Was there spillage of syrups when giving drugs to children?
- Where was the drug procured? For example was the drug procured from the clinic, registered pharmacy, or drug hawkers?
- What other drugs or treatments were taken?
- Was there use of traditional medicine?

2. Physical Examination –

- i. On performing a physical examination, you should look for danger signs of severe malaria (see severe malaria module for the signs)

- ii. Look out for signs of other severe illnesses which cause fever (e.g. pneumonia, meningitis, typhoid)
3. **Laboratory Investigations** – The following laboratory investigations are needed in a patient with fever after malaria treatment
- i. HB, blood film for malaria parasites or RDT, WBC/CBC (thick and thin films)
 - ii. Urine analysis
 - iii. Other investigations will be guided by clinical findings



Summary:

We have come to the end of our session on assessment of patients presenting with fever after malaria treatment. In this session, we learned there are three steps to assess a patient presenting with fever after taking an antimalarial treatment.

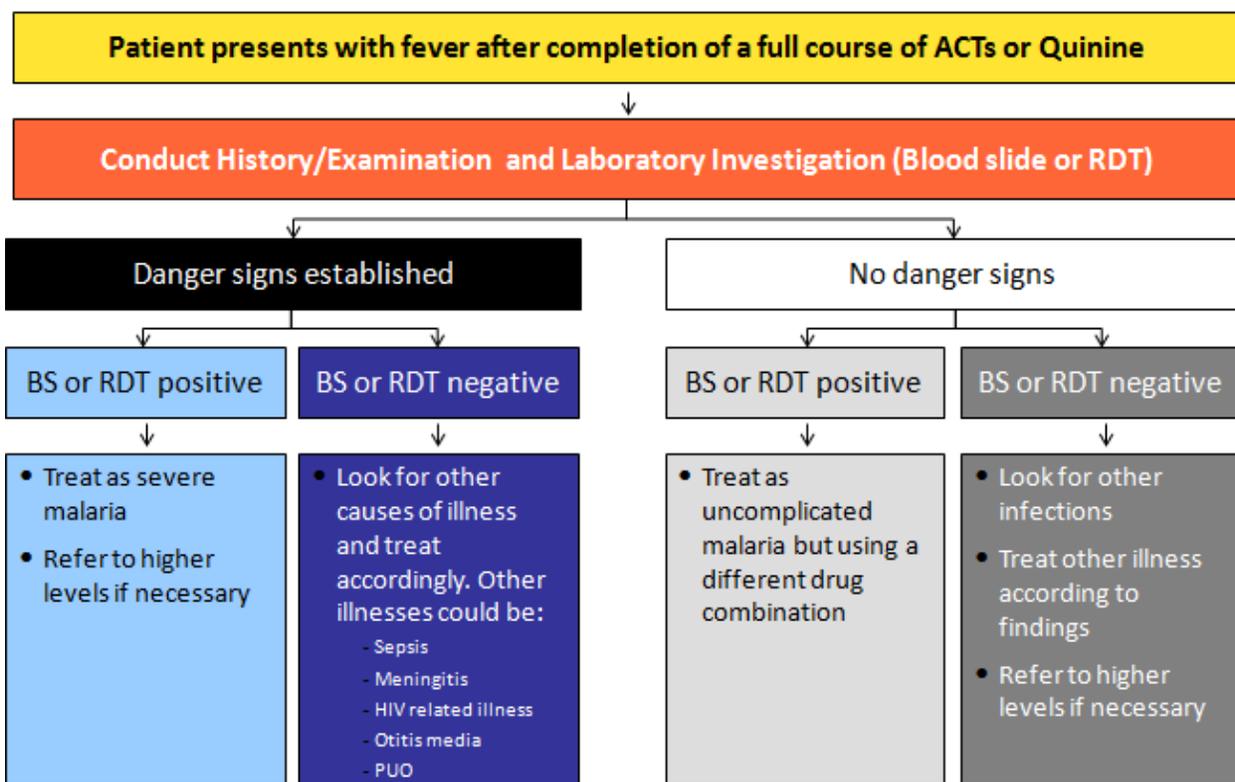
The three steps, (1) History Taking (2) Physical Examination and (3) Laboratory Investigation are the same steps that would be taken to evaluate any patient, but there are specific questions for health workers to ask and signs for health workers to help identify the cause of fever.

Part 3: Management of Patient with Fever After Malaria Treatment

3.1 Making a Decision on how to Manage a Patient who Returns with Fever after Malaria Treatment

- The management of a patient with fever after malaria treatment will depend on the result of history taking, physical examination and laboratory investigations leading to a new working diagnosis.
- In case the new diagnosis is not malaria, refer to the appropriate treatment guidelines such as the Uganda Clinical Guidelines for its management
- The following flowchart will help health workers make a decision on how to manage a patient who returns with fever after completing a full course of antimalarial treatment

Figure 3.1 – Making a decision on how to manage a patient who returns with fever after completing a full course of antimalarials



3.2 Considerations

- Before you recommend any antimalarial drugs to a patient identified with antimalarial treatment failure, you should consider the following:
 - Severity of illness
 - Previous drugs taken
 - Age
 - Availability of alternative antimalarials

