

THE REPUBLIC OF UGANDA

MINISTRY OF HEALTH

INTEGRATED MANAGEMENT OF MALARIA TRAINING

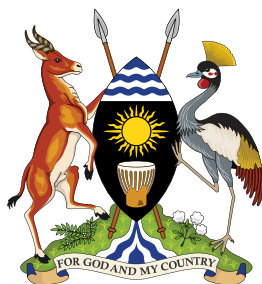
HEALTH WORKERS' MANUAL



Third Edition

November, 2019





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FOREWORD

There has been great progress made in the control of malaria in Uganda with the incidence rate reducing from 272 cases per 1000 population in 2016/17 to 191 cases per 1000 population in 2017/18. The Government of Uganda through the Ministry of Health National Malaria Control Program (NMCP) and other development partners are dedicated to controlling malaria with cost effective, evidence-based prevention and treatment methods guided by the National Malaria Control Policy 2018 and the Uganda Malaria Reduction Strategy 2014 – 2020. These include; appropriate malaria case management, continuous availability of effective anti-malarial commodities, use of long-lasting insecticide treated nets (LLINs), and use of indoor residual spraying (IRS). However, there are several challenges that derail these efforts including; low adherence to treatment policy of the test, treat and track leading to irrational drug use and poor case management practices, stock out of Artemisinin-based Combination Therapies (ACTs), low utilization of LLINS, resistance to chemicals used in IRS, scanty and poor data. These inefficiencies have led to a persistent malaria burden on the health care system and an unnecessary increase in health care costs.

The MoH recognizes that to curb malaria, a holistic and a collaborative approach in case management and implementation of malaria prevention methods is very important. Therefore, the integrated management of malaria (IMM), a five-day training targeting all health workers and focusing on fever management was developed to;

- To improve health worker malaria case management practice by bridging the gap between knowledge and practice
- Strengthen a multidisciplinary team approach to malaria case management at health facility level.
- Develop a monitoring and evaluation system that will demonstrate the progress on malaria management and impact
- To ensure that health workers keep abreast of the changes in malaria case management and prevention.

The IMM training is highly interactive and has 13 modules covering all key aspects of malaria control and case management. It is complemented with a continuous medical education (CME) kit to ensure that the trained health workers conduct mandatory CMEs at their respective health facilities to ensure horizontal transfer of knowledge and skills. Therefore, I call upon all malaria stakeholders including health workers to utilize the IMM training manuals as we strengthen our move towards malaria elimination in Uganda.



Dr. Tusiime Patrick
Commissioner, Communicable Diseases, Prevention and Control

ACKNOWLEDGEMENTS

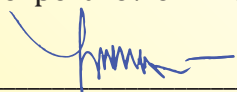
The National Malaria Control Program wishes to acknowledge with thanks the support and contribution of all stakeholders who have contributed in one way or another to the development of this training manual for the Integrated Management of Malaria. The completion of this manual was made possible by the input of several individuals and organizations who coordinated and participated in the consultations and working group meetings that compiled, reviewed, evaluated and refined this manual.

Special thanks go to the Infectious Diseases Institute - Joint Uganda malaria training Programme (IDI-JUMP), Makerere College of Health Sciences, Mulago National Referral Hospital, Gulu University, President's Malaria Initiative (PMI), Stop Malaria Project (SMP), Malaria Consortium (MC), National Drug Authority and Clinton Health Access Initiative (CHAI) for developing the initial version of the Integrated Management of Malaria manual. Medicines for Malaria Venture (MMV) is also thanked for their contribution of the Artesunate job aid.

The contribution of the under listed persons whose unreserved intellectual and technical input resulted in the finalization of the first published training Manual cannot go unnoticed: Dr. Okui Albert Peter, Dr. Sam Siduda Gudoi, Dr. Kato Fred, Dr. Achan Jane, Dr. Opoka Robert, Dr. Okello Patrick, Dr. Kuule Julius, Dr. Nathan Kenya Mugisha, Dr. Charles Katureebe, Dr. Patrick Bukoma, Mr. Agaba Bosco, Dr. Sussie Nasr, Dr. Ssekitoleko James, Dr. Nabakooza Jane, Ms. Noorin Mawani, Mr. Lorne Chi, and Mr. Amaan Banwait.

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Dr. Jimmy Opigo
Program Manager,
National Malaria Control Program

LIST OF ABBREVIATIONS AND ACRONYMS

3TC	Lamivudine
ACT	Artemisinin-based Combination Therapy
AIDS	Acquired immunodeficiency syndrome AL Artemether/Lumefantrine
AMC	Average Monthly Consumption
ARDS	Acute 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
IPTp	Intermittent Preventative Treatment in Pregnancy
IUD	Intrauterine deaths
IUFGR	Intrauterine foetal growth retardation
JUMP	Joint Uganda Malaria Training Programme
K+	Potassium ions
LCF	Late clinical failure
LLINS	Long Lasting Insectide Treated Nets
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
RDT	Rapid Diagnostic Test
SP	Sulfadoxine/Pyrimethamine
TDF	Tenofovir (Disopropyl fumarate)
TNF	Tumour necrosis factor
UMSP	Uganda Malaria Surveillance Programme
UTI	Urinary Tract Infection
VCT	Voluntary Testing and Counseling
WHO	World Health Organization

TRAINING SCHEDULE

Time	Day 1	Day 2	Day 3	Day 4	Day 5
	Arrival and registration	Lecture Module 3 Recap from previous day (30 Minutes)	Lecture Module 5 Recap from previous day (30 minutes)	Practical Session 2 Recap from previous day (30 minutes)	Lecture Module 9 Recap from previous day (30 minutes)
08:30 – 10:00	Introduction (15 minutes) Pre-test (30 minutes)	ACTIVITY Patient Cases for management of Uncomplicated Malaria and Negative test result 90 minutes)	Module 8: Malaria and HIV/AIDS co-infection (60minutes)	ACTIVITY Severe Malaria ward visit and discussion (2 Hours)	Post-test (30 minutes) Marking
10:00 – 10:30	Morning Tea Break				
10:30 – 12:30	Module 1 Introduction to Malaria (45 minutes) Module 2: Evaluation of patient with fever (60 minutes)	Module 5 Management of a patient with severe malaria (60 minutes)	Module 9: Management of suspected Treatment Failure (60 minutes) Module 10: Monitoring for Drug Safety – Pharmacovigilance (30 Minutes)	ACTIVITY Severe Malaria ward visit and discussion (2 Hours)	Patient case of Severe malaria (60 minutes) Question & Answer Wrap up (30minutes)
12:30 – 1:30	Lunch Break				
13:30 – 16:00	Module 3: Testing for Malaria (1hour 45minutes) ACTIVITY RDTs (45 minutes)	Management of patient with severe malaria – continued (30 minutes) Module 6 Management of fever patient with Negative test Result (90 Minutes)	Module 11: Patient Education (30 minutes) Module 12: Medical records keeping (30 minutes)	ACTIVITY At least one patient case of severe Malaria (60 minutes) Patient Case Studies (1 hour 45 minutes) (four patient cases;)	Departure
16:00 – 16:30	Morning Tea Break				
16:30 – 5:00	Module 4: Treatment of Uncomplicated Malaria (30 minutes)	Module 7: Management of Malaria in pregnancy (60 minutes)	Module 13: Medical supply management (30 minutes)	Patient Case Studies Continued	

Module 1: Introduction to Malaria

Learning Objectives

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

- (1) Describe the epidemiology of malaria in Uganda
- (2) Describe the control and policy framework

Session 1.1 Malaria Transmission in Uganda

1.1.1 What is Malaria?

Malaria is an acute febrile 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 or simple malaria' while the severe life-threatening illness is referred to as 'severe or complicated malaria'?

There are several species of malaria parasites which can cause infection in humans:

- Plasmodium falciparum
- Plasmodium Malariae
- Plasmodium Vivax
- Plasmodium Ovale
- Plasmodium MolesiKnowlesi

The commonest cause of malaria in Uganda is *P. falciparum* (98%1) and this same species is also responsible for the severe forms of the disease because:

- It attacks all ages of red blood cells
- Causes infected red blood cells (RBCs) to stick to each other which affects their functioning and creates plugs that can block blood vessels
- It has high multiplication capacity

How is Malaria Transmitted to Humans?

Malaria is mainly transmitted through;

- (i) A bite of an infected female *Anopheles* mosquito.
- (ii) In rare occasions, it can also be transmitted through blood transfusion and
- (iii) Via the placenta from mother to child (vertical transmission).

Quiz: Give all health workers 2 minutes to write down as many behavior characteristics about the *Anopheles* mosquito as they can. It is expected that there will be large differences in the level of knowledge in the class.

Answer: _____

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 of session:

In this session on malaria and its transmission, we have learnt that;

- Malaria is a disease caused by a parasitic organism called Plasmodium
- Malaria is mainly transmitted to humans through the bite of an infective female Anopheles mosquito.
- The commonest species of malaria parasite in Uganda is *P. falciparum* (99% of all species)
- The clinical consequences of malaria infection can lead to asymptomatic, uncomplicated, and severe malaria.
- 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

Session 1.2 Epidemiology of malaria in Uganda

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 location.

Question: What is leading cause of morbidity and mortality in Uganda?

Answer: _____

The Burden of Malaria in Uganda

Malaria is most prevalent in Children aged 5 to 11 years but the most vulnerable populations are;

- o Children under 5 years
- o Pregnant women, especially prime gravidae
- o People living with HIV/AIDS
- o People with sickle cell disease
- o Travellers from areas where there is little or no malaria (due to low immunity to 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: _____



Percent of children age 0-59 months who tested positive for malaria by microscopy MIS 2018/2019

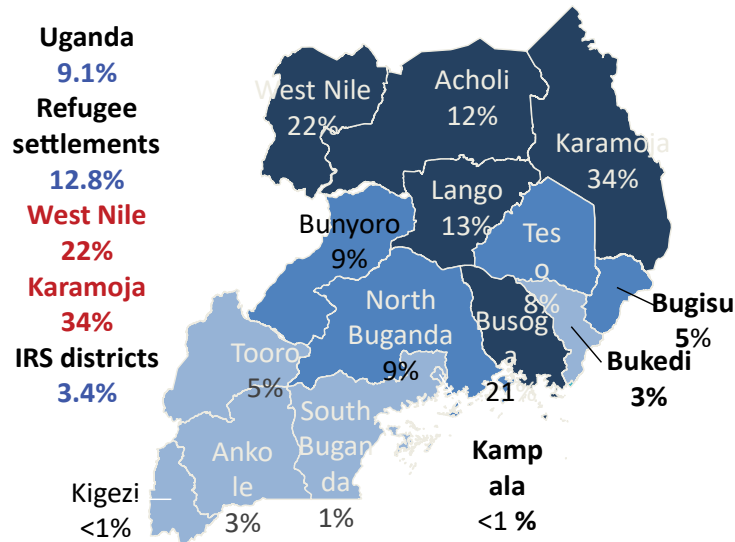


Figure 1.1: Epidemiological Stratification Based on UMIS 2018/19

Percentage of children aged 0-59 months who tested positive for malaria by microscopy
From Uganda Malaria Indicator Survey results of 2018/2019, it is shown that malaria prevalence in U5s reduced from 19.2% by microscopy in 2014/15 to 9.1% in 2018/19

Summary of session:

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.
- ❑ There is reduction in the malaria prevalence, so all fevers should be tested to confirm malaria before treatment.

Session 1.3: Control and policy framework for malaria in Uganda

Control Strategies for Malaria in Uganda

Quiz:

There are five ways to control malaria. Within 3 minutes try and determine specific strategies that can be used to control malaria within the five areas below.

- i) Preventing mosquitoes from biting humans
- ii) Reducing the population of mosquitoes
- iii) Reducing the malaria parasite load in humans
- iv) Sensitization about prevention and early treatment seeking
- v) Surveillance, Epidemic Preparedness and Response

Answers

i) For Prevention of Mosquitoes from biting humans:

ii) For Reducing the population of Mosquitoes:

iii) Case management:

a) _____ b) _____

iv) Sensitization about prevention and early treatment seeking:

v) Surveillance, Epidemic Preparedness and Response:

There are five major ways that malaria can be controlled:

1. Prevention of contact between mosquitoes and humans

- a) Sleeping under Long Lasting Insecticide treated mosquito Nets (LLINs) – 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 LLINs reduce morbidity and mortality due to malaria.



Figure 1.2: Illustration of how to use the LLINs and Indoor Residual Spray (IRS)

- b) Screening of houses–Screening of houses by putting mesh windows, doors, eaves and ventilators reduces the entry of mosquitoes in the houses. Doors and windows should also be closed early, before dusk.
- c) Site selection – Residential houses should be built far away from marshes and other collections of stagnant water where mosquitoes breed.

2. Reduction of the mosquito population

- a) The reduction of the adult mosquitoes can be one through spraying of the internal walls of houses with residual insecticide.
- b) Reduction of mosquitoes by destroying larvae (Larval source management). This involves removal of stagnant water around homes and applying larvicides in permanent water bodies where feasible

3. Destruction of malaria parasites – This can be achieved through case management and preventive treatment:

- a) 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 duration of illness and risk of mortality.
- b) Preventive Treatment – Use of chemoprophylaxis is reserved for special high-risk groups with the aim of reducing their chances of getting malaria episodes. This will be explained later.

4. Social and Behavior Change Communication, Advocacy and Community Mobilization (SBCC)– Keeping People at the Centre of the Response.

In order to achieve the national target of the Uganda National Malaria Strategic Plan (UMRSP) 2014/2020 of reducing mortality to less than 1 case per 100,000, reducing morbidity from 150 per 1000 to 30 cases per 1000 population and prevalence of Malaria to less than 7%, the Mass Action Against Malaria (MAAM) was designed.

The purpose of this strategy is to equip and engage every individual to be able to actively respond to malaria prevention and early treatment seeking behavior. Those responsible for data collection and reporting at all levels should be vigilant in accurate and prompt reporting to inform peak transmission and commodity consumption.

Mass Action Against Malaria (MAAM) initiative was designed on the premise that empowering the entire Ugandan population to own the fight against malaria through reaching all communities and households. This will accelerate Uganda to ultimately achieve malaria elimination. A multi-pronged approach is being used to reach communities including multi-sectoral and deliberate political engagement.

As health workers, we need to be committed not only to treating but actively contribute to the provision of prevention messages and interventions to patients we interact with. SBCC 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 under different slogans and messages.

Individual and family level: *"Am I Malaria free today?" Requires individuals to ensure they keep malaria free as an individual and as a family.*

Community Health Extension Workers and community leaders: *"A Malaria free village/Parish is my responsibility"*

The Health facility workers should give skills to community Health workers, through mentorship, supervision and guidance to support their communities in use of malaria prevention measures, early diagnosis and treatment of malaria cases and prompt referral of severe malaria cases for proper management. In pursuit of ***"A Malaria free village is my responsibility"***.

Health workers are responsible for providing health services to schools in their Health facility catchment areas through supply of School Health Kit (including ACTs and RDTs), and supervision of sick bays manned by school Nurses for boarding schools and Science teachers in primary day schools in line with ***"A malaria free school is my responsibility"***

5. Surveillance, Epidemic Preparedness and Response – By monitoring data on antimalarial treatment efficacy, malaria death audits and the onset of epidemics, we can prepare a response that addresses the challenge. For example, during heavy rainfall season, health workers should be prepared for an increase in the number of malaria cases especially because mosquitoes breed in stagnant water.

Summary of session:

In this session on the control and policy framework for malaria in Uganda, we learned that there are five 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 LLINs, IRS, and mosquito larval control where applicable
- * Early detection and response to malaria epidemics
- * Health education and community mobilization
- * Surveillance, Epidemic Preparedness and Response

Module 2: Evaluation of a Patient with Fever

Learning Objectives

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

- (1) Describe fever
- (2) Take detailed history in a patient with fever
- (3) Describe how to conduct a physical examination in a patient with fever

Content

Unit	Content	Activity	Time
Session 1	Description of Fever	Lecture	10 minutes
Session2	Taking History and Physical Examination of a Patient	Role play	50 minutes

Materials needed for this session

- Flipchart
- Markers for trainers to use flipchart
- Two copies of Role Play exercise instructions (one for patient, one for health worker)
- A copy of the 'History and Physical Examination of a Patient checklist' for each health worker so they can assess role play exercise
- Table for examining patient in roleplay exercise
- Pens for each participant

References and recommended readings

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

Session 2.1 Description of Fever

- ▶ In the local languages, patients and caretakers describe fever as a subjective feeling signalling 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.

Fever is common to all infections therefore; malaria should be confirmed with a laboratory test.

Characteristics of Fever

Fever can be described in three ways:

Elevation in axillary temperature

Normal body temperature (axillary temperature) is between 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, 'step-ladder' or constant. The step-ladder pattern is characteristic of typhoid fever.

Duration of fever

Can be of short duration (less than a week) or long duration (greater than a week).

Summary of the section using the points below:

In this session, we have learnt that:

Fever can be characterized in three ways:

- (1) Elevation in axillary temperature
- (2) Fever pattern
- (3) Duration of fever.

Its recommended to confirm malaria fevers with a test (microscopy or RDTs)

Session 2.2 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 like:

- Characteristics of the fever
- Patient's recent activities
- Past medical history
- Prior treatment
- Presence of other symptoms
- Presence of danger signs

Physical Assessment

In the physical assessment of a patient with fever do the following:

- Measure the temperature
- Assess for danger signs and measure 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 – Role Play Case Study (25 minutes total)

Instructions for Exercise

To demonstrate how to take the history of a patient and conduct a physical examination, two participants volunteer to participate in a role play exercise where one participant is a patient presenting symptoms of malaria and another is a health worker taking history and conducting a physical examination of the patient.

Follow the role play carefully because you will score the role play against a checklist at the end of the role-play. This feedback will be discussed in a plenary session.

Checklist for Role Play on Management of a Patient with Fever

Follow the checklist to assess the health worker performance on history taking and physical examination.

Summary of Session

In this session, we have learnt;

How to take the history of a patient with fever and conduct a physical assessment of a patient with fever. The five main components to consider when taking the history and conducting a physical examination of a patient with fever include;

History	Physical Examination
Characteristics of the Fever	Measure the temperature
Presence of other symptoms	Take the weight
Patient's recent activities	Measure the vital signs
Past medical history	Assess for danger signs
Prior treatment	Carefully examine all other systems of the body

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

Answer: _____

Module 3: Testing for Malaria

Learning Objectives

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

1. List the two methods of testing for malaria and describe why microscopy is considered the gold standard.
2. Compare and Contrast the benefits and Limitations of Malaria Microscopy and RDT
3. Describe how malaria RDT works and why they are an accurate and reliable diagnostic tool for malaria.
4. Perform a Rapid Diagnostic Test
5. Interpret RDT results
6. Identify incorrect RDT practices and explain why
7. Explain the correct procedures for disposal of waste materials

Content

Unit	Content	Activity	Time
Session 1	The two methods of testing for malaria	Lecture	10 min
Session2	Description of RDT and how it works	Lecture	30 min
Session3	Advantages and limitations of malaria Microscopy and RDT	Lecture	20 min
Session4	Performing an RDT	Lecture	30 min
Session5	Safe handling of blood and sharps	Lecture	15 min
Session6	Performing an RDT	Practical	45 min
Session7	Clinical management of a patient following an RDT result	Group Exercise	20 min
Session8	RDT quiz	Group exercise	10 min

Materials needed for this session

- Job aid on how to perform an RDT
- RDT Kits (RDT, gloves, sharps, etc)

References and recommended readings

- Training Guidelines for Malaria Diagnosis (2017)

Session 3.1 The methods of testing for Malaria

The National Malaria Control Policy recommends prompt parasite-based diagnosis by microscopy or malaria rapid diagnostic test (RDT) for all patients suspected of malaria before antimalarial treatment is administered. This new recommendation emphasizes the importance of high-quality microscopy or, where not feasible or available, quality-assured RDTs.

The purpose of the test and treat policy is to improve the quality of case management, reduce over-prescription of antimalarials and delay in the development of drug resistance.

Malaria Microscopy

This is one method of laboratory diagnosis of malaria using a microscope. It involves collection of blood samples, making smears, staining the smears and identifying the parasites under a microscope. Each species of malaria parasite has a distinctive morphological feature under a microscope. It is important to establish and report on other hematological findings on a blood slide. NMCP recommends Microscopy as the gold standard for malaria diagnosis.

Advantages

- o It is an in-expensive method in the long term
- o It gives the examiner the opportunity to quantify parasites
- o It can be used for differentiation of the malaria species
- o It provides opportunity for differential diagnosis of diseases other than malaria

Disadvantages

- o The diagnostic accuracy depends on training and competence of the user.
- o More time is required for preparation and examination of smears.
- o May be difficult to use in non-laboratory settings such as field and community.

Session 3.2 Malaria Rapid Diagnostic Test (mRDT)

Description of RDTs

RDT stands for Rapid Diagnostic Test. It is called “rapid” because it gives 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 another laboratory equipment.

What do RDTs detect?

Question: Ask the participants “What do malaria RDTs detect?”