3.3 Severe Malaria

- A patient presenting with signs of severe malaria should be managed as described in Session 5 – Management of Severe Malaria. However, special consideration needs to be given to the drugs previously taken as shown below:
 - If the patient took Coartem within the last week, then treat with:
 - Parenteral Quinine for at least 24 hours followed by oral Quinine tablets for seven days
 - If the patient had received a full course of Quinine before and is presenting with severe malaria then treat with IV Artesunate

3.4 Management of uncomplicated malaria after treatment failure

- If patients have a positive blood slide or RDT after completing antimalarial treatment the following regimens are recommended (based on the treatment the patient has already taken):

- If patients have previously taken ACTs and present with a positive blood film at least 2 weeks after the previous episode, we can assume that we are dealing with a new infection and therefore ACTs (Artemether/Lumefantrine, Artesunate-Amodiaquine) can be repeated
- If however fever occurs within 2 weeks of the previous treatment we can assume we are dealing with treatment failure and should manage such a patient with
 - Piperaquine + Dihydroartemisinin (Duo-Cotexin)
 - The alternative second line treatment for uncomplicated malaria is oral Quinine for 7 days.



Summary:

We have come to the end of our session on management of patient with fever after malaria treatment. In this session, we learned that we need to take the history of a patient, conduct a physical examination and conduct any necessary laboratory investigations to understand the cause of the fever.

If it is confirmed that the patient does have malaria again, the appropriate treatment depends largely on whether the malaria is uncomplicated or severe, and what treatment the patient previously took.

Session 10: Monitoring for Drug Safety: Pharmacovigilance

OBJECTIVES

By the end of this session, you should be able to:

- Define pharmacovigilance
- Understand the importance of pharmacovigilance
- Recognized and Report on Adverse Drug Events

REFERENCES AND RECOMMENDED READINGS

- Pharmacovigilance reporting form

Part 1: Definition of Pharmacovigilance

1. **Pharmacovigilance** - Science and activities relating to the detection, assessment, understanding, and prevention of adverse effects or any other possible drug related problem.
2. **Adverse event** - Any untoward (unpleasant) medical occurrence that may present during treatment with a drug but which does not necessarily have a causal relationship with this treatment.
3. **Adverse drug reaction** - Response to a drug which is harmful and unintended, and which occurs at doses normally used in humans.
4. **Side effect** - Unintended effect of a drug occurring at doses normally used in humans and which is related to the pharmacologic properties of the drugs.
5. **Serious adverse event** - A serious adverse event is an adverse event which is:
 - Fatal, Life-threatening, Causes or prolongs hospitalization
 - Requires medical or surgical intervention to prevent a serious outcome
 - Causes persistent incapacity or disability
 - Causes misuse or dependence

Part 2: Importance of Drug Safety Monitoring



Question: What is the importance of Pharmacovigilance?

Answer:

- Early detection of new adverse reactions which were not previously known or recognized
- Detection of adverse reactions which were previously known to occur but which appear to occur more commonly than expected, or are more severe than expected
- Identification of risk factors for adverse reactions
- Evaluation of the risks of a treatment or likelihood of experiencing an adverse reaction as compared to the benefits of the treatment.
- Dissemination of information needed to improve drug prescribing and regulation

Part 3: Assessment and Reporting of Adverse Drug Events (Time = 10 minutes)

3.1 Assessment & Reporting of Adverse Drug Events



Question: How do you assess and report Adverse Drug Events?

Answer:

- Evaluate any report or complaint by a patient/caretaker following drug intake. Take a detailed history and a thorough examination.
- Document and report any new problems, or problems that are worsening, as an adverse event.
 - Record any other diseases that the patient has
 - Record any additional medications that the patient has taken
 - Record any herbal treatments that have been used
- Adverse events should be reported to the National Drug Authority using the form “*For suspected adverse drug reactions*”. All adverse events should be reported. The report should include:
 - Patient demographic details
 - Drug details
 - Reaction details
 - Actions taken: outcome and date of resolution of the event
 - Other drugs used
 - Reporter’s details
 - Any additional comments
- The completed report should be sent to the office of the District Health Officer (DHO) to be forwarded to the NDA. Forms should be forwarded to next level within 24-48 hours

3.2 Managing Adverse Drug Events



Question: How do you manage a patient with an adverse drug event?"

Answer:

- **Mild adverse event** – treat the symptoms and continue the antimalarial drugs, if therapy is ongoing.
- **Moderate, severe, or life-threatening adverse event** – discontinue the antimalarial drugs if the therapy is ongoing, treat the symptoms appropriately, and consider treating with an alternative antimalarial.
- ***Refer any patient whom you are unable to diagnose or manage appropriately***



Summary:

- Pharmacovigilance is important for the early detection of new adverse reactions which were not previously known or recognized
- All adverse drug event should be assessed, managed and reported to the NDA

Session 11: Patient Education

OBJECTIVES

By the end of this session, you should be able to:

- Explain the importance of patient education in Malaria management
- Describe/explain four good communication skills
- Outline the important messages to give to a patient/care giver to promote adherence to treatment
- Outline the important messages to give a patient/care giver on care of a patient with Malaria
- Explain the counseling of patients with regards to when to come back to the health facility
- Outline the important messages to give a patient or caregiver on prevent of Malaria

REFERENCES AND RECOMMENDED READINGS

- None required

Part 1: Good Communication Skills

1.1 Why is it Important to Appropriately Communicate to a Patient/Caregiver?

- Appropriately communicating to the patient can have a significant impact on:
 - Adherence to drug treatment
 - Supportive care to be given at home
 - Follow-up care
 - Preventive care

1.2 What are the Four Good Communication Skills?

- The four good communication skills can be summarized as APAC:
 - A – Ask and listen
 - P – Praise where appropriate
 - A – Advise
 - C – Check understanding

1. **Ask and listen** – This requires you to use open ended questions that encourage a patient/caregiver to talk and give you more information. Open questions usually start with How? What? When? Where? Why?
 - Repeat back: By repeating back what a patient/caregiver says, it shows you understand what the client explains and is more likely to share more

- Avoid words that sound judgmental: Words such as ‘wrong’ or ‘badly’ will make the patient feel guilty and block communication
 - Allow patients/caregivers to ask questions on issues where they need clarity at any time during the interaction: This gives the health worker the opportunity to find out whether the client actually understands the message
2. **Praise** – Praising good practices is highly beneficial. It builds the patient/caregiver’s confidence, encourages him/her to continue those good practices, and makes it easier for him/her to accept suggestions later.
 3. **Advice** – Give information that is relevant to the situation and advise against any harmful practices that may have been used by the patient/caregiver and explain why the practice is harmful.
 - Use simple language that the patient/caregiver understands well: Avoid using technical terms when talking to patients/caregivers but use simple familiar terms
 - Avoid commands: Avoid commands such as ‘give,’ ‘do,’ and ‘bring.’ Make suggestions which leave the patient/caregiver feeling he/she is part of the decision making process – this helps him/her feel more confident. Suggestions include
 - “Would it be possible...?”
 - Would you be able to...?”
 4. **Check Understanding** – Ask questions to find out what the patient/caregiver understands and what needs further explanation. Avoid questions that can be answered with a simple yes or no. Examples of a good checking question include “how often will you take the drug?”



Summary:

We have come to the end of our session on good communication skills. Ensure the following in your patient education:

- Use a patient-friendly approach
- Give relevant information that is in context
- Reinforce important messages
- Allow the patient to ask questions
- Ensure the patient knows the correct things to do at the end of the interaction

Part 2: Important Messages to give a Patient

- This module covers four important messages to give a patient:
 1. Important messages on Adherence to Treatment
 2. Important messages on Care of a Patient with Malaria

3. Important messages on When to Return to the Health Facility
4. Important messages on Prevention of Malaria

2.1 Important Messages on Adherence to Treatment

- There are two important messages you should give the patient to promote adherence to treatment:
 1. About the current Malaria episode
 2. What the patient is expected to do
1. **About the current Malaria episode** – The following should be communicated to the patient
 - The cause of illness is Malaria
 - Malaria is transmitted by mosquito bites
 - The specific medication/drugs you are giving
 - The correct way to take the drugs (the correct number of tablets, correct number of times per day and the correct number of days)
 - The expected course of the illness (it is expected that the illness will be cured within three days)
 - The drugs given are for the current malaria episode and they will not prevent future episodes of malaria attacks
 2. **What the patient is expected to do** – The health worker should explain the following to the patient/caregiver:
 - In order to be totally cured, the patient must take the full course of treatment
 - If the patient vomits the drug within 30 minutes of taking the dose, he/she should take another dose. The caretaker/patient should come back to the health facility for more drugs to ensure that a complete course of treatment is given.
 - Symptoms may not disappear immediately after taking the first dose. Improvement may take up to two days. The patient should not change treatment by himself/herself.
 - The patient should consult a health worker immediately if symptoms worsen or if they persist beyond two days.

2.2 Important Messages on Care of a Patient with Malaria

1. How the antimalarial is to be given:
 - Orally or parenterally and the reason why you have chosen the route of administration; and the need for compliance
 - How many times per day
 - For how many days
 - If orally, tell the patient how to administer the drugs (e.g. it is necessary to take Coartem with food – fatty meals and milk enhance the absorption of Coartem)
2. A caretaker caring for the patient with malaria at home must consider the following
 - Use of antipyretics, tepid sponging, and/or fanning in case of high fever

- Fluid intake to correct/prevent dehydration
 - Feeding especially in babies and children to prevent hypoglycaemia and maintain strength
3. Provide advice on storing medication:
- Keep Coartem in a dry, cool place away from children and vermin
 - Keep Coartem in its blister packs until the actual time of swallowing
 - Do not expose Coartem to heat or direct sunlight
4. Provide advice on dangers of sharing medication
- The course of treatment is for one person for one episode of fever. If it shared, none of the recipients will have received a full course and malaria is unlikely to get cured.
 - Exposing the malaria parasite to suboptimal doses of antimalarials increases the risk of drug resistance