Answer: _____

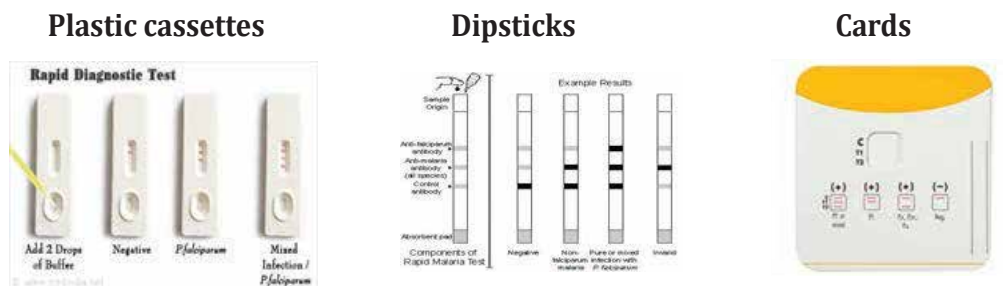
There are different types of RDTs that detect different malaria parasite antigens. The two main types of RDTs detect antigens called histidine rich protein II (HRP II) produced by *P. Falciparum* while other malaria parasites/species produce plasmodium lactate dehydrogenase (PLDH) and Aldolase a pan-malaria antigen for non-*P. Falciparum* malaria. However, all plasmodium species produce PLDH in blood Aldolase (Pan-specific).

The Pan RDTs can detect both *P. Falciparum* and non- *p. falciparum* species but cannot differentiate between *p. vivax*, *p. ovale* and *p. malariae*, nor can they distinguish pure *p. Falciparum* infections from mixed infections that include *p. falciparum*.

In Uganda, *P. falciparum* is the most predominant malaria parasite existing at 97% (MIS 2018/19). For this reason, as a country the HRP II RDTs which are *p. falciparum* specific are the most commonly used. The pan RDTs which detect more than one species of plasmodia may be adopted in future depending on available evidence to justify their use on large scale.

Formats of RDTs

The malaria RDT kits come in the following formats:



How do RDTs work?

- ▶ RDTs contain molecules called antibodies that can bind with malaria antigens in blood. If the malaria antigens are present in the blood, the antibodies in the RDT can bind to it.
- ▶ 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' are 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.

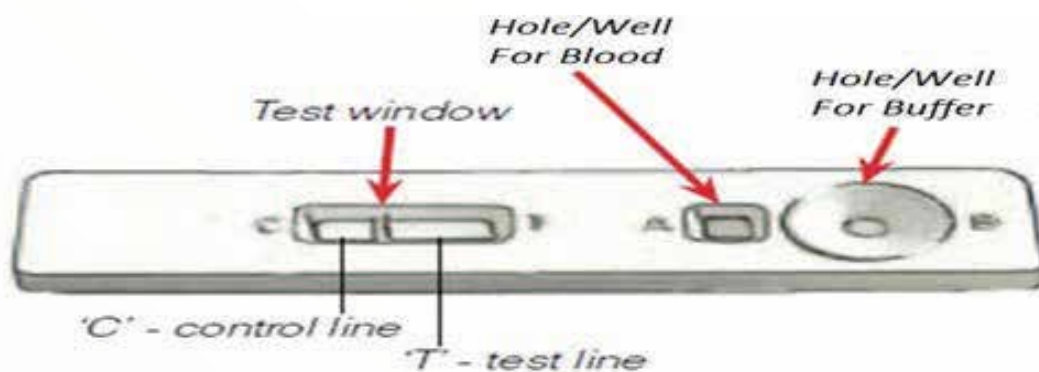


Figure 3.1: RDT design and mode of action

The RDT has a red or purple control line that should appear at the point usually 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.

Note

- > 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.
- > Malaria antigens stay in blood for up to 14 days therefore; it is possible to get a positive result even if the patient has cured of malaria after completion of an effective malaria medication.
- > This is because an RDT works by detecting an antigen 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.

Session 3.3 Advantages and limitations of RDT and microscopy

Below are some benefits and limitations of RDTs as compared to microscopy

Advantages of RDTs vs. Microscopy	Limitations of RDTs vs. Microscopy
RDTs are easy to use by any health worker compared to microscopy that requires trained laboratory personnel	RDTs cannot quantify the number of malaria parasites present in the blood whereas microscopy can. They can only test whether parasites are present or absent.
RDTs can be performed outside a laboratory setting	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 whereas microscopy detects malaria parasites.
RDTs can give results in about 15 minutes compared to microscopy	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.
RDTs do not require expensive or complicated equipment.	

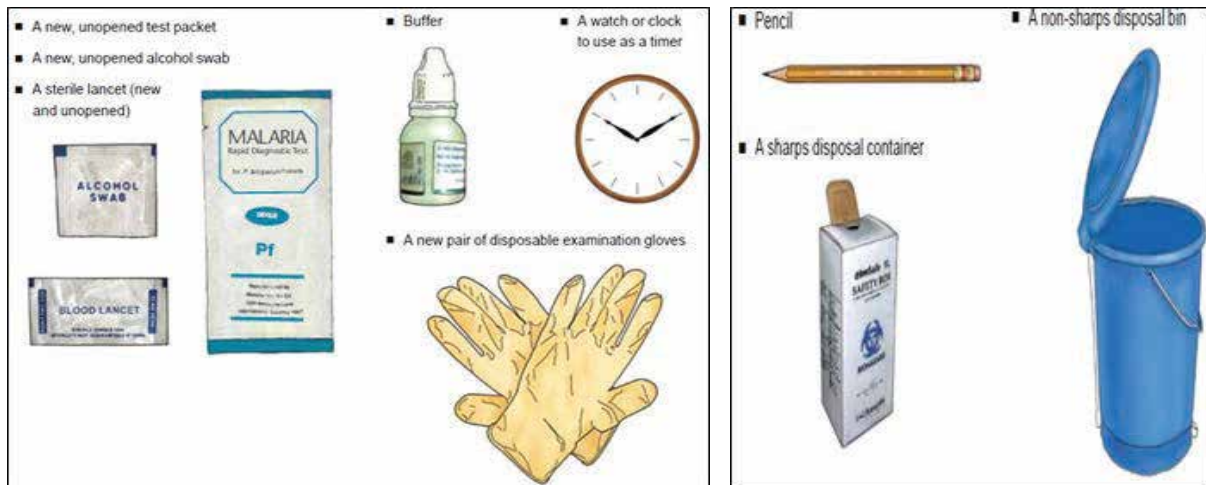
Summary of session

We have learnt that:

- > Microscopy is a gold standard but RDTs are equally accurate and reliable. The limitation of RDT is that it does not quantify the malaria parasites which may be important for patient monitoring and follow up. We have noted that RDTs give a rapid result, in 10-20 minutes, on the presence of antigens produced by malaria parasites in the blood.
- > It is important to follow the recommended steps for microscopy and mRDT to ensure accurate results.
- > 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

Session 3.4 Performing a malaria RDT

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



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 the RDT is expired DO NOT USE IT.

Step 2: Put on a pair of new examination gloves



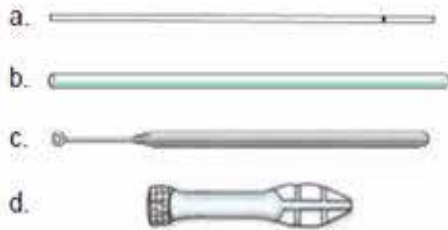
Question: Ask participants “Why is it important to wear gloves when doing this test?”

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

- As you remove each item, hold it up so that everyone can see it. Explain how each item is used in performing an RDT.
- Below are the key points to convey to the participants

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.

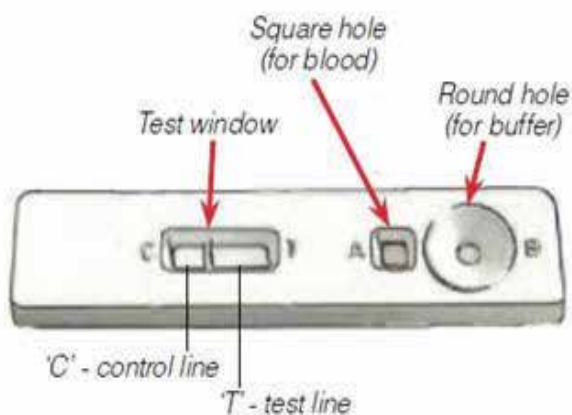


2.6.2 The desiccant sachet protects the test from humidity before the packet is opened.



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.

2.6.3 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: Ask the participants “Why is it important to write the patient’s name on the cassette?”

Answer: _____

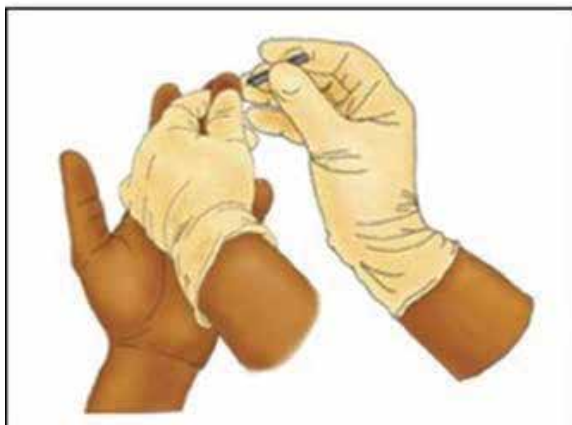
Step 5: Open the alcohol swab. Clean the patient's 4th finger

- 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.



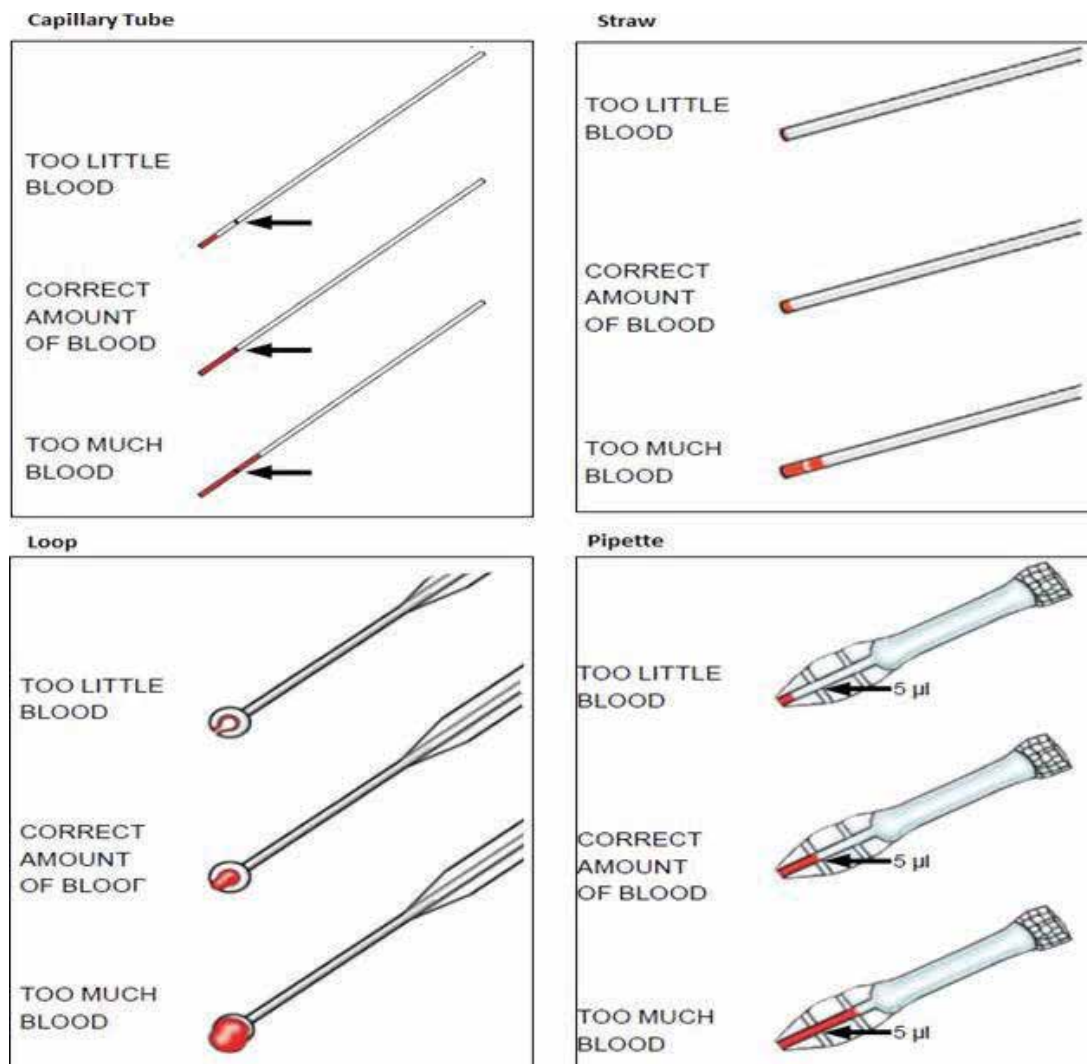
Step 6: Once the patient's finger is dry, open the lancet

- 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.
- Remind participants that every time they use a lancet, they must take all 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-sharp's 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 you are using for demonstration

- 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



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

- Explain to the participants that 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

Explain to participants that they must discard the blood- collection device into the sharps box immediately after they transfer the blood to the test cassette.

Participants should not set the blood-collection device- down on the table or anywhere else to prevent any possible accidental pricks

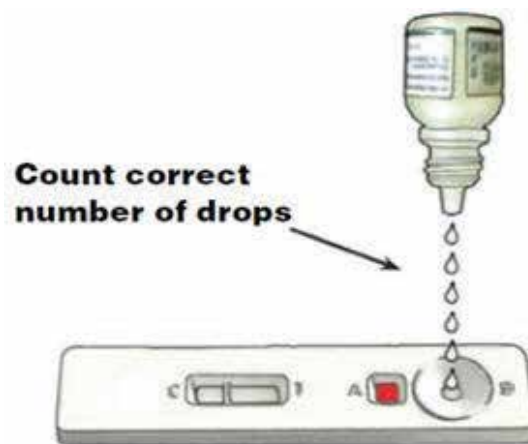


Step 10: Explain and demonstrate how to add buffer to the cassette

Question: Ask the participants “Where do we add the buffer?”

Answer: _____

- Add exactly the correct number of drops of buffer as per manufacturer’s instructions.
- Watch closely as you add the buffer.
- 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), depends on manufacturer’s guide.



Once the current time and the end time are recorded, read the test results on the cassette:

- Note that 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 eventually disappears from the results window as well, leaving only the control line (if the result is negative) and the **results line** (if the result is positive).

Step 12: Read & Record the results.

After reaching the time, as per manufacturer'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

Make sure to 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 of the session

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. Collect the droplet of blood using the blood-collection device included with the RDT you are using
8. Deposit the blood into the sample well/hole on the cassette.
9. Discard the blood-collection device after use.
10. 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. Read & record the results.
13. Remove and discard the RDT and your gloves.

Session 3.5 Safe handling of blood and sharps

Correct handling of blood and sharps is very important for your safety and the safety of your co-workers and patients. Safe handling involves protecting yourself and others from exposure to diseases that may be carried and transmitted by blood



Remember

- Always to wear gloves when working with blood, or with items that have touched blood. (This includes used alcohol swabs and cotton swabs).
- Put the lancet into the sharps box immediately after using it. If you put down the lancet after using it, you or someone else may accidentally be pricked with it. Dirty lancets can spread HIV, Hepatitis viruses and other diseases.

- Never use a lancet on more than one person. Used lancets spread HIV, Hepatitis viruses, and other diseases, it still may carry diseases.
 - Never put the lancet into the regular waste container. Only use the sharp box.
 - Put the blood loop into the sharps box immediately after the transfer of the blood to the test cassette.
 - After you have read an RDT and recorded the result in the patient's record, put the used RDT device into the waste container.
- Then it can be disposed of with the rest of the medical waste from the Health Centre, including used gloves, used spirit swabs (alcohol swabs) and other items.

Session 3.6: Participants perform an RDT and read RDT

Please follow the following steps:

1. Provide each participant with a job aid
2. Give each pair the necessary supplies to perform an RDT
3. Ask them to perform a RDT as per your demonstration and the job aid.
4. Rotate among all the groups to provide coaching where necessary.
5. After each pair completes an RDT test, group members should discuss which steps were completed correctly and which steps incorrectly.
6. Once each participant has completed an RDT, bring all participants back together into one group.
 - Ask participants to talk about their experiences carrying out the RDTs.
 - Ask which steps they found easy.
 - Ask which steps they found difficult.
7. Once participants have had a chance to discuss and ask questions, point out any important issues you observed during the practice session (e.g., trouble collecting the blood from the finger, disposing their lancet in the sharps box, etc.)

Session 3.7: Clinical management of a patient following an RDT result

1. If the test result is positive, treat the person for malaria according to national guidelines (Refer to session 5 and 6)
2. If the test result is negative, follow national guidelines for management of febrile patients who have a negative malaria test result. (Refer to session 4)
3. It is important to follow-up all patients whether positive or negative. If fever persists a few days after a negative RDT result and other appropriate management, it is important to re- test the patient with another RDT

Case 1: A patient comes in today complaining of fever in the last 2 days. He has taken an ACT which was Coartem which was left-over from a previous illness. What malaria test would you request to rule out malaria as the cause of his fever? Give reasons. What are the steps to performing the test?

Answer: _____

Case 2: A pregnant woman comes in complaining of general body weakness for 2 weeks and 3 days of fever. She is 5 months pregnant and has been taking her Fansidar for Intermittent Preventative Treatment for pregnancy (IPTp). What malaria test would you request to rule out malaria? Give reasons.

Answer: _____

Session 3.8: RDT Quiz

Review the sample tests results 1, 2 & 3 below and write down answers if the result is Negative, Positive or invalid.

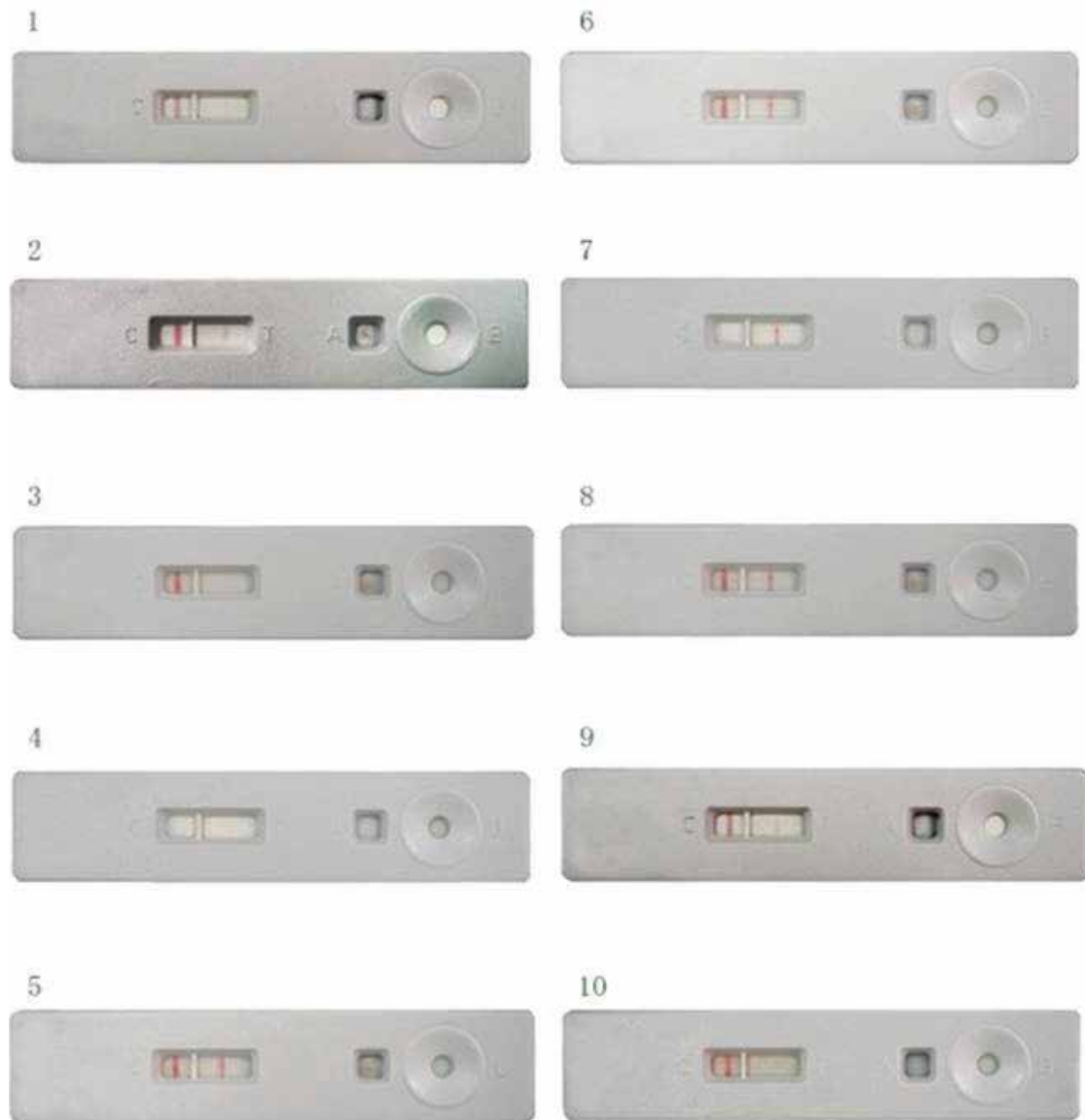
Sample Test 1

Generic Pf RDT Quiz ver.1



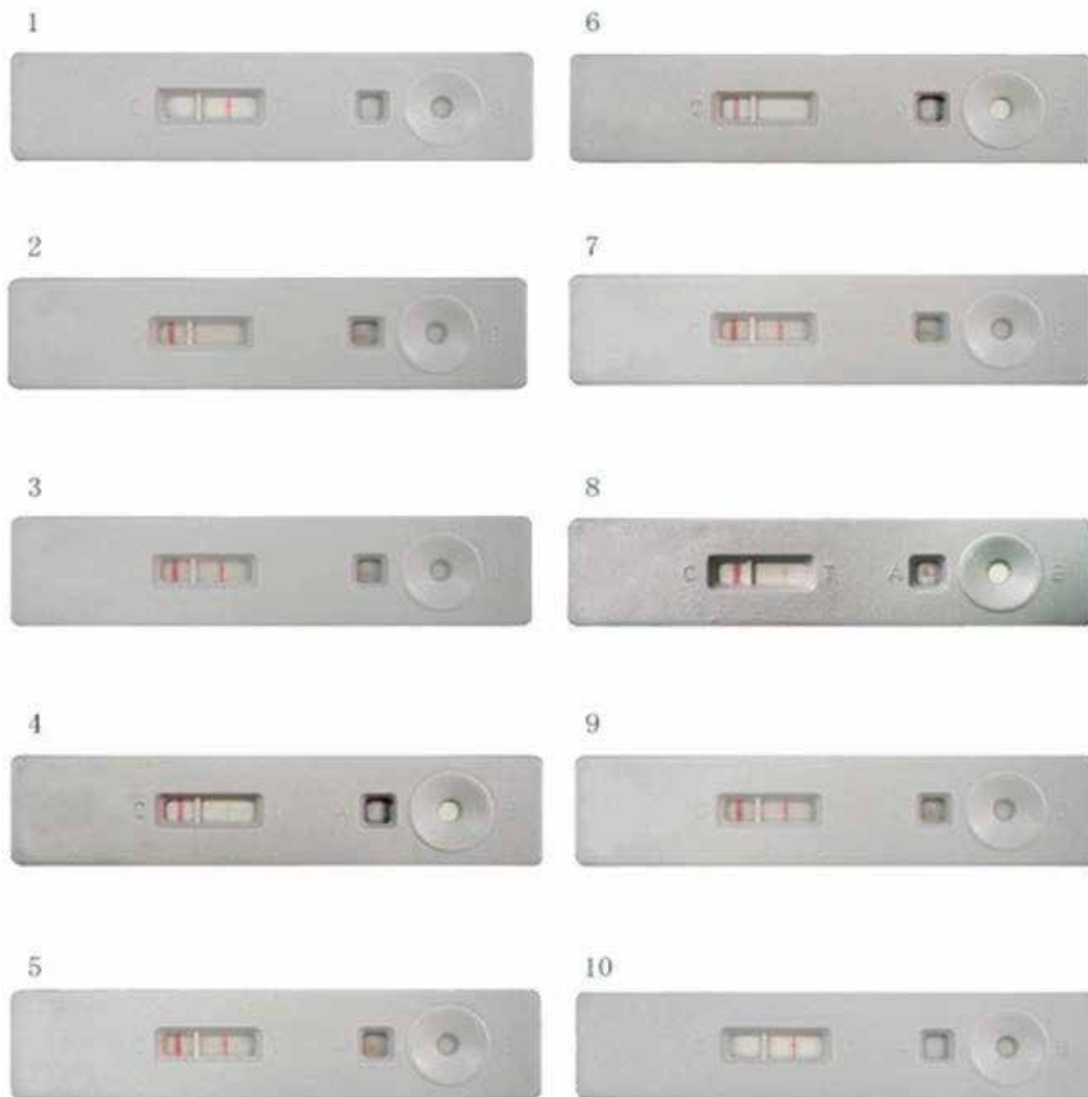
Sample Test 2

Generic Pf RDT Quiz ver.2



Sample Test 3

Generic Pf RDT Quiz ver.3



Summary of the session by using the points below

In this session, we learned that:

RDTs test for malaria antigens and are accurate for malaria diagnosis. 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 testing and reading RDT results using quizzes. Note that even faint lines near the test line "T" or "Pf" mean that an RDT is positive

Module 4: Treatment of Uncomplicated Malaria

Learning Objectives

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

1. Define the term uncomplicated malaria
2. Define antimalarial combination therapy
3. Describe the management of a patient with uncomplicated malaria

Content

Unit	Content	Activity	Time
Session 1	Uncomplicated Malaria and Antimalarial Combination Therapy	Lecture	20 minutes
Session 2	Management of a Patient with Uncomplicated Malaria	Lecture/Quiz	40 minutes

Materials needed for this session

- Flip chart
- Markers for trainers
- Pens and paper for all health workers

References and recommended readings

- None required

Session 4.1: Uncomplicated Malaria and Antimalarial Combination Therapy

What is Uncomplicated Malaria?

Uncomplicated malaria is when malaria symptoms are present but no clinical or laboratory signs to indicate severity or vital organ dysfunction.

Clinical features of Uncomplicated Malaria

Fever is the most characteristic symptom of malaria. The fever in malaria is intermittent (it's on and off)

A typical malaria episode is characterized by three stages:

- **The cold stage** is when the patient feels cold and shivers.
- **The hot stage** is when the patient feels hot.
- **The sweating** stage is associated with sweating and relief of symptoms.

Note: These classical stages may not be seen in those people with partial immunity or those that have had partial treatment.

Common symptoms of uncomplicated malaria in children

Children under 5years	Adults and children over 5 years
<ul style="list-style-type: none"> ○ Fever raised axilla temperature (above 37.5°C with a thermometer) or on touch with a back of the hand) or a history of fever ○ Loss of appetite ○ Weakness ○ Lethargy ○ Vomiting 	<ul style="list-style-type: none"> ○ Fever / history of fever ○ loss of appetite ○ Weakness ○ Lethargy ○ Nausea ○ Vomiting ○ Headache ○ Joint and muscle pains

Common signs of uncomplicated malaria

On examination, common signs of malaria include;

- A raised body temperature (above 37.5°C as taken from the axilla)
- Mild anemia (mild pallor of palms and mucous membranes); occurs commonly in children
- Dehydration (dry mouth, coated tongue, and sunken eyes). In adults, sunken eyes are usually a sign of severe dehydration.

Artemisinin –based 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 the malaria parasites in a person with malaria.

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: Artemisinin-based combination therapy (ACT). It is a combination therapy in which one of the components is an Artemisinin derivative. Examples of ACTs are shown in the table below:

Table 4.1: Examples of ACTs

Order of preference	ACT (Generic name)	Examples (Trade names)
First line	Artemether plus Lumefantrine (AL)	Luminer
		Artefan
		Coartem
		Lumartem
Alternative First line	Artesunate plus Amodiaquine (AS-AQ)	Larimal
		Falcimon
		Arsucam
		Amonate
Second Line	Dihydro-artemisinin plus Piperaquine (DP)	Duocotecxin,
		Pilaxin
		Dartep P.
New molecule ACT in the private sector yet to be adopted in our policy after TES on it	Pyronaridine Phosphate Plus Artesunate	Pyramax

Non-artemisinin-based combination therapies: These are **NOT** recommended for use in Uganda. Examples include *Sulfadoxine/Pyrimethamine plus Chloroquine (SP + CQ)* and *Sulfadoxine / Pyrimethamine 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.

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 fevers 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 majority of parasites, the partner drug “mops up” the remaining parasites. Examples of Artemisinin derivatives include; Artemether, Artesunate and Dihydro-artemisinin

Summary of the section

- In this session, we have learnt;
- The definition of uncomplicated malaria
- Common signs and symptoms of uncomplicated malaria
- The recommended treatment of uncomplicated malaria in Uganda which is Artemisinin based combination therapy.
- That monotherapies are not effective.

Session 4.2: Management of a Patient with Uncomplicated Malaria

Management of uncomplicated malaria involves specific and supportive treatment

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: 1st Line: _____
Alternative 1st Line: _____

- ▶ 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 at 0 hrs, then repeat after 8hrs then (12 hourly) for the next 2 days. Meaning treatment period is 3 days. The number of tablets per dose depends on the weight of the patient. Artemether/Lumefantrine is the first line drug for the treatment of uncomplicated malaria in all health facilities government, PNFP, private, and at community level. The medicine is safe for all age groups and all trimesters. The dose for children under five kgs will be the same as that of 5 kgs.
- ▶ For patients with P. Vivax malaria, give ACT for 3 days and test for G6PD deficiency. If G6PD is normal, give primaquine at 0.25mg/kg once daily for 14 days.
- ▶ If G6PD test unavailable or the patient has mild to moderate G6PD deficiency, give 0.75mg/kg once every week for 8 weeks under close medical supervision.

Table 4.2: Treatment schedule for Artemether/Lumefantrine (AL)

Weight (Kg)	Age	Day 1	Day 2	Day 3
<14	Birth to 3 years	1 tablet at 0 hours then 1 tablet at 8 hours	1 tablet twice (12 hourly)	1 tablet twice (12 hourly)
15-24	3 to 7 years	2 tablets at 0 hours then 2 tablets at 8 hours	2 tablets twice (12 hourly)	2 tablets twice (12 hourly)
25-34	7 to 12 years	3 tablets at 0 hours then 3 tablets at 8 hours	3 tablets twice (12 hourly)	3 tablets twice (12 hourly)
>35	12 years and above	4 tablets at 0 hours then 4 tablets at 8 hours	4 tablets twice (12 hourly)	4 tablets twice (12 hourly)

Alternative 1st line 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. Always check the pack for the correct dose of the formulation before administering to the patient.

Table 5.3: Dosing schedule for Artesunate (50mg) / Amodiaquine (153mg)

Age	Day 1	Day 2	Day 3
0 – 12 months	25mg / 76mg (½ tab)	25mg / 76mg (½ tab)	25mg / 76mg (½ tab)
1 – 6 years	50 mg / 153mg (1 tablet)	50 mg / 153mg (1 tablet)	50 mg / 153mg (1 tablet)
> 7 – 13 years	100mg / 306mg (2 tablets)	100mg / 306mg (2 tablets)	100mg / 306mg (2 tablets)
>13 years	200mg / 612mg (4 tablets)	200mg / 612mg (4 tablets)	200mg / 612mg (4 tablets)

Note: Always remember to read the manufacturers' instructions before use especially when using different: brands.

► **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:**

It is given when the patient doesn't improve or relapses less than 28 days from correct dose and compliance to the 1st line or alternative 1st line treatment.

A. Dihydro-artemisinin plus Piperaquine

This is a co-formulated tablet containing 40mg of Dihydro-artemisinin (DHA) and 320mg of Piperaquine (PPQ). Some brands like D-Arrtepp has double strength molecules

The dose is 2.5mg/kg body weight (DHA) and 20mg/kg (PPQ) for children below 25Kg and 2.0mg of dihydro artemesin and 16mg of piperaquin for children equal or more than 25 kgs . Dispersible tablets are available. The common brands are D-Artepp and Duocotexin.

Table 5.4: Dosing schedule for Dihydroartemisinic / Piperaquine

Weight (kg)	Age	Day 1	Day 2	Day 3
≤ 9.9	0 months – 1 year	½ tablet (20mg/160mg)	½ tablet (20mg / 160mg)	½ tablet (20mg / 160mg)
10 – 19.9	2 – 7 years	1 tablet (40mg / 320mg)	1 tablet (40mg / 320mg)	1 tablet (40mg / 320mg)
20 – 39.9	8 – 13 years	2 tablets (80mg / 640mg)	2 tablets (80mg / 640mg)	2 tablets (80mg / 640mg)
40 – 64.9	Adult	3 tablets (120mg / 960mg)	3 tablets (120mg / 960mg)	3 tablets (120mg / 960mg)
60-80kgs	Adult	4 tablets (160mg / 1280mg)	4 tablets (160mg / 1280mg)	4 tablets (160mg / 1280mg)
>80ks	Adult	5 tablets (200mg / 1600mg)	5 tablets (200mg / 1600mg)	5 tablets (200mg / 1600mg)

Note:

- i. Always read the manufacturer's insert.
- ii. For tablets that are not scored, use a surgical blade to cut to the appropriate dosing.

Body Weight	Product Description	Day 1 Dose	Day 2 Dose	Day 3 Dose
5kg to < 8kg	D-ARTEPP Dispersible Dihydroartemisinin / Piperazine (20 mg / 160 mg)	1 Tablet	1 Tablet	1 Tablet
8kg to < 11kg		1.5 Tablet	1.5 Tablet	1.5 Tablet
11kg to < 17kg		2 Tablets	2 Tablets	2 Tablets
17kg to < 25kg	D-ARTEPP Dispersible Dihydroartemisinin / Piperazine (40 mg / 320 mg)	1.5 Tablet	1.5 Tablet	1.5 Tablet
25kg to < 36kg		2 Tablets	2 Tablets	2 Tablets
36kg to < 60kg	D-ARTEPP Dihydroartemisinin / Piperazine (40 mg / 320 mg)	3 Tablets	3 Tablets	3 Tablets
60kg to < 80kg		4 Tablets	4 Tablets	4 Tablets
> = 80kg		5 Tablet	5 Tablets	5 Tablets
60kg to < 80kg	D-ARTEPP Dihydroartemisinin / Piperazine (80 mg / 640 mg)	2 Tablet	2 Tablet	2 Tablet
>=80kg		2.5 Tablets	2.5 Tablets	2.5 Tablets

Figure 5.1: Dosing schedule for Dispersible Dihydroartemisinin/Piperazine D-ARTEPP brand

Alternative second line Treatment

- A. Quinine: Oral Quinine is the alternative second line for managing uncomplicated malaria.

Table 5.6: Treatment schedule for Quinine

Weight (Kgs)	Age	Dose (Every 8 hours for 7 days)
5 – 10	3 months – 1 year	¼ tablet (75mg)
10 – 18	1 – 5 years	½ tablet (150mg)
18 – 24	5 – 7 years	¾ tablet (225mg)
24 – 30	7 – 10 years	1 tablet (300mg)
30 – 40	10 – 13 years	1¼ tablets (375mg)
40 – 50	13 – 15 years	1½ tablets (450mg)
> 50	> 15 years	2 tablets (600mg)

B. Pyronaridine Tetrphosphate / Artesunate (PYRAMAX)

This is a newly registered ACT in Uganda available for use in the private sector. Its reported to be effective against P. Vivax but to be field tested through Therapeutic Evaluation Studies in our settings before considering it as 1st or 2nd line.

Table 5.5: Treatment schedule for Pyronaridine Tetrphosphate / Artesunate

PYRONARIDINE TETRAPHOSPHATE/ ARTESUNATE (PYRAMAX)				
Body Weight	Product Description	Day 1 Dose	Day 2 Dose	Day 3 Dose
5kg to < 8kg	Pyronaridine / Artesunate (60mg / 20mg) Sacket granules for Oral Suspension	1 Sachet	1 Sachet	1 Sachet
8kg to < 15kg		2 Sachets	2 Sachets	2 Sachets
15kg to <20kg		3 Sachets	3 Sachets	3 Sachets
20kg to < 24kg	Pyronaridine / Artesunate (180mg / 60mg) Film Coated Tablet	1 tablet	1 tablet	1 tablet
24kg to < 45kg		2 Tablets	2 Tablets	2 Tablets
45kg to < 65kg		3 Tablets	3 Tablets	3 Tablets
> = 65kg		4 Tablets	4 Tablets	4 Tablets

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 38.5oC. 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

Question: Ask all participants to brainstorm common errors in the management of uncomplicated malaria.

Answer: Participants may come up with many different answers. Here are the most important ones. It is important to explain why each of the answers could cause serious harm to patients.

Common errors in management of Malaria

Common Error	Rationale
Presumptive treatment of malaria	Mistreatment of true illness; wastage of antimalarial medicines; potential for development of resistance to antimalarial medicines
Delay in starting antimalarial therapy	Progression to severe disease
Partial treatment or incorrect dosages	Progression to severe disease; potential for development of resistance to antimalarial medicines
Monotherapy	Progression to severe disease or death; potential for development of resistance to antimalarial medicines
Delay or failure to refer a patient who needs referral	Progression to severe disease or death
Inappropriate route of administration of the medicines (e.g. giving a patient with severe malaria oral treatment)	Progression of symptoms or death
Failure to recognize severe malaria	Progression of symptoms or death
Failure to recognize and treat other conditions	Failure of patient to recover and progression of complications of the other conditions

Summary of the session:

In this session, we have learnt that:

The management of uncomplicated malaria include specific and supportive treatment

- Specific treatment – This involves use of an effective antimalarial
- Supportive treatment – This is 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 and Artesunate/Amodiaquine is the 1st line alternative treatment.

Dihydro-artemisinin / Piperaquine is the 2nd line treatment for patients that fail to respond to the 1st line treatment and quinine is the alternative second line treatment

Module 5: Management of a Patient with Severe Malaria

Learning Objectives

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

1. Define severe malaria
2. Outline the high-risk groups likely to get severe malaria
3. Describe the different presentations of severe malaria.
4. Explain how to make a diagnosis of severe malaria
5. Describe the treatment and management of a patient with severe malaria

Content

Unit	Content	Activity	Time
Session 1	Introduction and Diagnosis	Role play on making an accurate diagnosis	90 minutes
Session 2	Treatment and Management of Complications	Exercise on Triage and interactive question and answer on the management of complications. Activity on the administration of Artesunate.	120 minutes
Session 3	Follow up and other tips on the management of severe malaria	Exercise on creating a timeline for follow-up and key activities that need to be performed	30 minutes
Session 4	Ward Visit	Visit a health facility ward to see how severe malaria is treated <i>(note: this is to be completed on a different day than Parts 1-3)</i>	2 hours

Materials needed for this session

- Handout: Classical definition of severe malaria
- Handout: Patient History and Physical Evaluation Checklist (Steps for a diagnosis of Severe Malaria patient)
- Handout: Signs of Triage Priority Groups
- Job aid: Administering IV Artesunate
- IV Artesunate Administration Activity
 - i. IV Artesunate Vials – Artesunate 60 mg.
 - ii. Note: Please ensure you have one vial for every three participants.
 - iii. Gloves - Note: Please ensure you have one vial for every three participants.
 - iv. Syringe – Note: Please ensure you have one syringe for every three participants
 - v. Water for Injection – Note: Please ensure you have one for every for every three participants

Session 5.1: Severe Malaria Introduction and Diagnosis

Introduction

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

In Uganda, approximately 5% of cases of Malaria develop severe Malaria. Approximately 9 – 14% of all health facility deaths are attributed to malaria.

Congenital malaria with a confirmed positive malaria test result should be treated according to presentation. If there are no signs of severe malaria, manage as uncomplicated but if there are signs of severe disease, then manage as severe malaria.

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

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 is a positive blood film or RDT and any of the features outlined in Table 6.1 below.

Question: What are the complications that indicate severe malaria?

Answer:

Table 6.1: Classical definition of severe malaria

COMPLICATION	CRITERION FOR DIAGNOSIS (Clinical or Laboratory finding)
Cerebral malaria	<i>Positive malaria test with</i> Deep coma (unable to localize a painful stimulus), Normal CSF
Severe anaemia	<i>Positive malaria test with</i> Hb < 5g/dl
Respiratory distress	<i>Positive malaria test with</i> Tachypnoea, nasal flaring and intercostal recession in a patient
Hypoglycaemia	<i>Positive malaria test with</i> Blood glucose <60 mg/dl (3.0 mmol/L)
Circulatory collapse	<i>Positive malaria test with</i> Clinical shock (systolic pressure <50 mmHg for children and < 80mmHg for adults, with cold extremities and clammy skin)
Renal failure	<i>Positive malaria test with</i> Urine output < 12 ml/kg/24hrs and plasma creatinine > 3.0mg/dl
Spontaneous bleeding	<i>Positive malaria test with</i> unexplained spontaneous bleeding
Repeated convulsions	<i>Positive malaria test with</i> 2 or more convulsions in 24 hours
Acidosis	Deep (acidotic) breathing, Plasma bicarbonate < 15 mmol/L, with <i>Parasitaemia</i>
Haemoglobinuria (Black water fever)	<i>Positive malaria test with</i> haemoglobin in urine (dark colored' urine but no RBC's) Black water fever if passing dark / red urine with a positive RDT or parasitemia, myoglobin, protein, haemoglobin in urine with renal involvement.
Pulmonary Oedema	<i>Positive malaria test with</i> deep breathing, fast breathing, laboured breathing (nasal flaring, intercostal recession and chest in-drawing), Cheyne stokes breathing
Impaired Consciousness	Parasitaemia with depressed level of consciousness but can localize a painful stimulus
Jaundice	Parasitaemia with unexplained jaundice

Laboratory Diagnosis using Microscopy and interpreting parasite Load

Result	Number of visible parasites on Microscopy per 100 thick film
+	1 – 10 parasites per 100 thick film fields
++	11 – 100 parasites per 100 thick film field
+++	1 – 10 parasites per one thick film field (hyper-parasitaemia)
+++ +	>10 parasites per one thick field

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

Session 5.2: Treatment and Management of Severe Malaria Complications

5.2.1 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

Cerebral malaria in adults

An adult with cerebral malaria will present with Unarousable coma with a Glasgow coma scale of less than 10/15 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%

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

Emphasis:

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.