2.3 Important Messages on When to Return to a Health Facility

- The condition of a patient with malaria may change even as he or she may be on treatment. The following circumstances/signs should lead to a return to the health facility:
 - Presence of danger sign (convulsions, vomiting everything, severe dehydration, loss of consciousness). Such patients require admission to a health facility capable of administering intravenous drugs and carrying out intensive monitoring among other things.
 - Persistent signs and symptoms in spite of completing the course of treatment. Such patients may have resistant malaria or any other illness causing the fever.
 - Any adverse drug reaction. In such patients it may be necessary to discontinue the current treatment to investigate and manage the reaction. Alternative antimalarial treatment could be instituted.
 - If the patient vomits a dose of antimalarial treatment within 30 minutes, such a patient will require a replacement dose to ensure the course of treatment is completed.
 - If an adult/child is unable to eat or breast feed
 - If a child develops difficulty in breathing if he or she had cough or cold

2.4 Important Messages to give on Prevention of Malaria

- It is important for you to talk about the prevention of Malaria to a patient or caregiver during your interaction while still at the health facility. Your discussion about prevention of other episodes of Malaria will require you to do the following:
 - Explain the role of the mosquito in Malaria transmission (malaria is transmitted by the bite of an infected *Anopheles* mosquito)
 - Explain the role of specific preventive measures such as:
 - **ITN** - The importance of sleeping under an insecticide treated net (as malaria transmission occurs at night)
 - **IRS** - The use of Indoor Residual Insecticide Spraying (IRS) in Malaria control

- **IPTp** - The use of Intermitten Preventive Treatment in Pregnant women (IPTp) with Sulfadoxine/Pyrimethamine (Fansidar) in the second and third trimester of pregnancy
- **Prophylaxis** - Explain the use of malaria prophylaxis in special groups such as sicklers and non-immune travelers.



Summary:

We have come to the end of our session on important messages to give a patient. In the session, we learned that there are four important messages to give the patient:

- Adherence to Treatment
- Care of a Patient with Malaria
- When to Return to a Health Facility
- Prevention of Malaria

Each of these topics has a very big impact on treatment for a patient so each should be thoroughly communicated to the patient.

Session 12: Medical Records Keeping

OBJECTIVES

By the end of this session, you should be able to:

- Define medical records
- Explain the importance of medical records
- Describe the types of medical records
- Describe how to complete relevant medical forms
- Describe roles of different individual staff in record keeping
- Describe the tracking of patients for record keeping purposes in the OPD

REFERENCES AND RECOMMENDED READINGS

- Various registers and forms (e.g. OPD Register, In-Patient Register)

Part 1: Importance of Medical Records (Time = 5 minutes)

1.1 Definition of Medical Record Keeping

- A medical record is a compilation of facts about a patient's life and health. It includes documented data on past and present illnesses and treatment written by the health professional caring for the patient.
- The medical record must contain sufficient data to:
 - Identify the patient
 - Support the diagnosis
 - Reason for attendance at the health facility for each visit
 - Justification for treatment
 - Accurately documented results of treatment
- This information will be used by doctors, nurses, laboratory personnel and other health care professionals to treat the patient in the future, so accurate documentation is essential.

1.2 Importance of Medical Records

- Medical records are useful/important for several reasons:
 - Medical records are used to provide information about the health of the people in a country. The collected information forms the basis of development of health facility plans.
 - Management and financing of health facilities
 - Medical research and production of health care statistics

- Maintaining efficient medical records: In developed countries medical records are kept electronically. However, in our setting this is not yet the case so the efficient management of manual medical record systems remains essential for the collection of complete, accurate and timely data on health.
- Consequences of poor medical records keeping:
 - Patient may suffer: If the medical record is not available then the patient may suffer due to a lack of previous information which could be vital for their continuing care.
 - Confidence in the system suffers: If the medical record cannot be produced when required for patient care the medical record system is not working properly and confidence in the overall work of the facility is affected.



Summary:

We have come to the end of our session on the importance of medical records. In this session, we learned that a medical record is a compilation of facts about a patient's life and health. Since the medical record will be used by various health workers in a facility, it should be accurately filled out.

The consequences of poor medical records keeping impact both the quality of care for patients as well as the health facility. Thus, maintaining effective medical records is highly important.

Part 2: Types of Medical Records

The table below provides examples of some of the records that are necessary at your health facility

Description	Form
OPD Register	HMIS 031
In-patient Register	HMIS 054
Laboratory Register	HMIS 055
Antenatal Register	HMS 071
Outpatient card	MMeF 5
Inpatient treatment sheet	HMIS 051
Referral form/note	HMIS 032
Laboratory request form	HF 307
X-ray request form	HF312(a)
Inpatient discharge form/note	HMIS 052
Antenatal card	
Birth certificate	MF 104
Child health card	
Consent to operation form	
Death certificate	MF105
Family planning card	
Family planning register	HMIS074
Leprosy patient card	
TB patient card	
Tetanus Immunization card	
Partogram	
Child register	HMIS 073



Summary:

We have come to the end of our session on types of medical records. This module can be referred to at any time by participants if they need to determine what the appropriate form is for a record they need to complete.