Table summarizing description of the severe malaria complications

Complication	Description of the complication
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 60 mg/dl (3.0 mmol/L). The patient may have mental confusion, extreme weakness, sweating, convulsions and may be in coma. The patient's condition may rapidly deteriorate despite 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 0.5-1.2mg/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. Emphasize: Take note of subtle convulsions such as nystagmus, fixed conjugate gaze and frothing of saliva and treat them as if they are full convulsions
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.
Hemoglobinuria or Black water fever	The patient presents with, hemoglobin or myoglobin or protein in urine that is characterized by 'dark coloured' urine normally described as tea coloured urine with positive Uri sticks test for blood but no red blood cells on microscopy. This is due to the hemolyzed cell by the parasites but sometimes it may be due to massive intravascular hemolysis which is induced by drugs such as quinine especially in patients with glucose 6 phosphate dehydrogenase (G6PD) deficiency. Not all patients who present with dark urine have severe malaria, there are other causes like; acute glomerulonephritis, sickle cell disease, G6PD deficiency, autoimmune etc. Some artemisinin derivatives have been associated with black water fever and delayed hemolysis but this is rare.
Respiratory distress in children	Deep breathing (Acidotic breathing, acidotic fetor or sweet smell of the breath); Fast breathing due to high temperature or anaemia; Labored 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: _____

Table 5.2: Differences between severe malaria in adults and children (WHO, 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
Haemoglobinuria or black water fever	Rare	Common

Emphasize:

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

Assessing fast breathing by age

Age bracket	Cut off for fast breathing
(0 – 2 Months	≥ 60 breaths per minute
2 – 12 Months	≥ 50 breaths per minute
1 – 5 Years	≥ 40 breaths per minute
Adults	> 20 breaths per minute

Groups at high risk of getting severe malaria

Quiz: Ask the participants to list the high-risk groups for severe malaria

Answer:

<input type="radio"/>		<input type="radio"/>	
<input type="radio"/>		<input type="radio"/>	
<input type="radio"/>		<input type="radio"/>	
<input type="radio"/>		<input type="radio"/>	

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 or RDT.

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

A complete history has two important aims:

- Identifying other possible diagnosis
- Assessing for complications

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

Activity:

Taking a detailed history.

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

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

Step 1: Take the History of the Patient

(a) Understand the Symptoms

Sign / Symptom	Enquiry	Patient's response
Fever	<ul style="list-style-type: none"> ○ When did the fever start? <i>Answer: Two days ago</i> ○ What other symptoms are associated with the fever? ○ Is there a pattern to the fever? 	<ul style="list-style-type: none"> ○ <i>Two days ago</i> ○ <i>General weakness</i> ○ <i>No</i>
Convulsions	<ul style="list-style-type: none"> ○ Have there been convulsions? What type, when, how many, and how long? ○ Is there abnormal movements and posture? Try to distinguish from unconsciousness for which the same word is used in many languages. 	<ul style="list-style-type: none"> ○ <i>Yes, one in the last 24 hours</i> ○ <i>No</i>
Altered state of consciousness	<ul style="list-style-type: none"> ○ Is there an altered state of consciousness? For example, is there drowsiness or a deteriorating level of consciousness or coma? 	<ul style="list-style-type: none"> ○ <i>Deteriorating level of consciousness</i>
Urine	<ul style="list-style-type: none"> ○ Is there passing of dark urine, little or no urine? Dark urine looks like dry tea 	<ul style="list-style-type: none"> ○ <i>The patient's urine is dark</i>
Change of Behavior	<ul style="list-style-type: none"> ○ Can be asked to relatives or guardians ○ Has the behaviour of the patient changed in the last 4 weeks? 	<ul style="list-style-type: none"> ○ <i>General weakness</i> ○ <i>Altered state of consciousness</i>

Other symptoms

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

(b) Understand the drugs taken for current illness

What anti-malarials and other drugs is the patient currently taking for this illness or other illnesses?

What have been the doses and duration?

Have there been any adverse reactions to drugs taken in the past?

(c) Previous illnesses and treatment

Health worker Enquiry	Response
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.	No
Does the patient have any chronic illnesses? For example, sickle cell disease, diabetes mellitus, HIV/AIDS and other co morbidities.	No
What current medications is the patient on? For example. ARVs, anti-epileptics, anti-hypertensives, anti-psychotics	None
Has the patient been admitted previously and why?	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.	No

(d) Geographical, travel and family social history

Health worker enquiry	Patient response
Where have they recently travelled to?	No travel
What have they been doing? (Contact with animals?)	No contact with animals
What has been their type of housing / sleeping arrangements?	No mosquito net
Have they been near heavy vegetation, water bodies and possible breeding sites for mosquitoes?	No
How many people live in their home, what do they do, and what is their diet like?	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, chickenpox, tuberculosis.	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 LLIN. 3 If the patient is between the ages of 15 – 45, it should be assumed that the patient is pregnant. Answer: 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. Assessing for complications

a) Record the vital signs

Measure and 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
- 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
- Jaundice
- Bleeding tendency: Look for spontaneous bleeding from the gums in the skin sub-conjunctival or prolonged bleeding at venepuncture 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.
- Is there neck stiffness and Kernig's sign?
- What are their reflexes like?
- Are there any cardiopathies

Respiratory system

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

Cardiovascular 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: Have a discussion with the class at the end of the role-play asking questions below;

1. Is it likely that the patient has severe malaria?
2. What did the health worker do well? What could the health worker have improved on?

Step 5: 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: _____

Question: What are among the investigations you should request for?

Answer: (i) _____
(ii) _____
(iii) _____

In the presence of some conditions, a lumbar puncture is contraindicated.

What conditions are these?

Essential Laboratory investigations

- Thick blood film or RDT and thin blood film for malaria parasites⁴. The thick smear or RDT screens for the malaria parasites and the thin film is for typing the plasmodium.
- Blood glucose determination; For any patient with altered consciousness, confusion or convulsions.
- Hemoglobin level (Hb) and Hematocrit (Packed Cell Volume (PCV)) estimation should be done in all patients suspected of having severe Anaemia.
- Urinalysis; For patients presenting with dark urine
- 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 is 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 papillo-edema (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 un-resolving 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 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:

Investigations during management

Some investigations will be equally, or more, valuable if repeated during the treatment course, 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 be driven by the judgment of the clinician. Often, repeat investigations will not be needed if the patient's status is improving.

Summary of the section:

- It is important to 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

Session 5.3: Treatment and Management of a Patient with Severe Malaria

Management of severe malaria is a team effort and involves the clinicians, nurses, pharmacists/ dispensers, laboratory staff and the administration. It involves the following;

- Priority Triage
- Antimalarial chemotherapy
- Management of complications
- Regular Monitoring
- Continual treatment

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.

Emphasis: Most of the severe malaria patients will fall in category 1

Activity: The “Signs of Triage Priority Groups” handout (Appendix 7)

Table 5.3a: Emergency signs in severe malaria – RED CODE (Answers to Handout)

	Emergency Sign
i.	Obstructed airway
ii.	Central cyanosis
iii.	Severe respiratory distress (<i>Rapid weak pulse</i>)
iv.	Cold and blue hands (<i>cold extremities</i>)
v.	Slow capillary refill (<i>more than 3 seconds</i>)
vi.	Lethargy or unconsciousness
vii.	Sunken eyes
viii.	Very slow skin pinch
ix.	Convulsions at the time of examination
x.	Severe anaemia (<i>severe pallor of palms and mucous membranes</i>)

Table 5.3b: Priority signs in severe malaria – BLUE CODE (Answers to Handout)

	Priority Signs in Severe Malaria
i.	Convulsions or fits in the last 2 days
ii.	Notable to drink or breastfeed
iii.	Vomiting everything
iv.	Altered
v.	Prostration or extreme weakness (<i>unable to stand or sit without support</i>)
vi.	Respiratory distress
vii.	Dehydration (<i>coated tongue, lethargy, in ability to drink</i>)
viii.	Severe malnutrition
ix.	A sick young infant (<i>less than 2 months</i>)
x.	Cases that have been assessed and referred from another health facility with; <i>Temp. >39.5°C, Trauma, Poisoning Restless, Burns, Oedema of both feet</i>

Treating severe malaria

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

Question: Which of the drugs below is the first choice for the treatment of severe malaria?

- (a) IV or IM Quinine
- (b) Injectable Artemether
- (c) IV or IM Artesunate

Answer: _____

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 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.
- Artesunate offers several programmatic advantages over quinine; Requires fewer logistics, no rate-controlled infusion or cardiac monitoring and is administered for a shorter duration.

How do you administer parenteral Artesunate?

Activity:

In groups of 7 to 10 participants, reconstitute Artesunate for IV and IM for a child weighing 11kg patient. Half of the class will reconstitute for IV administration and the other half for IM administration.

In your respective groups, ensure to have; one vial of Artesunate, one Bicarbonate ampoule, one pair of gloves, one syringe, and one vial of water for injection.

Figure 5.1 – Job Aid on how to administer Artesunate

GUIDELINES FOR ADMINISTRATION OF INJECTABLE ARTESUNATE FOR SEVERE MALARIA

PRODUCT DESCRIPTION 1

Dose: For children < 20 kg: 3.0 mg/kg
For children > 20 kg and adults: 2.4 mg/kg
Can be given by intravenous route (IV) or intramuscular route (IM).
IV is the preferred route of administration.
Please refer to the patient information leaflet for more information.
*Water for injection is not an appropriate dilutant



Artesunate powder 60mg

Bicarbonate ampoule

Saline solution

Artesunate reconstituted solution

1 WEIGH THE PATIENT

2 DETERMINE THE NUMBER OF VIALS NEEDED

Weight	less than 25 kg	26-50 kg	51-75 kg	76-100 kg
60 mg vial	1	2	3	4

3 RECONSTITUTE

■ Activate the drug: artesunate powder + bicarbonate ampoule (immediately before use)

A Artesunate powder + bicarbonate ampoule

B Inject full contents of ampoule (1 ml) into artesunate vial.

C Shake until dissolved. Solution will be cloudy. Discard if not clear.

D The reconstituted solution is now ready for use.

4 DILUTE

■ Reconstituted artesunate + saline solution (or dextrose 5%)

	IV	IM
Bicarbonate solution volume	1 ml	1 ml
Saline solution volume	5 ml	2 ml
Total volume	6 ml	3 ml

Artesunate 60 mg solution concentration: 10 mg/ml | 20 mg/ml

A Artesunate reconstituted solution + saline solution

B Withdraw all the air from the vial.

C Inject required volume of saline into the reconstituted solution.

D Artesunate solution is now ready for use.

1. World Health Organization (WHO). Use of Paquetal Medical Products (<http://www.intramuscularly/intramuscularly.asp?lang=es>).
2. World Health Organization. Management of Severe Malaria - A practical handbook - Third edition - April 2013. (<http://www.who.int/malaria/publications/whos20130426/9789241546528/whome.html>)

WHO RECOMMENDED TREATMENT 2

6 ADMINISTER

IV: slow bolus 3-4 ml per minute.



IM: inject slowly. Spread the doses of more than 2 ml over different sites for babies and 5 ml for adults.



7 DOSING SCHEDULE

- Give 3 parenteral doses over 24 hours as indicated in the opposite table
 - Give parenteral doses for a minimum of 24 hours once started irrespective of the patients ability to tolerate oral treatment earlier.
 - Day 1 Dose 1: on admission (0 Hours)
 - Day 1 Dose 2: 12 hours later
 - Day 2 Dose 3: 24 hours after first dose
- When the patient can take oral medication, prescribe a full 3-day course of recommended first line oral Artemisinin Combination Therapy (ACT).
The first dose of ACT should be taken **between 8 and 12 hours** after the last injection of artesunate.
- Until the patient is able to take oral medication, continue parenteral treatment (one dose a day) for a **maximum of 7 days**.
- A course of injectable artesunate should always be followed by a 3-day course of ACT.
- Evaluate the patient's progress regularly.

IMPORTANT

- Prepare a fresh solution for each administration.
- Discard any unused solution after use.

This document is intended to demonstrate to health workers how to prepare and administer injectable artesunate. It is not intended to be used as a substitute for the product information and use of this material lies with the reader. In no event shall MMV be liable for damages arising from its use.

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Remark: the upper limit for each weight band is 0.9 kg e.g. 14 - 16 kg covers 14 - 16.9 kg.

Key to note during Artesunate administration

Parenteral Artesunate is the preferred treatment in Uganda for all children and adults including pregnant women in all trimesters for severe Malaria.

Recommended Dosages:

Give 3.0mg/kg body weight for children below 20kg or 2.4 mg/kg body weight for adults and children above 20kg IV or IM stat, repeat after 12 hours and 24 hours (from the first dose), then once daily until patient can swallow, for up to six days.

Once patient is stable and can take oral medications, discontinue parenteral therapy and commence a full course of recommended oral (ACTs)

There should be an interval of at least 8 hours between the last dose of Artesunate and the first dose of AL.

Reconstitution of injectable Artesunate

Parenteral Artesunate 60mg must be reconstituted by 1ml of sodium bicarbonate supplied in the pack

Dilution of injectable Artesunate

Dilute the reconstituted Artesunate with 5 ml saline solution for IV or 2 ml saline solution for IM.

A fresh solution should be prepared for each administration. Do not use Artesunate that has been reconstituted or diluted for more than an hour. Discard unfinished vials.

Artesunate should only be diluted with 5% dextrose solution or normal saline (0.9% sodium chloride). Do not use water for injection.

i. Calculate the number of vials of injectable artesunate needed

ii. Reconstitute as follows:

- Gather all the item needed (Artesunate powder and the bicarbonate ampule)
- Inject contents of bicarbonate ampoule into artesunate vial
- Shake gently for 2 – 3 minutes until the powder dissolves. The solution will be cloudy. The solution will become clear in a minute.

Remember: Do not shake too vigorously. If the solution does not become clear, it cannot be used.

1. Dilute
 - i. Determine saline required using the chart on the job aid
 - ii. Inject required volume of saline solution into reconstituted solution
2. Determine dose needed in ml using the chart on the job aid
3. Review the dosing schedule

Using parenteral Quinine or Artemether as the alternatives 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/kg bodyweight 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 AL

Note: 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 cardiotoxicity 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, haemoglobinuria, black water fever, 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, & 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 A/L.

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 every day 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 anti malarial used for uncomplicated malaria (currently AL)

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:

- Start immediate resuscitation measures using the ABCD (Airway, Breathing, Circulation, Drugs) procedure.
- Position the patient in the left lateral position if unconscious.
- Establish I.V access, if possible, for rehydration and administration of drugs.
- Take the necessary blood samples for investigations
- Manage immediate complications appropriately
- Start definitive treatment for severe malaria
- Ensure proper nursing care;

Emphasize:

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

Keep the patient warm

Correctly position patient if unconscious and turn every 2 hours 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.

Treatment of specific complications of severe malaria

Question: A patient has severe malaria with signs and symptoms of low blood sugar (less than 60 mg/dl (3.0 mmol/L). How do you treat this patient?

Answer: _____

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

Answer: _____

Question: How much blood do you infuse?

Answer: _____

Severe Anaemia:

If PCV is below 15% or Hb is below 5g/dL, the patient has severe anaemia. 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 10-15 ml/ kg of packed cells. For severely malnourished children we give 10mls/kg of packed cells.
- For severely dehydrated patients with severe anaemia, give 20mls/kg of whole blood.
- 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 hyper-parasitaemia.

Indications for transfusion in adults and children with Malaria:

- Hb Less than 6g/dl with hyper-parasitaemia
- 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 for transfusion. Give appropriate pre-referral treatment before referral.
- For patients with malaria and passing dark/ tea coloured urine, transfuse with if Hb is below 7mg/dl.

Question: Can someone demonstrate a convulsion? [Let a participant demonstrate].
How should convulsions be treated?

Answer: _____

Management of 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 persist, other anticonvulsants than can be used in order of preference are;
 - **Phenobarbitone:** 15mg/kg given slowly I.V. as a loading dose OR
 - **Phenytoin:** 15mg/kg given slowly I.V. as a loading dose

NOTE:

- For any convulsions, always look for associated factors like hypoglycaemia or 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).

Establish an intravenous line. Assume hypoglycaemia and give dextrose. 2 mls/kg of 25% dextrose or 5ml/kg of 10% dextrose (as a bolus).

Insert a naso-gastric tube for feeding

Question:

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

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

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:

Children 2 - 12 months: Use: _____ Dose ____ml/Kg first hour then ____ml/Kg over next five hours

Children older than 12 months and adults: Use: _____ Dose ____ml/kg first half hour then ____mg/kg next 2½ hours

Keep monitoring the hydration status and act accordingly.

Dehydration:

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. For severe dehydration use treatment plan C: intravenous rehydration in a health facility.

- For Children 2 – 12months with severe dehydration give 30ml/kg in the first 1 hour then 70 ml/kg in the next 5 hours.
- 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.
- Keep monitoring the hydration status and act accordingly
- For severely malnourished children with dehydration, give Resomal 5mls/kg. In severe dehydration, give 5mls/kg every 30mins for the first 2 hours, then if better continue with 5mls/kg alternating with F75 every hour for 10hrs then re-assess.
- For severely malnourished children with some dehydration, give Resomal at 5mls/kg alternating with F75 every hour for up to 10hrs, then re-assess. Keep monitoring the respiratory rate, pulse and weight, if signs of overhydration, stop the Resomal and other fluids.

Question: How do you treat acidosis?

Answer: _____

Acidosis

- 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°. Do pulse oximetry, give oxygen and a diuretic such as Frusemide 1-2 mg/ kg/24hours in 3 divided doses. Restrict I.V fluids.

See table below showing Oxygen dosing for management of hypoxia

Table showing Oxygen dosing for management of Hypoxia

Age	Dose
0 – 1 month	0.5 – 1 litre per minute
1 - <3 years	1 – 2 litres per minute
3 – 5 years	2.5 – 3 litres per minute
>5 years	3 – 4 litres per minute

NOTE: Titrate dose according to the response as observed by Pulse oximetry

Question:

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

Answer:

- a) _____
- b) _____
- c) _____

Hyperpyrexia:

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

Hemoglobinuria:

- Rehydrate patients, to avoid the accumulation of hemoglobin 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

Monitoring a patient with severe malaria complications

Table 5.4: Important observations in management of Severe Malaria and their implications

Regular observations	Possible abnormality	Appropriate Action
Coma score	Deterioration	Check blood glucose to rule out hypoglycaemia. Consider other diagnoses such as meningitis.
Breathing	Increased rate or difficulty Deep breathing in children	Review fluid input and output to rule out fluid overload and possible pulmonary oedema. Examine the lungs to make sure it is not pulmonary oedema, aspiration pneumonia or acidosis, the heart and liver to rule out heart failure and treat appropriately. Chest X-ray if available.
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
Blood pressure	Systolic pressure: <80mmHg in an adult, or <50mmHg in infants and children. In children, BP is not reliable: check for delayed peripheral perfusion / capillary refill 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.
Fluid balance (input and output chart); Especially in patients with acute renal failure and/or pulmonary oedema	Oliguria: <17 ml/hour in an adult (< 400 ml in 24 hours) or <0.3 ml/kg/hour in children	Review adequacy of hydration and infusion. Correct deficit if necessary. Prevent or manage acute renal failure if present.

Table 5.4 Continued: Important observations during treatment and their implications

Regular observations	Possible abnormality	Appropriate actions
Convulsions (Subtle convulsions can be easily missed)	<p>These can recur or develop for the first-time during treatment.</p> <p>They may be due to malaria, to high fever, abnormal blood glucose levels, electrolyte imbalance, or be part of the disease spectrum.</p> <p>Often convulsions are accompanied by reduced levels of consciousness.</p>	<p>Check axillary temperature and if >38.5°C, manage as above.</p> <p>Check blood glucose to rule out hypoglycaemia</p> <p>Check fluid balance</p> <p>Check electrolytes if possible. There is a risk of hyponatraemia.</p> <p>Correct any cause and give anti-convulsant medicine.</p>
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.
B. Laboratory		
Blood glucose	<p>Hypoglycaemia</p> <p>Blood glucose falls below 3.0 mmol or 60mg/dl</p>	Review infusion. A child will become hypoglycaemic if deprived of glucose for more than 12 – 24 hours. Correct hypoglycaemia
Packed cell volume or haemoglobin concentration	<p>PCV <15%</p> <p>Hb < 5 g/dl</p>	Consider need for transfusion. Group and crossmatch blood but give only if clinically indicated. Repeat PCV or Hb at regular intervals.
Parasitaemia	Remains high for 2 – 3days, or remains positive for > 5 days	Review adequacy of antimalarial medicine and dosage. Consider alternative or give an additional medicine.

Management of Severe Malaria in Pregnancy – refer to Module 7: Management of Malaria in Pregnancy

Summary of session:

- Intravenous Artesunate (IV AS) is the preferred treatment for severe malaria. If not available, use IV 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

Session 5.4: Follow up of Patients with Severe Malaria and other tips

Activity:

On the timeline, indicate the points in time at which you follow up with a patient who has suffered severe malaria, and the activities that should be performed at each follow up visit.

NOTE:

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. It has been noted that cases of severe malaria commonly are admitted with severe malaria symptoms in the first 3 months following discharge. Some of severe anemia might not have recovered fully, hence the situation worsens. For that matter all severe malaria cases will be given prophylaxis DP on a monthly basis starting on 28 post admission.

Let's draw out a timeline, and the intervals at which you should follow up with your severe malaria patient. Now, let's write in the activities we should perform at each interval.

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, day 14, day 28 and monthly for six months after discharge
- Repeat packed cell (PCV) and blood films

Management of Follow Up

Patients who have recovered from severe malaria should be followed up to assess for possible sequelae of the disease or the treatment. Follow up is recommended as follows: day 7, day 14, day 28 and then monthly for six months after discharge, depending on the

complication and the sequelae. 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.

A few patients treated with artesunate have been found to develop delayed hemolysis (post malaria treatment anemia) hence all patients treated with artesunate should be reviewed 14 days after treatment.

Children who pass dark urine during an episode of severe malaria have high mortality after discharge due to recurrent hemolysis and Anaemia. They should be followed up.

Patients with hemoglobinuria or black water fever should be reviewed monthly for 3 months then every 3 months for 1 year. They should be given daily ferrous sulphate/ folic acid and weekly chloroquine tablets until at least 1 year when symptoms free.

All patients discharged after treatment for severe malaria should be given health education on use of ITNs, high iron foods etc.

All patients who are transfused due to severe malaria Anaemia except sicklers should be put on ferrous supplementation after the fever has gone down, for not less than 1 month. Assessment should be done during follow up to ascertain whether to continue with iron supplementation or not.

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
- Do a thorough physical examination, check for Anaemia, jaundice and the general nutritional status
- Health education on malaria prevention and nutrition

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:

Repeat packed cell (PCV) and blood films

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 the patient, 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 safe drinking water. Give 50 ml of this solution orally or by nasogastric tube if the patient is unconscious.
- For children less than 6 years, insert 10 mg/kg body weight of Artesunate suppository (rectal Artesunate). If the suppository is expelled within 30 minutes of insertion, a second suppository should be inserted. In young children especially, the buttocks should be held together for 10 minutes to ensure retention of the rectal dose of Artesunate.
- If more than three suppositories are needed, first give three, wait ten minutes then add the rest.
- In case suppositories are not available or in children older than 6 years and adults, give 10 mg/kg body weight quinine I.M. after dilution. 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.

Dosage regimen for Artesunate suppositories in children

Weight (kg)	Age	Artesunate	Dosage Regimen (Single Dose)
<10	<12months	50mg	One 50mg Suppository
10 – 19	1 –6 years	100 mg	250 mg Suppository

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 recognize 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 hypoglycemia.
- 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 recognize and treat severe Anaemia.
- Use of potentially dangerous therapies.
- Failure to cover with antibiotics where it is indicated

Summary of the session:

- Ensure adequate follow up of the patient. The patient should be followed up 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 in children below 6 years and parental artesunate in above 6years.

CHEMOPHYLAXIS

This administration of medicine to prevent contracting malaria. Different medicines are used for different groups as below;

- **Intermittent preventive treatment of pregnant women (IPTp):** Reduces the risk of poor pregnancy outcomes such as; maternal anaemia, abortion, Intra-uterine fetal growth restriction and low birth weight among others. IPTp is provided to mothers as Sulhurdoxine / Pyremethamine (SP) commonly known as Fansidar at a dose 3 tablets every month starting from the 2nd trimester (13th week of pregnancy one month apart till delivery.
- **People with Sickle Cell Disease:** Monthly SP is the drug of choice. C/Q is the alternative.
NOTE: Once you give SP withhold folic acid for a week.
- **HIV positive people with low immunity, children and pregnant women:** These categories of people with HIV should be given Cotrimoxazole (Septrin) daily at the recommended dose unless they are using an alternative preventive treatment.
- **Non-immune visitors / travellers:** In addition to using preventive means such as use of LLINs, the travellers / non-immune visitors should also use chemoprophylaxis. The anti-malaria prophylaxis should be started 2 – 14 days before arriving in Uganda and continued for 1 – 4 weeks after departure depending on the drug used. The recommended prophylactic drugs are;

Table 1.3: Preference of preventive treatment for non-immune visitors/travellers

Preference	Drug Name	Adult Dose	Comment
Preferred drug	Mefloquine	250 mg once a week 5 mg/Kg in children	Can also be used in Pregnancy
First Alternative	Atovaquone /Proguanil	Once daily (1–2 days before entering malaria zone	NOT recommended in children & pregnancy
Second Alternative	Doxycycline	100mg once daily	NOT recommended in children & pregnancy

NOTE: The choice of chemoprophylaxis should be guided by safety, cost, length of stay and availability. Frequent febrile convulsions in children are not an indication for chemoprophylaxis.

Part 5.4: Ward Visit

In this activity, we will visit a ward to reinforce the knowledge and skills on history taking, physical examination of the patient, and relevant investigations learnt during our class sessions.

Module 6: Management of a Fever Patient with a Negative Blood Smear or Rapid Diagnostic Test (RDT)

Introduction

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.

Learning Objectives

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

- Identify correctly patients with fever who may or may not have malaria
- Assess patients with fever for other differential diagnosis
- Appropriately manage patients with other conditions

Content

Unit	Content	Activity	Time
Part 1	Ruling Out Malaria as The Cause of Fever	Lecture	20 minutes
Part 2	Management of Most Common Childhood Illnesses: Pneumonia and Diarrhea	Lecture & Quiz	30 minutes
Part 3	Management of Other Illnesses / Conditions	Quiz & Discussion	20 minutes

Materials needed for this session

- White board / Flip charts
- Markers for trainers
- Pens and paper for all health workers

Session 6.1: Ruling out Malaria as the Cause of Fever

It is important to note that if a 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.). Not all fevers are malaria and other illnesses or conditions can be present at the same time as malaria. *(Refer to Module 4-Part 2: Management of Most Common Childhood Illnesses – Pneumonia and Diarrhea, Module 4-Part 3: Management of Other Illnesses / Conditions, and Module 8: Malaria and HIV/AIDS Co-Infection)*

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:

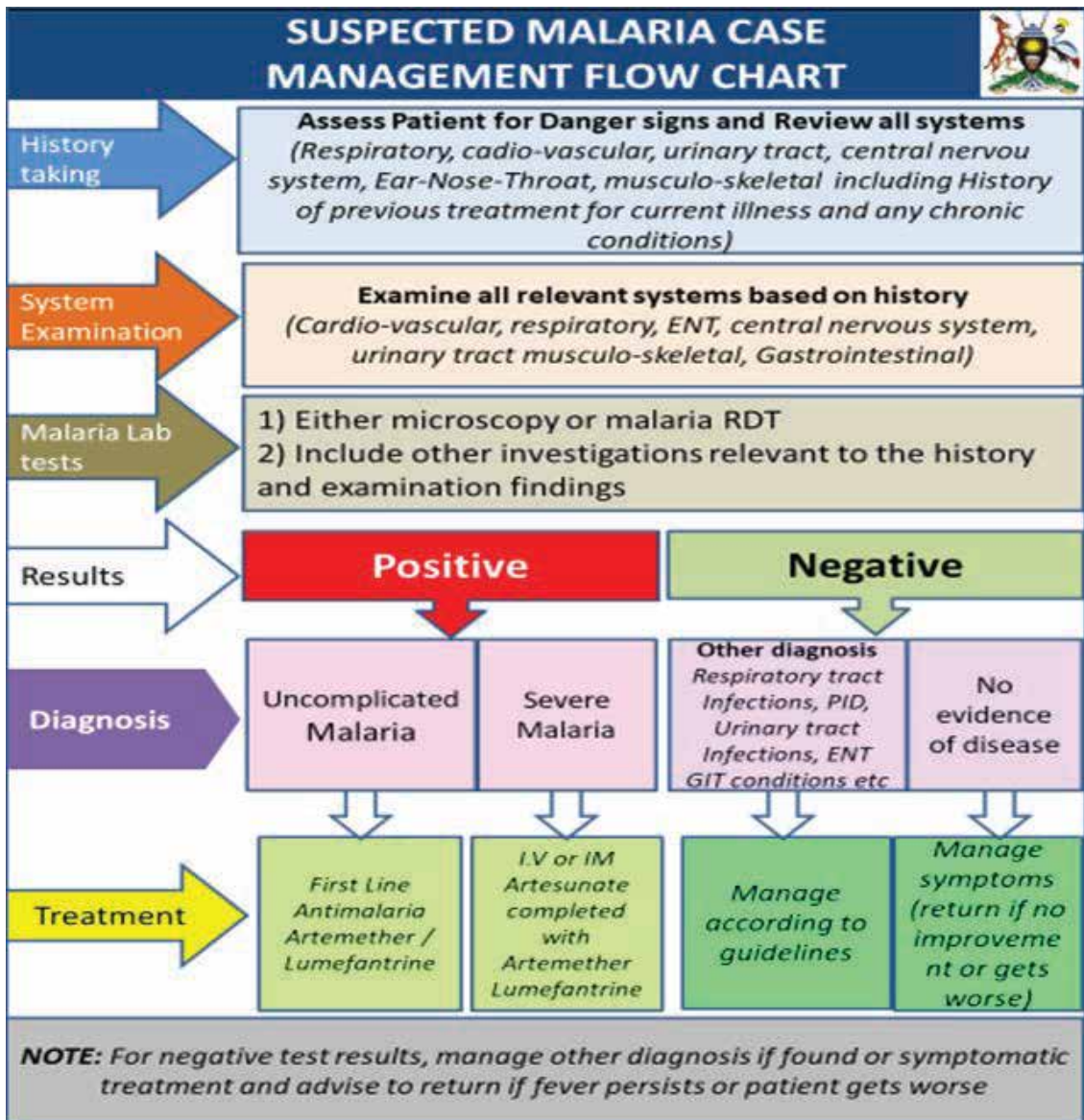
- Low peripheral parasitaemia
- Sequestration of parasites in the internal organs
- Partially effective antimalarial treatment
- Inadequate doses of an effective drug
- Technical error in performing the test or test reagents that are expired
- Cases who are on prophylactic treatment for malaria

Steps to take to verify patient does not have malaria

- Take detailed patient history, detailed clinical signs and laboratory investigations in accordance with Module 2: Evaluation of a patient with fever (Page 10)
- If malaria is still suspected, investigate using the algorithm in figure 6.1 below
- If malaria is ruled out, it is important to diagnose and treat the underlying cause of the fever.
- There are several conditions that cause fever, but some are more common and/or more dangerous – these must be prioritized.

See figure 6.1 below for reference on steps to assess a patient with a negative malaria test

Figure 6.1: Assessing a Malaria Suspect flow chart



Session 6.2: Management of Common Childhood Illnesses

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.

Question 1: What are the two important causes of fever in children, other than malaria?

Answer: _____

Question 2: Name as many causes of fever in either adults or children as you can

Answer: _____

Assessing Children for Pneumonia or Diarrhea

In addition to Malaria, Pneumonia and diarrhea are the two high causes of death in children.

Pneumonia Management

Pneumonia is classified into 2 forms

- i. Pneumonia
- ii. Severe Pneumonia

In children less than 1 month, all Pneumonia is considered severe disease and hence managed as such.

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

Answer: _____

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) 0 – 2 months: _____ breaths per minute
(b) 2 – 12 months: _____ breaths per minute
(c) 1 – 5 years: _____ breaths per minute

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

Answer: _____

Question 4: What is the dose you should give to children with pneumonia?

Answer: Drug: _____ Dose: _____ mg/kg/dose _____ times a day for _____ days

Dosing of Amoxyl by Age and weight

AGE AND WEIGHT OF CHILD	DOSAGE OF AMOXICILLIN
2months to 1year (4-<10kg)	250mg twice a day x 5days
1 up to 3 years (10-<14kg)	500mg twice a day x 5days
3 up to 5years (14 – 19kg)	750mg twice a day x 5days

Question 5: What should you do if a patient presents with any pneumonia general danger sign?

Answer: _____

Knowledge and experience sharing- open discussion

1. How many people have ever seen a child with pneumonia? Is there a sense that this is the most common cause of fever in children after malaria?
2. How many people have prescribed cotrimoxazole for pneumonia? The Uganda Clinical Guidelines have changed – amoxicillin is now considered a better antibiotic for pneumonia
3. How old are patients with pneumonia who have been seen by the class? Are they all ages, or are they mostly children less than 5 years?

PNEUMONIA: SIGNS, SYMPTOMS AND MANAGEMENT

SIGNS AND SYMPTOMS	CLASSIFICATION	TREATMENT			
			Antibiotic	Adults	Children
Cough and/or difficult breathing and/or chest in drawing and 2) any general danger sign e.g. Child not able to drink, persistent vomiting, convulsions, lethargic or stridor in a calm child, unconscious or severe malnutrition	SEVERE PNEUMONIA OR VERY SEVERE DISEASE	Will require: <ul style="list-style-type: none"> • Oxygen • injectable treatment If treatment not available give first dose of antibiotic and refer URGENTLY to HCIV or Hospital	Benzyl penicillin (x-pen) OR Ampicillin (IM or IV) 50mg/kg	2 mu IV or IM daily every 4-6 hours x 5 days 25mg/kg body weight every 6 hours IV or IM then orally x 7 days	50,000 - 100,000 IU/kg per dose every 6 hours x 7 days 50 mg / kg every 8hourly IV or IM then orally x 7 days
Fast Breathing and/ or chest in drawing Child Under 2mo: ≥ 60 breaths per minute Child 2- 12months: ≥ 50 breaths per minute Child 1 – 5years: ≥ 40 breaths per minute Above 5 years: ≥ 30 breaths per minute	PNEUMONIA	Give oral antibiotic for 5 days Give supportive treatment to soothe throat, relieve cough and reduce fever Give Vitamin A for children who did not receive within the last month If condition worsens treat as for severe pneumonia If no response to standard antibiotic therapy or coughing for more than 10 days, assess for tuberculosis Check for HIV and Advise when to return	Amoxicillin (preferably dispersible tablets (DT) in the under 5 years) OR Erythromycin tablets	500 mg every 8 hours x 5 days	Children 40mg/kg/dose twice daily for 5 days OR 2months to 1year (4 - <10kg) 250mg twice a day 5days 1 up to 3 years (10-<14kg) 500mg twice a day 5days 3 up to 5years (14-19) kg 500mg to 750mg twice a day 5days
			Antibiotic	Adults	Children

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

Answer: _____

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

Answer: _____

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

Answer: _____

How many cases of diarrhea have people seen that present with a fever?

How often have people prescribed zinc as well as ORS for treatment of dehydration in cases of diarrhea?

Does everyone know that zinc has been advised by the WHO for almost 10 years?

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

Answer: _____

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

Answer: _____, _____, _____,

_____, _____, _____

Knowledge and experience sharing- open discussion

How many people have seen cases of typhoid or meningitis? Are there any stand-out ways of recognizing these illnesses?

Session 6.3: Management of Other Illnesses / Conditions

CENTRAL NERVOUS SYSTEM INFECTIONS(MENINGITIS): SIGNS, SYMPTOMS AND MANAGEMENT					
SIGNS AND SYMPTOMS	CLASSIFICATION	TREATMENT			
		Antibiotic	Adults	Children	
<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 and REFER IMMEDIATELY to HCIV or Hospital Do not wait for RDT result to start treatment Give appropriate pre-referral treatment for any signs (e.g. fever, convulsions) 	<p>Antibiotic</p> <p>Ceftriaxone If clinical improvement, change to cheaper effective antibiotic</p> <p>OR</p> <p>Chloramphenicol Change to oral if clinical improvement</p>	<p>Adults 2 g every 12 hours IV or IM for 10 – 14 days</p> <p>Children 100mg/Kg 12 hourly for 10- 14 days</p>	
EARS NOSE AND THROAT INFECTIONS: SIGNS, SYMPTOMS AND MANAGEMENT					
SIGNS AND SYMPTOMS	CLASSIFICATION	TREATMENT			
		Antibiotic	Adults	Children	
<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 & 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 lymphnodes 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 	<p>Antibiotic</p> <p>Amoxicillin OR</p> <p>Benzathine penicillin OR</p> <p>Inj. PPF OR</p> <p>Phenoxyethyl Penicillin OR</p> <p>Erythromycin (if allergic to penicillin)</p>	<p>Adults 500mg every 8 Hours x 5 – 7 days</p> <p>1.2 million units (MU) x 1 injected IM dose</p> <p>20,000 IU / kg daily x 10 days</p> <p>500 mg every 6 hours x 10 days</p> <p>500 mg every 6 hours x 10 days</p>	<p>Children 40mg/kg every 8 hours for 5 – 7 days</p> <p>If child weighs less than 30 kg: 30,000 units / kg x 1 IM dose</p> <p>20,000 IU / kg injected daily x 10 days</p> <p>12.5 mg / kg every 6 hours x 10 days</p> <p>12.5 mg / kg every 6 hours x 10 days</p>

EARS NOSE AND THROAT INFECTIONS: SIGNS, SYMPTOMS AND MANAGEMENT			
SIGNS AND SYMPTOMS	CLASSIFICATION	TREATMENT	
		Adults	Children
<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>	<p>Thoroughly clean external ear canal</p> <ul style="list-style-type: none"> • Give antibiotic • Give supportive treatment • Advise to dry ear by wicking 3 times a day <p>Advise to return in 5 – 7 days</p> <ul style="list-style-type: none"> • If tympanic membrane damaged or patient returns repeatedly with signs of ear infection – REFER 	<p>Antibiotic</p> <p>Amoxicillin OR Apply antibiotic drops Chloramphenicol ear drops, If severe, use Cloxacillin</p>	<p>Children</p> <p>40 mg / kg every 8 hours x 5 days</p> <p>0.5% 2 drops into the ear every 8 hours for 14 days</p> <p>250 – 500mg every 6 hours for 5 – 7days</p> <p>12.5 – 25 mg/kg per dose every 6 hours for 5 – 7 days</p>
<ul style="list-style-type: none"> • Rare in patients <5years • Throbbing headache above the eyes, sinus tenderness • Discharge from nostrils and into the throat • Clear when due to viruses • Yellow(purulent) when due to bacteria • Nasal blockage (sometimes) 	<p>OTITIS MEDIA</p>	<p>Amoxicillin Plus Metronidazole</p>	<p>500mg every 8 hours for 7-10 days</p> <p>400 mg every 8 hours</p> <p>10 – 12.5 mg/Kg (max 200mg per dose) every 8 hours</p>
	<p>ACUTE SINUSITIS</p>	<p>Management HC2 <i>General management (all ages)</i></p> <ul style="list-style-type: none"> • Steam inhalation may help clear blocked nose • Give analgesics <p><i>If there is a dental focus of infection</i></p> <ul style="list-style-type: none"> • Extract the tooth • Give antibiotic <p><i>If there is a foreign body in the nose</i></p> <ul style="list-style-type: none"> • Refer for removal in hospital • Do not use antibiotics except in bacterial sinusitis • Use antibiotics only in those with clear features of sinusitis e.g. persistent purulent nasal discharge, cough with one or more of Sinus tenderness, Facial or periorbital swelling, Persistent fever <p><i>In such cases give anti-biotic</i></p>	<p>500mg every 8 hours for 7-10 days</p> <p>40mg/kg per dose every 8hours for 7 – 10 days</p>

<ul style="list-style-type: none"> • Fever • Runny nose with clear mucous and mild cough 	COUGH OR COLD	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 or BRONCHIOLITIS (CHILDREN)	<ul style="list-style-type: none"> • Viral and mild • Give supportive treatment plenty of oral fluids • If wheezing present give salbutamol 100micrograms (0.1mg)/kg every 8 hours until wheezing stops <p>If bacterial infection is suspected;</p> <ul style="list-style-type: none"> • Give antibiotic • Plus, supportive treatment as above 	<p>NO ANTIBIOTIC: Give prednisolone tabs at 0.5mg/kg once daily for 3 days.</p> <table border="1"> <thead> <tr> <th data-bbox="544 701 576 954">Antibiotics</th> <th data-bbox="544 477 576 701">Adults</th> <th data-bbox="544 219 576 477">Children</th> </tr> </thead> <tbody> <tr> <td data-bbox="576 701 695 954">Amoxicillin OR</td> <td data-bbox="576 477 695 701">500 mg every 8 hours for 5 – 7 days</td> <td data-bbox="576 219 695 477">40mg/kg every 12 hours of dispersible tablets for 7days</td> </tr> </tbody> </table>	Antibiotics	Adults	Children	Amoxicillin OR	500 mg every 8 hours for 5 – 7 days	40mg/kg every 12 hours of dispersible tablets for 7days
Antibiotics	Adults	Children							
Amoxicillin OR	500 mg every 8 hours for 5 – 7 days	40mg/kg every 12 hours of dispersible tablets for 7days							