Part 3: Completing Relevant Medical Records Forms (Time = 10 minutes)

- In this module, we shall learn how to complete the following relevant medical forms:
 - OPD Register
 - Medical form V or its equivalent
 - Inpatient register
 - Records in specialized clinics and departments

3.1 OPD Register

- The OPD register is very important and therefore all patients should be recorded in it. It is used to record detailed information about each outpatient visit.
- Ensure that every OPD register is labeled with the name of the health facility, the date the register was opened and when it was closed.
- Some facilities keep different registers for age under 5 and those above 5. This mainly serves to ease monthly tallies. Irrespective of whether one or two registers are kept, the information contained about each patient should always include:
 - Patient's name
 - OPD number which should be unique to each patient each month
 - Patient's age, gender, village, parish, diagnosis and treatment
- In addition, you should indicate in the register whether the patient is new or returning; and whether they were referred from or to somewhere. It is important for you to ensure that all these details are completed accurately.

3.2 Medical form 5 or equivalent

- The medical form 5 has the following qualities:
 - Is the source of information contained in the OPD register
 - Contains sufficient data to identify the patient, support the diagnosis or reason for attendance at the health care facility, justify the treatment and accurately document the treatment given to the patient.
- Ensure that all patients have each a MF 5. Other medical records that may be used in the OPD include forms for laboratory investigations and referral letter/note.

3.3 Inpatient register

- Ensure that each in-patient register is labeled with the name of the health facility, the date the register was opened and when closed. Record all inpatients in the IPD register.

- The information contained in the register should include age sex, diagnoses, interventions/treatment, and final status of each patient. Other medical records that relate to the in-patient include:
 - Identification and summary sheet,
 - Consent for treatment
 - Discharge summary
 - Admission notes
 - Progress notes
 - Nursing progress notes
 - Pathology reports
 - Other reports – X-ray, Operation, Other health care professional notes, etc
 - Medication chart
 - Nursing observations

- These records are maintained in the **In-patient file**. In addition the other medical records that may be used in the IPD include forms for investigations and referral letter or note, similar to the OPD.

3.4 Unique Patient Identifier

- We use the Patient Identification Number as the Unique Patient Identifier. This can either be the OPD number or another number but since every patient should have an OPD number, this should be used as the Unique Patient Identifier.

- It is therefore important that we assign OPD numbers accurately and consistently for every patient. It is also important that this number gets recorded at every point in the health facility where the patient is seen.



Summary:

We have come to the end of our session on completing relevant medical records forms. In this session, we learned that all out-patients should be recorded in the OPD Register and all in-patients should be recorded in the Inpatient Register.

In addition, every patient should receive a Unique Patient Identifier. Since every patient has an OPD number, this number can serve as the Unique Patient Identifier.

Part 4: The Roles of Individual Staff in Record Keeping (Time = 10 minutes)

- Every health worker has a critical role to play in medical records keeping. Below, the key duties of various health workers are outlined:
 - Role of the clinician
 - Role of Laboratory staff
 - Role of the HMIS officer/records clerk
 - Role of the health service manager in-charge

4.1 The role of the Clinician in Medical Records Keeping

- Understand the importance of completeness and accuracy of records and registers
- Capture information from a client/patient
- Generate information from the findings and actions
- Record the information on the appropriate medical forms and registers
- Analyze, utilize and disseminate the information

4.2 The role of Laboratory Staff in Record Keeping

- Understand the importance of completeness and accuracy of records and registers
- Record patient's profile from his/her medical form into the laboratory register
- Generate information from the laboratory findings
- Record the information on the appropriate medical forms and registers
- Analyze, utilize and disseminate the information

4.3 The role of the HMIS officer/records clerk in Medical Records Keeping

- Understand the importance of completeness and accuracy of records and registers
- Record the information on the appropriate register
- Compile data from the registers into appropriate summary forms and storage forms
- Analyze and present into easily understood forms such as tables, graphs, pie charts and line graphs
- Analyze, utilize and disseminate the information

4.4 The role of the Health Service Manager In-Charge

- Understand the importance of completeness and accuracy of records and registers
- Analyze, utilize and forward information to relevant authorities/stakeholders for action
- Solicit feedback for relevant action
- Supervise medical records keeping and ensure its properly done

- Because of the vital nature of the work of the records department, it is important to provide support for the personnel. Cooperation from all staff in the following areas is vital:
 - Content of medical records

- Procedures required in the management of medical record services
- Adequate stationery



Summary:

We have come to the end of our session on the roles of individual staff in records keeping. In this session, we learned that every health worker has specific responsibilities to ensure medical records are well-maintained.

However, it must be noted that it is the responsibility of every health worker to ensure that the overall system to complete medical records operates effectively.

Session 13: Medical Supply Management

OBJECTIVES

By the end of this session, you should be able to:

- Define medical supply management
- List the essential medical supplies needed in malaria management
- Explain how to estimate the amount of antimalarials needed
- Describe the process of ordering, receiving and issuing supplies

Part 1: Overview of Medical Supply Management

- Medical supply management refers to the planning and control of the flow of drugs and other supplies. It is simply the overall management of medical supplies from ordering, procurement, storage, distribution and dispensing, maintenance and disposal of supplies.
- For effective service delivery, medical supplies systems help us to have products that satisfy the six 'rights' illustrated here:
 - The right quantities of the right supplies to the right places at the right time in the right condition at the right cost.
- To ensure the six 'rights,' you need inventory control systems within the medical supplies management system. The inventory control system should:
 - Tell us when we should place an order
 - Help us determine how much stock to be ordered or issued
 - Help us maintain an appropriate stock level of all products, avoiding shortages or oversupply

Part 2: The Essential Medical Supplies needed in Malaria Management

There are a number of supplies needed for malaria patient management and they include the following:

- Clinic equipment
- Laboratory equipment and supplies
- Stationery
- Drugs
- Medical supplies and sundries.

Let us next describe each of them in turn:

- **Clinic equipment** including
 - Thermometers,
 - Blood pressure machines,
 - Otoposcopes,
 - Weighing scales,
 - Stethoscopes
 - Tongue depressors,
 - Pulsometer or watch

These are very essential in the process of diagnosing malaria.

- **Laboratory equipments and supplies** - The most important are the equipments and supplies for malaria microscopy and RDT. For microscopy, the supplies needed include the microscope, the slides and the stains, and lancets.
- **Stationery** - The key stationery that you need includes the Patient registers, medical form 5s, Inpatient admission forms and Laboratory request forms.
- **Drugs** including
 - Antimalarials
 - Artemether/Lumefantrine or other appropriate ACT
 - Injectable artesunate
 - Quinine tablets
 - Quinine injection
 - Antipyretics
 - Paracetamol or other appropriate antipyretic
 - Anticonvulsants
 - Diazepam injection or other appropriate anticonvulsant
 - Intravenous fluids
 - Dextrose (both 5% and 50%)
 - Normal saline injection
- **Medical Supplies and sundries** including
 - Giving sets
 - Canulas
 - Needles and syringes
 - Butterfly needles
 - Plaster
 - Antiseptics/disinfectants
 - Dispensing envelopes
 - Gloves
 - Nasogastric tubes (NGTs)

- Tourniquets

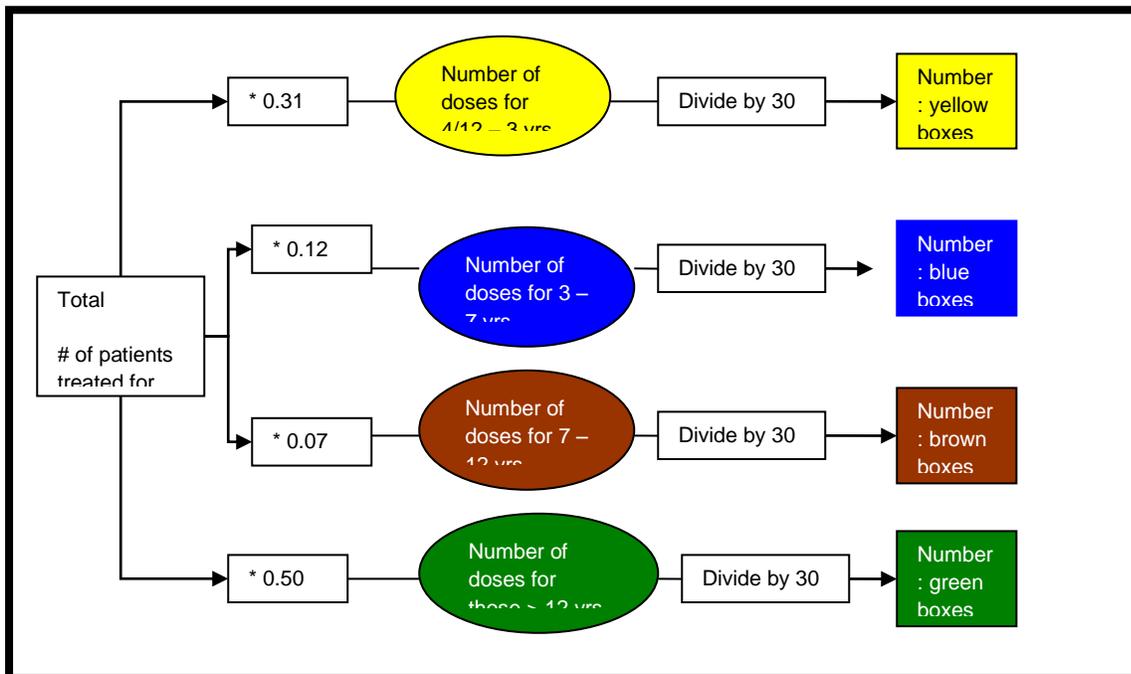
Part 3: Estimating the amount of Antimalarials Needed

- The amount of any antimalarial needed for use in a specified period is estimated from the total number of malaria cases seen at a facility in the previous time period.
- However, every order must be adjusted by the pack size. For example, each box of the ACT Coartem (Artemether-Lumefantrine) contains 30 blisters/treatments. Thus, the total number of patients quantified should be divided by 30 to get the correct number of boxes to order.