ALIMENTARY, GENITAL AND URINARY TRACT INFECTIONS: SIGNS, SYMPTOMS AND MANAGEMENT					
SIGNS AND SYMPTOMS			CLASSIFICATION TREATMENT		
<ul style="list-style-type: none"> Dysuria Frequent urination Possible haematuria Urgency Lower abdominal tenderness 	<p align="center">URINARY TRACT INFECTION</p>	<ul style="list-style-type: none"> Advise a lot of fluids intake If Cystitis; Manage with antibiotics as indicated. Advise to return within 3 – 5 days If no response to standard antibiotic therapy, REFER 	<p>Antibiotic</p> <p>Nitrofurantoin <i>(avoid in 1st trimester and at term)</i></p> <p>Amoxicillin OR</p>	<p>Adults</p> <p>100 mg twice a day for 5 days</p> <p>500mg every 8 hours for 5 – 7 days</p>	<p>Children</p> <p>40mg/kg dispersible tablets every 12 hours for 7 days</p>
<p>Symptoms above AND</p> <ul style="list-style-type: none"> Diarrhoea and convulsions (common in children) Renal angle tenderness 	<p align="center">PYELONEPHRITIS</p>	<p>Ensure adequate intake of fluid (oral or IV)</p> <p>Give paracetamol for pain and fever</p> <p>Give antibiotic as for UTI, if no improvement in 48 hours give injectable antibiotic and REFER to higher level health facility</p>	<p>Antibiotic</p> <p>Ampicillin <i>plus</i></p> <p>Gentamicin <i>(reduce dose in renal impairment)</i></p>	<p>Adults</p> <p>1 – 2g IV or IM every 6 hours for 7 – 14 days</p> <p>5 mg/kg IV or IM once a day for 7 days</p>	<p>Children</p> <p>50 mg/kg per dose every 6 hours for 7 – 14 days</p> <p>5mg/kg IV or IM once a day for 7 days</p>
<p>In Women</p> <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 	<p align="center">PELVIC INFLAMMATORY DISEASE</p>	<ul style="list-style-type: none"> Give antibiotics Give supportive treatment If no improvement within 7 days, REFER for specialist management Treat sexual partners as for urethral discharge syndrome to avoid re-infection 	<p>Antibiotic</p> <p>I.V or I.M</p> <p>Ceftriaxone OR</p> <p>Cefixime <i>plus</i></p> <p>Doxycycline</p> <p>In pregnancy, use Erythromycin not Doxycycline <i>Plus</i></p> <p>Metronidazole</p>	<p>Adults</p> <p>250 mg stat</p> <p>400 mg stat</p> <p>100mg every 12 hours x 14 days</p> <p>500 mg every 6 hours for 14 days</p> <p>400mg every 12 hours for 14 days</p>	<p>Children</p>

			Antibiotic	Adults	Children
<ul style="list-style-type: none"> • Fever (temperature rises in steps) • Gradual on set of chills and malaise, headache, anorexia, epistaxis, backache and constipation (usually 10 – 15 days after infection) • Abdominal pain and tenderness are prominent features • Relative bradycardia is common • Delirium and stupor (common) • Tender splenomegaly (common) 	<p>Give antibiotic</p> <p>In severe, resistant forms or pregnancy</p>	<p>Admit (only if patient condition is poor)</p> <p>Ensure effective infection control measures</p> <p>Diet: high in carbohydrates and vitamins, no animal proteins</p> <p>Avoid drugs generally, but especially sedatives and hepatotoxic drugs</p> <p>REFER all patients with a positive test to hepatitis treatment centers for further investigations and possible initiation on Antivirals.</p>	Ciprofloxacin OR	500 mg 12 hourly for 10 – 14 days	N 10 – 15mg/kg per dose
<p>TYPHOID FEVER (Enteric fever)</p>			Chloramphenicol	500mg 6 hourly for 10 days	25 mg / kg I.V, I.M or orally every 6 hours for 10 – 14days
			Ceftriaxone	1 g IV every 12 hours for 10-14 days	50 mg/kg per dose
			Amoxicillin	1 g every 8 hours for 10 days	10-15 mg/kg per dose
<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 	<p>HEPATITIS</p>	<p>Give supportive treatment</p>			

<p>Demonstration of 1 or more Opportunistic infections</p> <ul style="list-style-type: none"> • Cardinal features-presence of anyone 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 >6Months and <50 years (If no antibiotics taken in the past month) - Pneumocystis carinii pneumonia (Pneumocystis Jiroveci) - Toxoplasmosis infection - Cytomegalovirus retinitis • Other findings / risk factors: presence of any two or more of these • Characteristic findings: <ul style="list-style-type: none"> - Severe pruritic maculo-papular skin rash (prurigo) • Associated findings: <ul style="list-style-type: none"> - weight loss>10% - recurrent fevers for >1month - recurrent diarrhea for>1month - generalized lymphadenopathy <p>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 diarrhea - Very low weight-for-age - Oral thrush - Ear discharge - Generalized lymphadenopathy - Parotid enlargement - Mother is HIV positive <p>Positive HIV Antibody test in a child less than 18 months</p> <p>Confirm diagnosis with HIV test in both adults and children</p>	<p>Human Immuno-deficiency Virus (HIV)</p>	<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 balance 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 ➤ Abstaining from sex, or being faithful to one partner ➤ Using a condom to help ensure safe sex ➤ Prepare all HIV positive people for ART irrespective of CD4 count or viral load.
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<ul style="list-style-type: none"> • Fever/chills • Persistent mucoid/bloody diarrhea • Abdominal pain • Nausea, vomiting • Tenesmus Less frequent diarrhea compared to bacillary dysentery	AMOEBIC DYSENTRY	Correct any dehydration	Antibiotic Metronidazole OR Tinidazole	Adults 800mg every 8 hours for 10 days taken after food 2g daily for 5 days	Children 10mg/kg per dose every 8 hours x 8-10 days; taken after food 50mg/kg per dose for 5 days	Antibiotic	Adults	Children
<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 <i>In case of sepsis, toxemia, severe disease or pregnancy</i>	Antibiotic Ciprofloxacin IV Ceftriaxone	Adults 1g single dose 1 g daily till able to take oral, then switch to oral	Children >3mths 30mg/kg twice daily for 3 days HC	Antibiotic	Adults	Children

SKIN INFECTIONS: SIGNS SYMPTOMS & MANAGEMENT									
SIGNS AND SYMPTOMS	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 e.g. Paracetamol for fever prn • Advise mother when to return immediately • Increase fluid and nutritional intake (high risk of malnutrition and dehydration) • Recommend isolating patient at home (or in hospital if necessary), • Vaccinate contacts 	<ul style="list-style-type: none"> • Apply tetracycline eye ointment 1% every 12 hours for 5 days • Give 3 doses of vitamin A: • First dose at diagnosis; 2nd dose next day; 3rd dose on day 14 • Child <6 months: 50,000 IU • Child 6-12 months: 100,000 IU • Child >12 months: 200,000 IU • Monitor for and treat secondary bacterial infections with appropriate antibiotics immediately • Refer to hospital in case of complications 						
<p>Above Symptoms AND</p> <ul style="list-style-type: none"> • Any general danger sign • Clouding of cornea or pus draining from eye • Deep mouth ulcers 	SEVERE MEASLES / WITH COMPLICATIONS	<ul style="list-style-type: none"> • Give Vitamin A for treatment • Give first dose of cotrimoxazole • Give tetracycline eye ointment if have eye conditions <p>REFER URGENTLY to hospital</p>	<table border="1"> <thead> <tr> <th>Antibiotic</th> <th>Adults</th> <th>Children >3mths</th> </tr> </thead> <tbody> <tr> <td>Appropriate antibiotic as per UCG 2016 depending on complication</td> <td></td> <td></td> </tr> </tbody> </table>	Antibiotic	Adults	Children >3mths	Appropriate antibiotic as per UCG 2016 depending on complication		
Antibiotic	Adults	Children >3mths							
Appropriate antibiotic as per UCG 2016 depending on complication									
<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	<p>Symptomatic and supportive treatment</p> <ul style="list-style-type: none"> • Apply calamine lotion every 12 hours and cool, wet compresses to provide relief • Chlorpheniramine: Adult 4 mg every 12 hours • Child <5 years: 1-2 mg every 12 hours for 3 days • Recommend isolating the patient 	<p>Symptomatic and supportive treatment</p> <p>Pain relief: paracetamol 10 mg/kg every 6 hours</p> <p>In adults and children >12 years consider antivirals:</p> <p>Oral acyclovir 800 mg every 6 hours for 7 days</p> <p>Keep child at home/remove from school till healed to avoid spread</p> <p><i>In case of suspected bacterial infection, manage with appropriate anti-biotic.</i></p>						

<p>Varied can include</p> <ul style="list-style-type: none"> • Small localized skin rash itchy eyes, face bumps, or whole-body rash • Fever • History of drug use 	<p>DRUG SIDE EFFECT OR ALLERGIC REACTION STEVEN JOHNSON SYNDROME (SEVERE FORM OF DRUG REACTION)</p>	<ul style="list-style-type: none"> • Discontinue suspected allergen • Supportive care with an antihistamine • Advise when to return • Complete the “Suspected adverse drug reactions” Form and send to the DHO to be forwarded to NDA 	<p>Antibiotic</p> <p>PPF</p>	<p>Adults</p> <p>1.5 MU IM daily x 7 days</p>	<p>Children 3mths</p> <p>50,000 IU / kg IM daily x 7 days</p>
		<ul style="list-style-type: none"> • Elevate the affected limb 			

Summary of the session:

Not all fevers are malaria and other illnesses, or conditions can be present at the same time as malaria.

Always confirm malaria with an RDT or blood smear

Always check for other illnesses or conditions

Treat appropriately!

Session 6.4: Malaria case management in Viral Hemorrhagic Fevers (VHF) outbreaks especially Ebola

Introduction:

A number of diseases with varying etiologies and modes of transmission are grouped together under the term "Viral Hemorrhagic Fevers" since they present with common clinical symptoms. These symptoms are usually non-specific, and the severity depends on the etiology.

Common Clinical Syndrome

Fever, with a temperature of > 38.50 c.

Hemorrhagic symptoms (purpura, epistaxis, hematemesis, melaena etc. *All VHF are of international public concern and any suspect should be isolated and investigated and if confirmed, then reported as an epidemic.

Table below shows different diseases in the category of VHF but because of Ebola virulence, this section will be more of management of malaria in Ebola outbreaks.

<i>Name of Hemorrhagic fever.</i>	<i>Reservoir/Vector Geographical distribution</i>	<i>Isolation of Patients</i>	<i>Clinical Features</i>	<i>Estimated case Fatality</i>
1. Ebola 2. Marburg	Bats Africa	Strict Isolation	<ul style="list-style-type: none"> ○ High grade fever ○ Sudden onset general malaise ○ Vomiting and diarrhea ○ Haemorrhagic symptoms 	60 – 80%
3. Lassa	Rodents Central and West Africa	Strict Isolation	<ul style="list-style-type: none"> ○ High grade fever ○ Facial oedema ○ Purulent pharyngitis ○ Proteinuria on reagent strip ○ Haemorrhagic symptoms 	10 – 25%
4. Crimean Congo	Livestock/Ticks Africa and Asia	Strict Isolation	<ul style="list-style-type: none"> ○ High grade fever ○ Oedema of the soft palate ○ Generalized petechial rash 	5 – 20%
5. Rift Valley Fever	Livestock/Mosquitoes Africa	Mosquito Nets	<ul style="list-style-type: none"> ○ Fever ○ Encephalitis ○ Retinitis, Blindness 	30 – 50%
6. Yellow Fever	Primates /Mosquitoes Africa, south America	Mosquito Nets	<ul style="list-style-type: none"> ○ Fever ○ Headache ○ Proteinuria on a strip ○ Jaundice ○ Oliguria Hemorrhagic symptoms 	10 – 30%

7. Dengue Fever	Mosquitoes (Aedes) East Africa, Central/ south America		<u>Without warning signs.</u> <ul style="list-style-type: none"> ○ Fever, ○ Measles like rash. ○ Nausea and vomiting. ○ Body aches. ○ Mucocutaneous bleeding and leucopenia <u>With warning signs:</u> <ul style="list-style-type: none"> ○ Abdominal pain ○ Persistent vomiting ○ Ascites/pleural effusion or both Mucosal bleeding ○ Hepatomegaly of > 2cms ○ Lethargy & agitation ○ Increasing Haematocrit and a rapidly reducing platelet count (with warning signs) <u>Severe forms:</u>	
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Ebola Virus Disease

Ebola Virus Disease spreads through human-to-human transmission via direct contact (through broken skin or mucous membranes) with the blood, secretions, organs or other bodily fluids of infected people, and with surfaces and materials (e.g. bedding, clothing) contaminated with these fluids. EVD is a severe, often fatal illness in humans. The Ebola virus is transmitted to people from fruit bats and spreads among humans through human-to-human transmission. The Ebola virus causes severe viral hemorrhagic fever in humans.

Rationale for controlling malaria in Ebola outbreaks

- Ebola and malaria have similar clinical presentation especially fever and vomiting.
- Ebola may mimic severe malaria presenting with hemorrhage and thus health workers may wrongly diagnose either disease resulting in increased mortality.
- It is also possible to find malaria and Ebola comorbidities especially in malaria endemic regions such as Kasese.

Prevention of malaria therefore results in less fever cases going to health facilities and thus reduce the burden on the health system.

Prevention of malaria is very important because the communities may fear going to health facilities which have been reported to have Ebola cases increasing the number of malaria cases who may die in the community. Similarly, Health workers might absent themselves in fear of contracting Ebola.

Health workers are at a very high risk of contracting Ebola because of coming into contact with body fluids containing the virus. It is therefore important that observation of universal infection prevention and control procedures are observed. Health workers should be provided with adequate Personal Protective Equipment (PPE).

Objectives of the intervention

1. To minimize fever cases reporting to the health facility or VHT thus reducing on the need for assessment for Ebola among malaria cases
2. To increase health worker capacity to manage malaria Ebola co-morbidities
3. To reinforce infection prevention and control in malaria management
4. To increase protection against malaria

Proposed interventions and approaches

1. Malaria mass drug administration which is recommended by WHO (GMP 2015) – in an area of 5km radius where there is a confirmed case.
2. Presumptive malaria treatment for all Ebola suspects, probable and confirmed cases
3. Increasing health worker protection using PPE and improving infection prevention and control
4. A broad-spectrum antibiotic should be provided to an Ebola suspect.
5. Prophylaxis for frontline health workers and contacts of confirmed Ebola cases using D/P
6. Provision of LLINs to the Ebola suspects, probable and confirmed cases, health workers and the community of origin
7. Integrating malaria messages in the Ebola Social Behaviour Change Communication messages
8. Strengthening malaria surveillance in the affected areas

Mass Drug Administration and LLINs delivery should be guided by the MOH policy and delivered door to door so that transmission is limited.

The recommended medicine for MDA is Dihydro-artemisinin / Piperaquine (D/P) given monthly till outbreak is contained. This will be implemented in areas of high malaria incidence.

A team comprising of health workers, the VHT and local leader will move from house to house educating the community about;

- Relationship of malaria and Ebola
- Purpose of providing MDA

- promoting LLIN use and
- registering the beneficiaries

Dosing of Dihydro-artemisinin / Piperaquine

Day	Schedule for providing D/P	Provided by
Day 1	First dose must be given as Directly Observed Therapy	Given by the whole team
Day 2	Taken same time as dose one	Given by the VHT
Day 3	Taken same time as dose one	Given by the VHT

Each household member will be provided with a LLIN.

Through the NMS adequate doses of D/P will be provided with to the health facilities serving affected communities within 5 KM radius of a suspected, probable or confirmed Ebola case.

For case management, all fever suspects will be screened using the Ebola screening tool and those fitting the Ebola suspect or probable case criteria will be immediately isolated, provided an ACT and an alert sent to the Ebola surveillance team.

The suspect will be transferred to the Ebola Treatment Unit (ETU) where part of the sample collected will be used to conduct an mRDT. Other tests for common parasitic infections which almost present like Ebola such as schistosomiasis, leishmaniasis and filariasis should be considered on a case by case basis.

The health facilities in Ebola zones will be provided a buffer of 25% above their usual ACT supply to cater for presumptive treatment. Health workers will be provided with PPEs and additional Infection Prevention and Control (IPC) supplies such as gloves, Jik, masks, goggles and aprons.

Malaria prophylaxis will be provided to frontline health workers and contacts of confirmed cases using dihydro-artemisinin-piperaquine.

At community level, VHTs providing iCCM and private health facilities in the area with an Ebola suspect, probable or confirmed case will stop conducting mRDTs and instead provide presumptive treatment for fever cases using A/L and alert the surveillance team to take action.

The SBCC team will integrate malaria messages into the Ebola messages reinforcing malaria prevention, early treatment seeking and compliance with malaria treatment.

Surveillance for malaria in Ebola outbreaks will be reinforced.

Framework for recommended interventions

Intervention	Rationale	Recommendation	Target	Activities
Malaria case management	Minimize missed opportunities for malaria case management	<ul style="list-style-type: none"> ● Adhere to national malaria case management guidelines (Test/Treat/Track) ● Follow the national Ebola screening procedures and case definition ● If Ebola suspect or probable case, do mRDT in isolation unit ● Give ACTs presumptively ● Observe Infection Prevention and Control procedures ● VHT should assess using the Ebola community tool, and alert surveillance team ● VHTs should adhere to iCCM guidelines unless it is an alert case 	<ul style="list-style-type: none"> ● Frontline Health workers ● VHTs 	<ul style="list-style-type: none"> ● Training in Infection Prevention & Control (IPC) for HWs & VHTs ● Provision of IPC supplies – gloves, Jik, buckets, masks, aprons etc ● Training of private health sector staff in districts with epidemic SBCC for malaria ● Daily surveillance reports ● Weekly monitoring by DHT & NMCD ● Provision of job aids and PPEs ● Provision of 25% buffer stock of ACTs, mRDTs and LLINs
Malaria Prevention	To minimize new malaria cases among the risk population, health workers, ebola suspects and cases	<ul style="list-style-type: none"> ● Prophylaxis is recommended for vulnerable groups ● Prophylaxis is not recommended to people living in high malaria transmission areas – give MDA instead ● All HWs, Ebola cases or suspects, should receive LLINs ● LLINs & other linen of ebola cases must be incinerated or disposed as recommended ● Door-to-door distribution of LLINs & MDA by HWs & VHTs in villages with ebola suspect and confirmed cases 	<ul style="list-style-type: none"> ● Health workers ● Ebola suspects, probable & confirmed cases ● Household members in the village of suspect, probable or confirmed case 	<ul style="list-style-type: none"> ● Orientation of HWs, VHTs and LC1 for each village ● SBCC ● Door-to-door registration & LLIN distribution ● Monitoring by DHO and NMCD ● Reporting ● Supply chain management – ordering, distribution and storage

Mass Drug Administration	Reduce burden of fevers	<ul style="list-style-type: none"> • Use Dihydro-artemisinin / Piperaquine • Supplies through NMS supply chain • Door-to-door distribution by VHTs and HWs • First dose given as DOT; VHT administers subsequent doses • Initiate MDA within 48 hours of confirming an ebola case 	<ul style="list-style-type: none"> • Village, 5Km radius from household of confirmed ebola case • All community members including women and children < 5kg 	<ul style="list-style-type: none"> • Orientation of 2 health workers, 2 VHTs and LC1 for each village • SBC activity • Door to door registration and drug distribution • Monitoring by DHO and NMCD • Reporting • Pharmacovigilance • Supply chain management – ordering, distribution and storage
SBCC	To raise awareness on malaria	<ul style="list-style-type: none"> • Intensify SBCC messages focusing on prevention, early treatment seeking & adherence to treatment, IPTp etc 	<ul style="list-style-type: none"> • Private health sector • Community members • Leaders 	<ul style="list-style-type: none"> • Radio talk shows • Community dialogues • Home visits
Surveillance	To obtain real time malaria data	<ul style="list-style-type: none"> • Daily surveillance report using 033B • Pharmacovigilance 	<ul style="list-style-type: none"> • Public and private health facilities 	<ul style="list-style-type: none"> • Data collection, analysis • DQA

Summary of session

In this session, we have learned that;

- 1 Screening for Ebola cases to categorise as confirmed case, suspect of probably must be conducted for every patient presenting with fever in an Ebola outbreak community 5Km from an index patient
- 2 All people living in the 5Km radius of a confirmed Ebola case must be given preventive measures using LLINs and Mass Drug Administration to reduce the chances of getting sick with malaria and being mistaken for Ebola
- 3 If patient presents with fever in an Ebola outbreak, provide presumptive treatment of malaria as appropriate and if proper lab is available, conduct an mRDT

Module 7: Management of Malaria in Pregnancy

Learning Objectives

By the end of this session, the participants 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

Content

Unit	Content	Activity	Time
Session 1	Effects of Malaria on Pregnancy	Lecture	10 minutes
Session 2	Prevention of Malaria in Pregnancy	Lecture	10 minutes
Session 3	Treatment of Uncomplicated Malaria in Pregnancy and Management of Severe Malaria in Pregnancy	Activity	40 minutes

Materials needed for this session

- White board
- Markers for trainers
- Pens and paper for all health workers

References and recommended readings

- None required

Session 7.1: Effects of Malaria on Pregnancy

Why is 'Malaria in Pregnancy' a Special Topic?

- Malaria and its complications are more common in pregnant women than 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 prime gravidas are more susceptible to the complications of malaria.

Table 7.1 – Maternal and foetal / infant effects of malaria

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

Summary of the section:

- 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.

Session 7.2: Prevention of Malaria in Pregnancy (Time = 10 minutes)

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

Answer: (i) _____
(ii) _____

Intermittent Preventive Treatment in Pregnancy (IPT)

All pregnant women should be given SP for IPTp for prevention of malaria in pregnancy. However, HIV positive women on Cotrimoxazole should continue taking this and must not be given S/P. The IPTp is given to pregnant women starting after 13 weeks of gestation monthly until delivery.