Table X: Relationship between age and weight bands for Coartem

Colour	Weight(kg)	Age category
Yellow	5-14	From 4 months up to 3 years
Blue	15-24	From 3 years up to 7 years
Brown	25-34	From 7 years up to 12 years
Green	>35	From 12 and above

Figure Y: Estimating amount of Coartem



Similar to these calculations, you can actually use your patient information and monthly reporting data to calculate all the other supplies that you may need for the management of malaria, for example number of:

- severe malaria cases admitted at the facility
- children under 5 admitted
- adults admitted with severe malaria

Estimating from this number you calculate your needs as follows:

1 child admitted with severe malaria on average needs:

- 1 cannula (G 24/22) 1 bottle of 5% dextrose
- 4 ampoules of injectable artesunate
- 1 amp of Diazepam
- Paracetamol tablets (100mg) 10 tabs

1 adult admitted with severe malaria may need on average

- 1 cannula (G 20/21) 1 bottle of 5% dextrose
- 12 ampoules of injectable artesunate
- 2 amps of Diazepam
- Paracetamol tabs (500mg) 10 tabs

Exercise:

Let us assume you are working at a HC IV where you see 500 patients with malaria every month. You are also admitting 5 adults and 25 children with severe malaria in the same time period. Please make an estimate of:

- How much Coartem you will need to order for a 3 months period
- What you need to order for the ward where severe cases are admitted
- What quantities of laboratory supplies would you need assuming that all 500 patients have at least 1 blood film done and all admitted patients will have 2 blood films done

How should reporting and recording be done in effective supply management?

In order to manage supplies effectively we have to work together as a team. Clinicians, dispensers, laboratory staff, record staff and even cleaners need to be part of an effective supply management team. Where does recording need to be done?

The Outpatient, inpatient and laboratory registers give us information about

- Number of patients seen
- Age groups and therefore the types of drug they need
- Diagnosis made and therefore the drugs that they will need
- Laboratory investigations indicating number of slides, stains etc that we may need

- Length of the admission on a ward indicating supply needs in terms of drugs but also other supplies

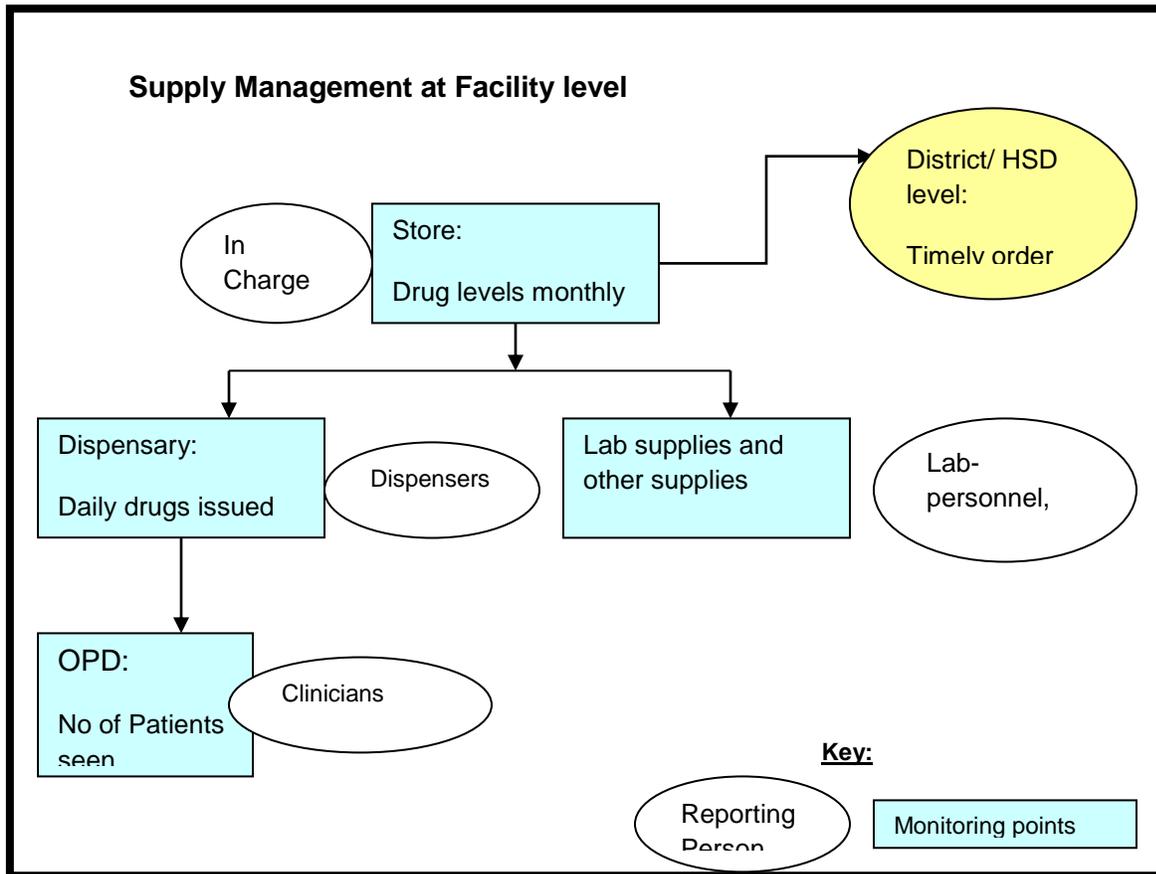
Each of these registers needs to be kept complete and must be legible for anyone who may need this information. Recording should be done on a daily basis and at least weekly these reports need to be reviewed by the in charge, so that appropriate action in terms of supplies can be taken.

How do we prevent stock outs of items at the health facility?

From the above example we have seen that accurate and complete record keeping of the number of patients, dispensed items and stock cards are absolutely essential for effective supply management. Every staff member (medical officer, clinical officer nurse, etc) plays an important role in preventing stock outs.