However, there are some important things to note about IPTp

- It is given as Directly Observed Therapy (DOT)
- Pregnant women who are HIV positive and are not on cotrimoxazole prophylaxis should receive the same number of doses of SP as the HIV negative.
- Pregnant women who are HIV positive and are on cotrimoxazole should not be given SP
- Patients who for one reason or another cannot take SP are advised to use

mosquito nets consistently and to seek treatment promptly as soon as they fall sick with fever.

Long Lasting Insecticide Treated Mosquito Nets (LLINs)

All pregnant women **MUST** be provided with LLINs and emphasis on proper use provided. LLINs' are the backbone of malaria prevention for pregnant mothers because they do not require health worker supervision.

NOTE:

It is important that the antenatal staff insist on pregnant mothers using LLINs. All health workers should speak to health workers in the ANC at their health facility to make this point.

Summary of the section:

- There are two major ways to prevent malaria in pregnancy.
- The first is Intermittent Preventive Treatment (IPTp), which involves giving more than three doses of SP at least one month apart as Directly Observed Therapy (DOT) starting after 13 weeks of gestation up to delivery.
- The second is the regular use of Long-Lasting Insecticide Treated Mosquito Nets (LLINs).

Session 7.3: Management of malaria in pregnancy

Overview of management 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 mRDT done for malaria parasites.
- Cases of severe anaemia in a pregnant mother should be fully investigated to find out the cause of anaemia and managed accordingly.

Quiz:

Organize the participants 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. normal adults.

Answer to Part 1: Specific Treatment

Answer Part 2 – Supportive Treatment

In addition to antimalarial treatment, patients with malaria in pregnancy should be given the usual supportive treatment:

Differences in Treatment of Severe Malaria.

- Severe malaria in pregnancy is treated with IV Artesunate for all trimesters. 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.
- Convulsions in pregnancy are more commonly due to eclampsia but can 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 mother's safety be taken as a clinical priority.

Summary of session:

In this session, we have learnt that;

- Malaria in pregnancy tends to be common and complicated due to a number of factors.
- Prevention and control of malaria in pregnancy can be done through prompt and effective case management, LLINs use and Intermittent Preventative Therapy (IPT).
- In severe malaria, pregnant women are treated with IV Artesunate just as normal adults are.
- However, there are several complications that pregnant severe malaria patients face that must be considered.

Module 8: Malaria and HIV/AIDS Co-Infection

Learning Objectives

By the end of this session, the participants 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

Content

Unit	Content	Activity	Time
Part 1	Significance of Malaria and HIV interaction	Lecture	15 minutes
Part 2	Effect of Malaria on HIV Positive Pregnant Mothers	Lecture	25 minutes
Part 3	Treatment of Patients Co-Infected with HIV and Malaria	Lecture	10 minutes
Part 4	Distinctive Preventive Measures Against Malaria in an Individual with HIV Co-Infection	Lecture	10 minutes

Materials needed for this session

- White board
- Markers for trainers
- Pens and paper for all health workers

References and recommended readings

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

Session 8.1: Significance of Malaria and HIV Interaction

Question:

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

Answer:

- i) _____
- ii) _____

Effects of HIV on Malaria

Malaria infection rates are higher 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 due to reduced immunity

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 regardless of parity.

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

Increasing HIV related immunosuppression may lead to more severe manifestations of malaria

Effects of Malaria on HIV

Malaria in an HIV infected person increases the risk of progression to HIV disease/AIDS and increases the risk of HIV transmission to others as a result of transient elevation of viral load.

Table 8.1: Effects of HIV on malaria infected person

	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- malaria 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 of the section:

- 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.

Session 8.2: Effect of Malaria on HIV Positive Pregnant Mothers

Malaria and HIV/AIDS co-infection in Pregnancy

- Naturally, pregnancy reduces the level of immunity therefore, pregnant women lose some of their immunity to malaria and hence more susceptible to malaria in the first pregnancy and to a lesser extent in their second pregnancy
- HIV infected pregnant women are more susceptible to malaria, anaemia and poor birth outcomes than pregnant women who are not HIV infected. 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 less extent second pregnancies
 - However, with HIV, all pregnancies (not 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

Prevention of Malaria in Pregnant Women with HIV

Question:

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

Answer:

i. _____

ii. _____

iii. _____

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 this treatment to reduce the risk of infection with malaria. They should not receive Cotrimoxazole and 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
- All pregnant women regardless of their HIV status should receive more than three doses of SP one month apart after 13 weeks of gestation up to delivery.
- However, pregnant women infected with HIV on Cotrimoxazole prophylaxis do not require SP.

Long Lasting Insecticide Treated Nets (LLINs)

All pregnant women, regardless of whether they are infected with HIV or not, should sleep under an LLINs 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 LLINs and either Cotrimoxazole or IPT
 - To reduce the risk of transmission of HIV to the child: Utilize Elimination of Mother- to-Child Transmission (eMTCT) ARV regimens as recommended by MOH eMTCT 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 LLINs.

Summary of session:

Knowledge of the effect of malaria on HIV positive pregnant mothers is important for health workers to prioritize and appropriately treat malaria infection. We learnt that HIV positive pregnant mothers should;

- Either continue to receive Cotrimoxazole prophylaxis (if they are already on it) or should receive minimum of three doses of Intermittent Preventive Treatment (IPT) if they are not on Cotrimoxazole.
- Use Long Lasting Insecticide Treated Nets (LLINs) and those with HIV should also access a PMTCT ARV regimen.

Session 8.3: Treatment of Malaria in Patients Co-Infected with HIV

- Malaria treatment in an HIV infected patient is not different from 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 recognize the need to holistically manage patients with HIV
- Amodiaquine containing drugs have bone marrow / haematological effects therefore it should not be used to treat HIV patients on Zidovudine or Efavirenz based ART regimens and cotrimoxazole.
- HIV infected patients on ART need to be closely monitored when on malaria treatment for any adverse drug reaction
- ALL patients that are HIV infected but not on ART should be prepared to start ART as soon as possible. This is in line with the current ART guidelines which recommend that all people who are HIV positive should be on ART to reduce transmission.

Emphasis:

There is no eligibility criteria for starting ART for all persons who are HIV positive. CD4 count, WHO staging and viral load are only used to monitor patient progress.

Figure 8.1: Flow chart on Assessing HIV positive patients with Malaria

HIV and Malaria Co-Infection		
Is patient taking Cotrimoxazole?	YES	Advise to continue
	NO	Start them on Septrin or Dapson
Is patient on ART?	YES	Continue ARVs
	NO	Initiate on ART
Does patient have signs of drug Adverse effects?	YES	Review drugs and manage accordingly
	NO	Continue treatment
Does patient have other medical conditions? (Review the WHO staging conditions)	YES	Manage accordingly and if suspected treatment failure, follow guidelines for switching
	NO	Manage current illness

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 events in a patient using ACTs, ART or any other drugs

Summary of the section:

Health workers should treat patients co-infected with HIV and malaria for better outcomes.

In this session, we learned that;

- Treatment for malaria is not different in patients who are infected with HIV vs. not infected, but that malaria tends to be more severe in patients with HIV.
- HIV positive patients not on ART treatment should be started on ART.
- Patients on ART presenting with Malaria should be assessed for other conditions to check for possible treatment failure

Session 8.4: Preventive Measures against Malaria in HIV Co-Infected Patient

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 to HIV patients:

- always Use Long Lasting Insecticide Treated Nets (LLINs)
- All HIV positive persons (children, adults, HIV infected mothers) should receive Cotrimoxazole prophylaxis

Those HIV positive pregnant women who are not on Cotrimoxazole prophylaxis should get SP for IPT monthly starting at 13 weeks of gestation

Children born to an HIV infected mother should receive Cotrimoxazole prophylaxis from 6 weeks after birth until they are confirmed to be negative after cessation of breastfeeding.

Immediate diagnosis and treatment of malaria is important to avoid progress to severe malaria.

Module 9: Management of suspected Anti-malarial Treatment failures

Learning Objectives

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

1. Describe “antimalarial treatment failure” and how it can be recognized
2. Assess a patient presenting with fever after malaria treatment
3. Manage antimalarial treatment failure

Content

Unit	Content	Activity	Time
Session 1	Antimalarial treatment failure and how it can be recognized	Lecture	20 minutes
Session 2	Assessment of Patients Presenting with Fever After Malaria Treatment	Lecture	20 minutes
Session 3	Management of Patient with Fever After Malaria Treatment	Lecture	20 minutes

Materials needed for this session

1. White board
2. Markers for trainers
3. Pens and paper for all health workers

References and recommended readings

None required

Session 9.1: How to Recognize Anti-malarial Treatment Failure

- Recurrence of *P. falciparum* can result from Re-infection or Recrudescence (treatment failure). Recrudescence means recurrence of parasitaemia and/or symptoms in a patient following completion of treatment reflecting failure of the drug to clear the parasites.
- Re-infection – Refers to a new malaria infection, meaning the parasites are different from those of the initial infection. This means that the antimalarial was effective, but the patient has been re- infected with new parasites through a mosquito bite

Causes of Antimalarial treatment failure

- Treatment failure may result from the following; Drug resistance due to sub optimal dosing, Poor adherence, Vomiting, Substandard medicines or Pharmacokinetics of an individual.
- It is important to determine from the patient's history whether he or she vomited the previous treatment or did not complete a full course of treatment.
- Examples of antimalarial drugs that were previously used but no longer effective for treatment of malaria include chloroquine and SP

Recognizing Antimalarial Treatment Failure

In individual patients, it may not be possible to distinguish recrudescence from re-infection although lack of resolution of fever and parasitemia or their recurrence within 4 weeks are considered failures with the currently recommended ACTs

In order to make a conclusion of antimalarial treatment failure, the patient must have:

- Had a positive blood slide 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
- Presented with a positive blood slide within 28 days after completion of an effective malaria medication

Suspected treatment Failure within 28 days

The recommended second line should be used (see session Module 5)

Suspected treatment failure after 28 days

- Recurrence of fever and parasitaemia after 28days (4weeks) can be due to either recrudescence or new infection.
- All suspected failures after 4 weeks should be considered new infections and managed by a first line ACT since the distinction between the two cannot be routinely possible

Note:

All suspected treatment failure should be confirmed with microscopy not RDTs. This is because RDTs remain positive for two weeks after the initial infection even without treatment failure.

Summary of session:

In this session, we have learnt that;

1. Antimalarial treatment failure is when a patient remains positive when tested for malaria with or without symptoms after completion of antimalarial treatment.
2. History taking is important in diagnosing treatment failure
3. With the current ACTs, lack of resolution of fever or parasitaemia or their recurrence with four weeks can be regarded as treatment failure
4. All suspected treatment failures should be confirmed by microscopy

Session 9.2: Assessment of Patients 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. _____
2. _____
3. _____

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

Does patient have any of the complaints below;

- ▶ Respiratory System: Cough, difficulty in breathing, chest pain, Signs of flu or cold
- ▶ Gastro-intestinal System: Diarrhea, constipation, abdominal pain, blood in stool etc
- ▶ Ear / Nose / Throat: Ear discharge (in children), painful swallowing, swelling or pain over the peri-orbital area;
- ▶ Skin: rash, swelling, visible inflammation, etc
- ▶ Urinary Tract Infection: Pain on passing Urine, small frequent amounts of urine, back ache,
- ▶ Central Nervous System: Severe Headache, vomiting, drowsy, confusion, stiff neck, etc.
- ▶ Assess history of treatment
 - Was the anti-malarial treatment taken correctly and completely,
 - How was it taken?
 - Did the patient vomit the medicines within 30 minutes of taking the drug or Was there spillage of syrups when giving drugs to children??
 - how long ago did they take the treatment?
 - which anti-malarial drug was taken?
 - What other medicines were taken concurrently?
 - Where was the drug procured? For example, was the drug procured from the clinic, registered pharmacy, or drug hawkers?
 - Development of symptoms of severe malaria

2. Physical Examination

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

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

- HB, blood film for malaria parasites or RDT, WBC/CBC (thick and thin films)
- Urine analysis
- Other investigations will be guided by clinical findings

Summary of the section:

In this session, we learnt that;

- There are three steps to assess a patient presenting with fever after taking an antimalarial treatment.
- The three steps are:
 - (1) History Taking;
 - (2) Physical Examination; and
 - (3) Laboratory Investigation

These 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.

Session 9.3: Management of Patient with Fever after Malaria Treatment

Deciding 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 history provided, physical examination findings 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 decide on how to manage a patient who returns with fever after completing a full course of antimalarial treatment

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

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): See flow chart on management of suspected treatment failure below;

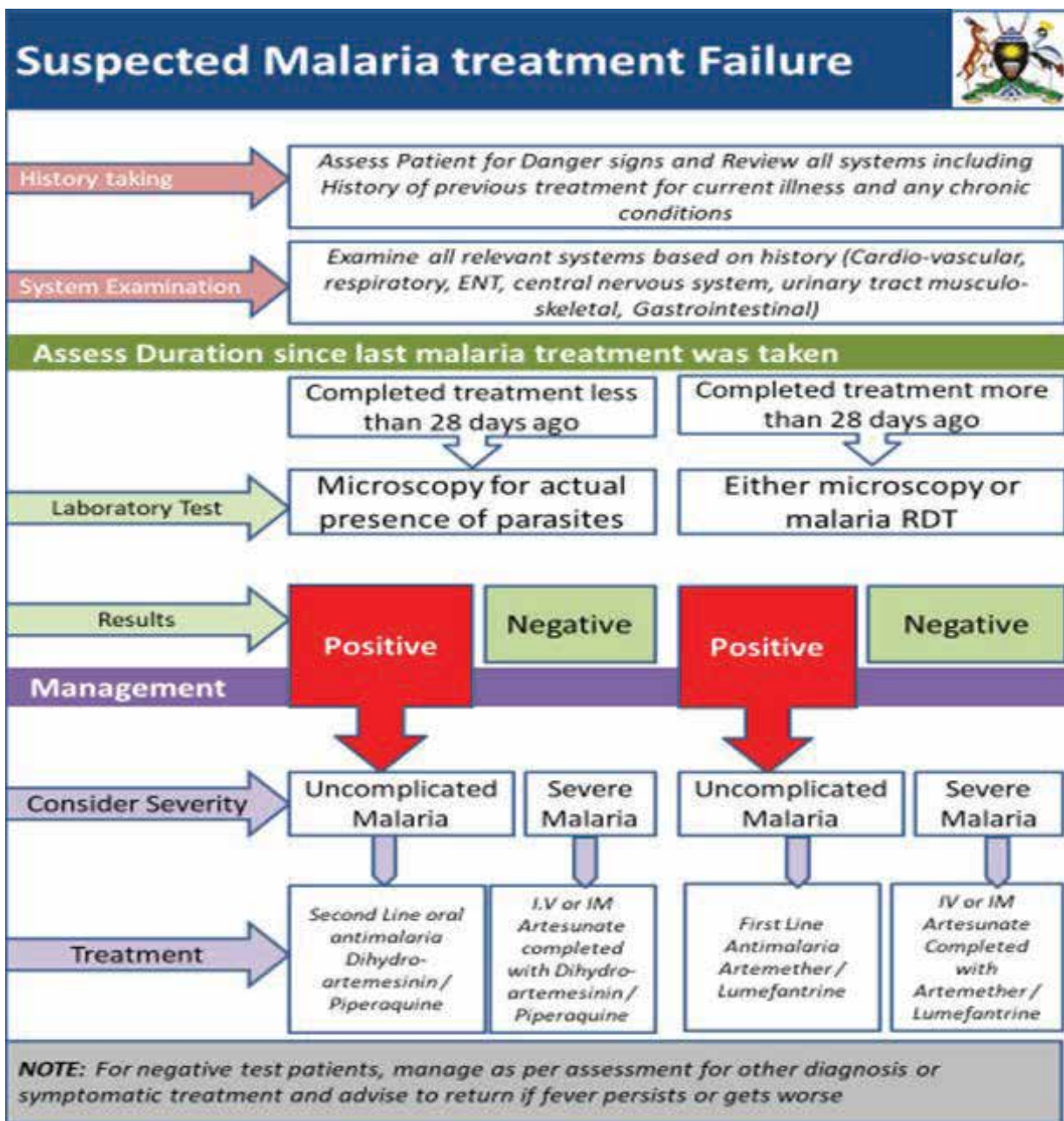
- ▶ If patients have previously taken ACTs and present with a positive blood film at least 28 days after the previous episode, we can assume that we are dealing with a new infection and therefore ACTs (Artemether/Lumefantrine, Artesunate-Amodiaquine) can be repeated
- ▶ If, however fever occurs within 4 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.

Management of Severe Malaria after treatment failure

A patient presenting with signs of severe malaria should be managed as described in Module 5 – Management of Severe Malaria. However, special consideration needs to be given to the drugs previously taken as shown below:

- ▶ If the patient took AL within the last week, then treat with: Parenteral Artesunate for at least 24 hours (minimum of 3 doses) followed by second line ACT (Dihydroartemisinin + Piperaquine) for 3 days or 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.
- ▶ If the patient had received a full course of Artesunate injection before and is presenting with severe malaria, then treat with IV Quinine

Figure 9.3: Decision making flowchart for patient with suspected malaria treatment failure



Summary of the section:

In this session, we learnt 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.

Module 10: Monitoring for Drug Safety: Pharmacovigilance

Learning Objectives

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

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

Contents

Unit	Content	Activity	Time
Session 1	Definition of Pharmacovigilance	Lecture	10 minutes
Session2	Importance of Drug Safety Monitoring	Lecture	10 minutes
Session3	Assessment and Reporting of Adverse Drug Events	Lecture	10 minutes

Materials needed for this session

- White board
- Markers for trainers
- Pens and paper for all health workers

References and recommended readings

- Pharmacovigilance reporting form

Session 10.1: Definition of Pharmacovigilance

Pharmacovigilance - Science and activities relating to the detection, assessment, understanding, and prevention of adverse effects or any other possible drug related problem.

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.

Adverse drug reaction - Response to a drug which is harmful and unintended, and which occurs at doses normally used in humans.

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.

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 in capacity or disability
- Causes misuse or dependence

Session 10.2: Importance of Drug Safety Monitoring

Question: What is the importance of Pharmacovigilance?

Answer:

Session 10.3: Assessment and Reporting of Adverse Drug Events

Assessment & Reporting of Adverse Drug Events

Question: Ask the participants “How do you assess and report Adverse Drug Events?”

Answer:

- i) _____
- ii) _____
- iii) _____
- iv) _____
- v) _____

Managing Adverse Drug Event

Question: Ask the participants “How do you manage a patient with an adverse drug event?”

Answer: Mild adverse event - _____

Moderate, severe, or life-threatening adverse event - _____

Summary of the session:

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

Module 11: Patient Education

Learning Objectives

By the end of this session, the participants 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 counselling of patients with regards to when to come back to the health facility
- Outline the important messages to give a patient or caregiver on prevention of Malaria

Content

Unit	Content	Activity	Time
Part 1	Good Communication Skills	Lecture	10 minutes
Part 2	Important Messages to Give a Patient	Lecture	20 minutes

Materials needed for this session

- White board
- Markers for trainers
- Pens and paper for all health workers

References and recommended readings

- None required

Session 11.1: Good Communication Skills

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

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 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 of the section:

In this session, we have learnt that for good communication, ensure that in your patient education you:

- 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

Session 11.2: Important Messages to give a Patient

This session covers four important messages to give a patient:

- i. Important messages on “Adherence to Treatment”
- ii. Important messages on “Care of a Patient with Malaria”
- iii. Important messages on “When to Return to the Health Facility”
- iv. Important messages on “Prevention of Malaria”

A. Important Messages on Adherence to Treatment

There are two important messages that should be given to the patient / care giver to promote adherence to treatment:

- i. About the current Malaria episode
- ii. What the patient is expected to do

About the current Malaria episode – The following should be communicated to the patient.

There are two important messages you should give the patient to promote adherence to treatment:

i. About the current illness

- The cause of illness is Malaria
- Malaria is transmitted by mosquito bites
- The specific medication/drugs that have been given for the illness
- The correct way to take the drugs (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

ii. **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.

B. Important Messages on Care of a Patient with Malaria

i. **How the antimalarial is to be given**

- Orally or parenterally and the reason why you have chosen the route of administration;
- The need for compliance to prescribed medicine
- How many times per day
- For how many days
- If orally, tell the patient how to administer the drugs

ii. **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

C. 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

Provide advice on dangers of sharing medication

The course of treatment is for one person for one episode of fever. If it is 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

D. 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 despite completing the course of treatment. Such patients may have resistant malaria and/or another 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

E. 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 female Anopheles mosquito)
- Explain the role of specific preventive measures such as:
 - **LLIN** - 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 Intermittent Preventive Treatment in Pregnant women (IPTp) with SP in the second and third trimester of pregnancy
 - **Prophylaxis** - Explain the use of malaria prophylaxis in special groups such as sicklers and non-immune travellers.

Summarize the section using the points below:

In the session, we have learnt 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.

Module 12: Medical Records Keeping

SURVEILLANCE, MONITORING AND EVALUATION

Health information is one of the six building blocks of a health system. Surveillance is the main component of the National Health Management Information System (HMIS) and comprises records tools, procedures, people and structures required to generate information.

In developed countries medical records are kept electronically. However, in our setting this is not yet the case, so the efficient management of the paper based medical record systems remains essential for the collection of complete, accurate and timely data on health to inform planning, surveillance, monitoring and evaluation.