Daily recording of patients, record of drugs dispensed and regular checks on stock levels (daily) as well as reporting to the in-charge of the health facility will allow timely orders that will prevent complete stock outs. Figure 5/2 below, highlights the important aspects of recording and reporting for supply management.

Figure Y: Supply Management at facility level



Part 4: Ordering, Receiving and Issuing Supplies

Based on the above information the in charge of a health facility can order drugs in a timely manner. He/She will base the order on:

Stock on Hand

This is the amount of a drug or any other item that is available at the facility at any given point in time. All items, drugs and other supplies should have a stock card that is kept in the store of the facility. The stock card used in Uganda can be found in Appendix I with the necessary explanation on how to use it.

Rate of Consumption

This is the average quantity of drugs or other items that were dispensed to users during a particular time period. This is usually expressed as average monthly consumption and is based on the data we get from the dispensary or the laboratory.

In some cases this information may not be completed and then we can use the data we get from stock cards in the stores. Stock cards allow us to track the quantity of a drug that was issued to the dispensary in a given period.

Average Monthly Consumption

Average Monthly Consumption (AMC) is the quantity of a product that is used during an average month. Calculating an average monthly consumption is based on data of consumption of three consecutive months divided by 3. Use the most recent three months period preceding the date when the average is being calculated.

Exercise:

In HC IV in Katikamu the in-charge orders 500 boxes of Coartem for a month based on the drugs issued during the month from the store to the dispensary. At the end of the month he reports that 6000 patients were treated for malaria in that time period and when checking, he found that 100 boxes of only green Coartem were still in the dispensary. You are at the DHO's office and you receive this report.

- How many boxes of Coartem will you issue to this health facility?
- What else would you need to do?

Losses or Adjustments

Losses

These are the quantities of drugs or other items that are removed from the system for any reason other than consumption by clients. This is for example through losses, expiry and damages.

Adjustments

Adjustments may include receipt or issue of supplies to or from one facility to another at the same level. This is for example through a transfer or a correction for an error in counting.

Physical Count

A physical count is the process of counting item by item the total number of units of each commodity in your store or health facility at any given time. Officers in charge or store keepers should conduct a physical count on a regular basis, but most importantly when preparing to make an order.

The physical count is necessary to verify whether the amount indicated on a stock card is actually in the store. Only after a physical count can we identify losses and make necessary adjustments.

Minimum and maximum stock levels

The maximum stock level is the amount or quantity of product that we do not want to exceed because the drug may expire before we can use it. The minimum stock level is the amount or quantity of a

product that we need in order to guarantee uninterrupted drug supplies. For Uganda, the recommended stock levels for antimalarials like other essential drugs and contraceptives are as follows:

- The minimum stock level is 2 months of stock,
- The maximum stock level is 5 months of stock

Example:

If health centre's X monthly consumption for Quinine is 1000 tablets then the maximum stock quantity of Quinine would be 5000 tablets and the minimum stock quantity would be 2000. This health centre would never want to have more than 5000 tablets. If they had more than that, they would stand high chances of wastage due to damage and expiry.



Summary:

We have come to the end of our session on medical supply management. A well managed medical supplies system will ensure that the patients have access to quality antimalarials and other supplies at the right time.

In this session we learnt about four types of forms that we can use in management of medical supplies in our health facilities. These were the Stock record form, Reporting stock out for essential medicines form, Essential Medicines and Health supplies order form, and the Requisition and issue form. We learnt about the guidelines on estimating the amount of Coartem needed. We described the supplies needed for malaria management and emphasised the need to make proper orders of supplies based on the distribution system and the quantity of the supplies needed.

Further Reading

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14. Neurological aspects of tropical disease – Cerebral malaria. CRJC Newton. *J Neurol neurosurg Psychiatry* 2002; 69: 433-441 www.jnnp.com
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APPENDIX 1: Assessing Coma in adults using Glasgow Coma Scale (GCS) and in children using Blantyre Scale

The Glasgow coma scale for adults and older children

Observation		Score
Eyes open:	spontaneously	4
	to speech	3
	to pain	2
	no eye opening	1
Best verbal response	Oriented	5
	Confused	4
	inappropriate words	3
	Incomprehensible sounds	2
	no verbal response	1
Best motor response	obeys commands	6
	localizes pain	5
	withdrawal from pain	4
	flexion to pain	3
	extension to pain	2
	no motor response	1
Total		3-15

To calculate the Glasgow coma score, take the score for each section, then add the three figures to obtain a total score. A state of unarousable coma is reached at a score of <10.

The Blantyre coma scale for children aged 6 months to 5 years

Observation		Score
Best motor response	localizes painful stimulus ⁵	2
	withdraws limb from pain ⁶	1
	non-specific or absent response	0
Verbal response	appropriate cry	2
	moan or inappropriate cry	1
	None	0
Eye movements	Directed (for example. follows mother's face)	1
	not directed	0
Total		0-5

A state of unarousable coma is reached at a score of <3.

Measurement of coma in younger infants is difficult. It is best to describe how the child responds to a standard painful stimulus.

⁵ rub your knuckles firmly on the patient's sternum

⁶ press firmly on the patient's thumbnail bed with the side of a horizontal pencil