Learning Objectives

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

- Define surveillance, monitoring and evaluation
- Describe the health information management cycle (including definition & types of medical record, data capture and reporting, roles of different staff)
- Understand malaria performance indicators
- Analyze and use malaria related data

Content

Unit	Content	Activity	Time
Session 1	Definition of surveillance, monitoring and evaluation	Lecture	5 minutes
Session 2	Description of the health information management cycle	Lecture	5 minutes
Session 3	Introduction to the malaria performance indicators	Lecture	10 minutes
Session 4	Data analysis and use	Lecture	10 minutes

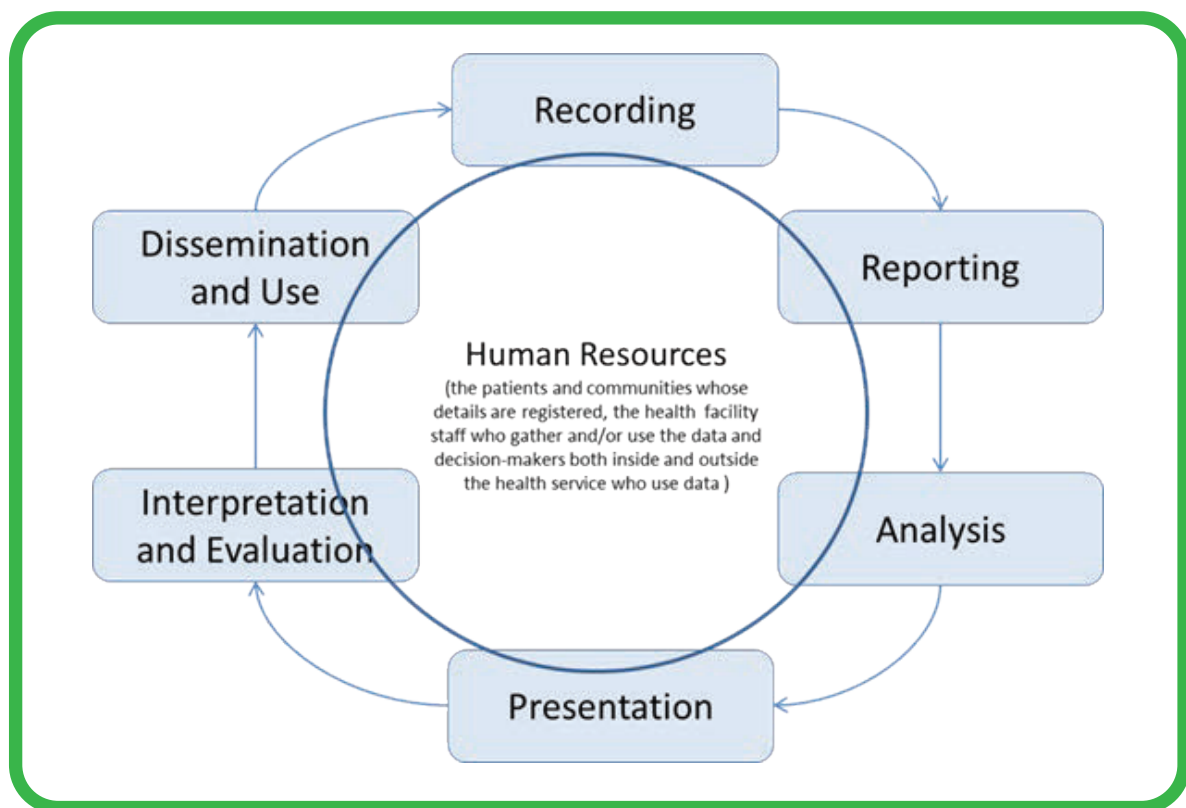
Session 12.1. Definitions:

Public health surveillance: This is the continuous, systematic collection, analysis and interpretation of health-related data needed for the planning, implementation, and evaluation of public health practice

Monitoring: Routine tracking and reporting of priority information about a program / project, its inputs and intended outputs, outcomes and impacts

Evaluation: The rigorous, scientifically based collection of information about program / intervention activities, characteristics, and outcomes that determine the merit or worth of the program/intervention.

Session 12.2. The health information management cycle



12.2.1: Importance of Medical Records

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 enough data to:

- Identify the patient
- Support the diagnosis
- Show the patient's reason for attendance at the health facility for each visit
- Show the health worker's justification for treatment
- Accurately document results of treatment

This information is used by doctors, nurses, laboratory personnel and other health care professionals to treat the patient for the current condition or in the future. Therefore, accurate documentation is essential.

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

■ The efficient management of manual (paper based) 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.

Summarize the section using the points below:

In this session, we have learnt 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.

12.2.2: Types of Medical Records

Table 12. 1 – Different registers / forms / cards and their associated HMIS form

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 of the section:

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.

Session 12.3: Completing Relevant Medical Records Forms

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

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.

2. Medical form 5 or equivalent

The medical form 5 has the following qualities:

- It is the source of information for 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. 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, like the OPD.

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 of the section:

In this session, we have learnt that;

All out-patients should be recorded in the OPD Register and all in-patients should be recorded in the Inpatient Register.

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

12.2.4: The Roles of Individual Staff in Record Keeping

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

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 in legible writing for all to refer
 - Generate information from the findings and actions
 - Record the information on the appropriate medical forms and registers
 - Analyze, utilize and disseminate the information

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

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 make easily understood forms such as tables, graphs, pie charts and present
- Analyze, utilize and disseminate the information

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 of the section:

In this session, we have learnt that;

Every health worker has specific responsibilities to ensure medical records are well- maintained.

It is the responsibility of every health worker to ensure that the overall system to complete medical records operates effectively.

Introduction to the malaria performance indicators

Indicator	Definition	Numerator:	Denominator:
1. ANC 4 Coverage	Percentage of women aged 15-49 with a live birth in each time period that received antenatal care four times	Number of pregnant women that received antenatal care at least four times in each period Data Source: Number of confirmed reported malaria (microscopy or RDT) in a year	Number of expected pregnancies in the catchment area in a given period Data Source: Population in specified geographical location
2. Malaria cases per 1,000 persons per year	Number of confirmed reported malaria (microscopy or RDT) cases per 1000 persons per year.	Data Source Number of pregnant women who received 3 or more doses of Sulphadoxine / Pyrimethamine for malaria prophylaxis during the last pregnancy.	Data Source Number of first antenatal clinic visits during a specified time
3. Intermittent Presumptive Treatment 3 or more doses coverage for pregnant women	The proportion of pregnant women attending antenatal care who have received the 3 or more doses of Sulphadoxine / Pyrimethamine for malaria prophylaxis during the last pregnancy.	Number of patients diagnosed with malaria that are laboratory confirmed (rapid diagnostic test or microscopy) in a specified period.	Number of patients diagnosed with malaria in a specified period Data Source Number of all malaria suspects (all with fever or; malaria test request, or test result, or malaria diagnosis, or treatment for malaria)
4. Patients diagnosed with malaria that are laboratory confirmed	Percentage of patients diagnosed with malaria that are laboratory confirmed (rapid diagnostic test or microscopy) in a specified period.	Data Source Number of mRDT and B/S microscopy tests recorded in the reporting month Data Source Number of malaria test negative patients with an anti-malaria	Number of patients who test negative with either mRDT or microscopy. Data Source
5. Malaria Testing rate	Percentage of suspected cases testing with RDT or microscopy	Percentage of negative test result patients who get an anti-malaria	
6. Adherence to test results	Percentage of negative test result patients who get an anti-malaria		

Session 12.4. Data analysis and use

12.4.1. Determining malaria epidemic thresholds

Epidemic threshold is a critical level at which the reported counts of cases or death, in a given space and time, are beyond what would be considered 'normal'. This threshold is used to confirm the occurrence of an epidemic so as to step-up appropriate control or response measures. The computation of effective thresholds requires the following conditions:

- Weekly malaria case data should be used for the computation of thresholds in epidemic-prone settings, malaria is highly focal and hence a threshold is specific to a given area or administrative unit.
- Where possible avoid applying a national threshold sub-nationally use at least five years of weekly data to define the expected 'long term' weekly case load.
- However, as transmission declines sharply due to recent interventions, historical data may bias your trends as they result in a higher 'long term' weekly case load. Where possible remove such historical data of the earlier years in order to be sensitive to recent epidemics.
- Developing two thresholds – an alert threshold for early warning (less sensitive) and an epidemic threshold for early detection (highly sensitive).
- The year of interest should be excluded from the calculation of threshold

12.4.2. Steps in constructing a normal channel graph.

Method 1.

1. Using MS EXCEL tabulate the malaria cases for each of the 52 weeks in a year for the most recent five (5) years.
2. Derive the mean (average) for the five years using the AVERAGE function in MS EXCEL as follows: if the cases are in cells A1-A5, the mean is generated by typing in a cell below AVERAGE (A1:A5).
3. Derive the standard deviation for each week using the STDEV function in MS EXCEL as follows STDEV (A1:A5).
4. Plot the means (the expected) for each week.
5. Plot the mean + 2SD – This is the upper normal.
6. The area between the mean and the mean+2SD is the expected malaria cases (NORMAL CHANNEL).
7. Compare by plotting the observed weekly malaria cases to the NORMAL CHANNEL

8. If the observed weekly malaria cases are above the upper plot of the Normal channel an epidemic alert exists and should be investigated within 24-48 hours. An example is as in table 1 and figure 4 below.

Method 2

Step 1: Arrange malaria cases per week

Since each year has 52 weeks from 1st January to 31st December, arrange and tabulate malaria cases for the 52 weeks for the last 5 consecutive years.

Week no.	Year 2014	2015	2016	2017	2018
1	20	15	30	10	40
2	12	24	32	16	18
....					

Step 2: Sort the cases (in ascending order)

Sort the cases of the same week across the years into ascending order starting with the lowest to the highest.

Week no.					
1	10	15	20	30	40
2	12	16	18	24	32
....					

Step 3: Determine the lowest expected cases and highest expected cases

The second number in the list is the 1st quartile and represents the lower limit of the expected cases. The fourth highest number, i.e. the fourth from the bottom, represents the 3rd quartile and this is the upper limit of the expected number of cases for that health facility.

Week no.		L		H	
1	10	15	20	30	40
2	12	16	18	24	32
....					

Step 4: Plot Weeks (X-axis) versus the cases (Y-axis) on the graph

Plot and join the 1st quartile (lower numbers) with a line. Plot and join the 3rd quartile (highest numbers) with a line. The gap “road” between these two lines makes the “normal channel” where malaria cases in that health facility would fall.

Step 5: Plot the number of malaria cases observed in the following year

The weekly malaria cases should be plotted on the graph before submitting the weekly report form to the district.

Step 6: Interpret the findings after each plotting

If the number of currently observed cases falls either below or between the two lines of the 1st and 3rd quartile, this can be considered normal. If, however, the number is above the 3rd quartile, this may be an indication of an epidemic and must be reported immediately.

Module 13: Medical Supply Management

Learning Objectives

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

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

Content

Unit	Content	Activity	Time
Session 1	Overview of Medical Supply Management	Lecture	5 minutes
Session 2	Essential Medical Supplies needed in Malaria Case Management	Lecture	5 minutes
Session 3	Ordering, Receiving and Issuing Supplies	Lecture	20 minutes
Session 4	Estimating the amount of Antimalarials Needed	Lecture	30 minutes

Materials needed for this session

- White board
- Markers for trainers
- Pens and paper for all health workers

References and recommended readings

None required

Session 13.1: 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

Session 13.2: The Essential Medical Supplies needed in Malaria Management

There are several supplies needed for malaria patient management and they include the following:

1. Clinic equipment
2. Laboratory equipment and supplies
3. Stationery
4. Drugs
5. Medical supplies and sundries

Let us next describe each of them in turn:

1. **Clinic equipment including;**

- a) Thermometers
- b) Blood pressure machines (Sphygmomanometers),
- c) Otoscopes,
- d) Weighing scales,
- e) Stethoscopes
- f) Tongue depressors,
- g) Timing device (e.g. Pulsometer or watch)

These are very essential in the process of diagnosing malaria.

2. Laboratory equipment and supplies - The most important are the equipment and supplies for malaria microscopy and RDT. For microscopy, the supplies needed include the microscope, the slides, the stains, and lancets.

3. Stationery - The key stationery that you need includes the Patient registers, medical form 5s, Inpatient admission forms and Laboratory request forms.

4. Drugs including

a) Antimalarials

• Artemether/Lumefantrine tablets and/or	• Quinine tablets
• Artesunate/Amodiaquine tablets	• Quinine injection
• Injectable Artesunate	• Dihydro-artemesinin / Piperaquine
• Artesunate suppositories	• Injectable Artemether

b) Antipyretics; Paracetamol tablets and/or paracetamol suppositories and/or ibuprofen tablets

c) Anticonvulsants; Diazepam injection and/or phenobarbitone injection and/or phenytoin injection

d) Intravenous fluids; Dextrose (both 5% and 50%) and Normal saline injection

5. Medical Supplies and sundries including

• Giving sets	• Antiseptics/disinfectants
• Canulas	• Dispensing envelopes
• Needles and syringes	• Gloves
• Butterfly needles	• Nasogastric tubes (NGTs)
• Adhesive Plaster	• Tourniquets

Session 13.3: Ordering, Receiving and Issuing Supplies

Overview of an effective Supply Management system

In order to manage supplies effectively, two things need to happen:

- a) Supply management system - A well-designed supply management system needs to be created and regularly maintained
- b) Supply management team - All health workers (clinicians, dispensers, laboratory staff, records staff and even cleaners) need to be part of an effective supply management team

Components of an effective Supply Management system

There are three components of an effective Supply Management system

1. Tracking and recording patients treated for malaria
2. Tracking and recording stock of drugs and supplies
3. Tracking and recording all drugs and supplies that are dispensed/used

1. Tracking and recording patients treated for malaria

- c) All patients tested and/ or treated for malaria need to be diligently tracked
- d) There are three main registers that should be used:
 - Outpatient register: For out patients only
 - Inpatient register: For in-patients only
 - Laboratory register: For all lab tests completed

These registers should track the following information:

- Number of patients seen (each patient should get a unique patient number)
- Diagnosis made and therefore the drugs they will need
- Age groups and therefore the strength of drugs they will need
- Laboratory investigations indicating number of slides, stains etc. that may be needed
- Length of admission on a ward indicating supply needs both in terms of drugs but also other supplies (e.g. dextrose)

Each of these registers needs to be kept complete and must be legible for anyone who may need this information.

All records should be entered daily and weekly reports should be reviewed by the in-charges of appropriate action on supplies can be taken.

2. Tracking and recording stock of drugs and supplies

- e) All malaria medicines and supplies need to be safely stored and tracked using Stock Cards and stock books
- f) Stock cards help you track the quantities dispensed of a particular item as well as track the current to quantity you have available to be used
- g) Stock book helps summarize the contents of individual stock cards in to one book, making the ordering process simpler and facilitates conducting of physical counts

DESCRIPTION OF COLUMNS

1. HEALTH UNIT NAME:

Indicated the name of the health unit

2. HEALTH UNIT CODE:

Indicated the unique code allocated to the health unit by the District Health Office

3. FINANCIAL YEAR:

This ranges from 1st July of the current year to 30 June of the following year.

4. ITEM DESCRIPTION:

(Name, formulation, strength) Enter the name of the item, its formulation and strength e.g. Paracetamol tablet, 500mg.

5. PACK SIZE:

The specific pack size in for each commodity. For example, Paracetamol can be packed in tins of 1000 tablets or in packages of 100 tablets. Issues from the store should be recorded in pack sizes. E.g. if 5 jars of 1000 tablets are issued out, write 5 in the Quantity Out column.

6. ITEM CODE NO:

This is the official unique number for the commodity given by MOH. Leave blank if you don't know the number.

7. SPECIAL STORAGE CONDITIONS:

These are specific instructions for storing a commodity. e.g., "Store in a cool dry place", "Store in temperature below 8 °C", etc.

8. UNIT OF ISSUE:

The smallest unit of an item e.g. 1 tablet, 1 vial, 1 cycle, 1 strip of determine.

9. MAXIMUM STOCK LEVEL:

This is 5 months stock based on the Average Monthly Consumption figures. For items with short shelf life Technical Programs will give guidance.

10. MINIMUM STOCK LEVEL:

This is a 2 months stock based on the Average Monthly Consumption figures. For items with short shelf life Technical Programs will give guidance.

TRANSACTION INFORMATION

11. DATE

Enter the date when a transaction has taken place at the health facility store (MUST be indicated here).

12. TO or FROM

To: When issuing out of the store, please indicate where the stock is going.

If abbreviations are used be consistent and clear.

From: When receiving into the store, please indicate where the stock has come from. If abbreviations are used be consistent and clear.

Note: Item (s) must not come into or leave the store without proper documentation i.e. requisition or issue documents that support the transaction.

13. VOUCHER NUMBER

The Voucher Number should be filled in whenever a transaction takes place. This is obtained from the Requisition and Issue Voucher (MH 017) and Delivery Note. This enables the tracking of movement of an item from one place to another.

14. QUANTITY IN

These are quantities received from a supplier e.g. National Medical Stores and should be written as number of Pack units. Usually the transaction is written in RED ink to highlight that these are items received in the Store. The items should be recorded in pack units

15. QUANTITY OUT

Enter the quantities in pack units issued out under this column.

16. LOSSES/ ADJUSTMENTS

Losses: This refers to any loss of commodities due to expiry, damage, pilferage, theft etc. This is usually indicated with a negative sign before the figure Adjustments: Refers to increase or decrease in stock due to borrowing, lending or redistribution of an item and it is usually indicated with a positive sign for a gain into the store and a negative sign for item (s) lent out of the store.

17. BALANCE ON HAND

Enter the quantities of the commodity remaining in the store after issuing or adjustment.

18. EXPIRY DATE(S)

Enter the expiry date of the commodity received in this column. Stock of the nearest expiry date should always be used first (FEFO)

19. BATCH NUMBER

Enter the batch number of the commodity in this column

4. PACK SIZE

The specific pack size in for each commodity. For example, Paracetamol can be packed in tins of 1000 tablets or in packs of 100 tablets

5. ITEM CODE NO

This is the official unique number for the commodity given by the supplier. Leave blank if you don't know the number.

6. DATE

Enter the date when you update the stock book page

7. PREVIOUS PHYSICAL COUNT

Enter the quantity from the previous physical count

8. QUANTITY RECEIVED

Enter the quantity received the previous month from the stock card, since the last physical count.

9. QUANTITY ISSUED

Enter the quantity used since the last physical count

10. LOSSES AND ADJUSTMENTS

Enter the losses and adjustments for the previous months as recorded on the stock card

11. BALANCE ON HAND

Enter the quantities after doing your physical count or copy it from the stock card

Note: Physical count should be done regularly at the end of each month.

12. DAYS OUT OF STOCK

Enter the number of days the item was out of stock during the previous month

13. ADJUSTED MONTHLY CONSUMPTION aMC

Quantity consumed in the current month adjusted for stock out days e.g. 1000 items consumed in 10days therefore for 30days it would be $1000/10*30\text{days} = 3000$ if the item was available in stock throughout the month.

14. AVERAGE MONTHLY CONSUMPTION (AMC)

AMC is calculated as follows:

Adjusted consumption in the current month plus adjusted consumption for the two previous months, divide by three (3), i.e.

$$\text{AMC} = \frac{(\text{aMC current month} + \text{aMC previous 2 months})}{3}$$

15. MAXIMUM STOCK QUANTITIES

This is obtained by multiplying adjusted AMC by five months

16. QUANTITY TO BE ORDERED

This is obtained by subtracting balance on hand from the maximum stock quantities.

17. REMARKS

Enter any comments or observations that you feel are of importance

18. INITIALS

Enter your initials

1. Tracking and recording all drugs and supplies that are dispensed/used

All drugs that are given to patients and supplies that are used by health workers must also be tracked (e.g. all drugs given out must be tracked in the dispensary)

- Each of these registers needs to be kept complete and must be legible for anyone who may need this information
- All records should be entered on a daily basis and weekly reports should be reviewed by the in charge so appropriate action on supplies can be taken

Summary of the section:

In this session, we have learnt that;

The three components of an effective Supply Management system are:

1. Tracking and recording patients treated for malaria in three registers:
(Outpatient Register, Inpatient Register and Laboratory Register)
2. Tracking and recording the stock of drugs and supplies using Stock Cards and stock book
3. Tracking and recording all drugs and supplies that are dispensed/used using dispensing logs and Stock Cards
4. The effective tracking and recording of patients and drugs/supplies is crucial to ensuring your health facility is well stocked on the items it needs to treat patients.

Session 13.4: Quantifying the amount of Antimalarials Needed

Overview of Ordering Antimalarials

All HCs at level II and III receive antimalarial drugs and supplies through a 'push' from the National Medical Stores in the Essential Medicines Kit

This standardized kit should include all the medicines and supplies you need to diagnose and treat malaria including Coartem, RDTs, Artesunate/Quinine injection etc.

All HC IVs and hospitals submit a completed Essential Medicines and Health Supplies order form to the National Medical Stores and specify the quantity of drugs they want.

How to order for Essential Medicines & Health Supplies

There are five steps to completing the Essential Medicines & Health Supplies order form

1. Current stock

- 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. An explanation on how to use the stock card is provided above.
- Physical count is used to determine current stock levels
- 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 storekeepers 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.

2. Average Monthly Consumption

Average Monthly Consumption (AMC): the quantity of items consumed per month called average monthly consumption; it should be calculated periodically because the consumption rate may vary; AMC is useful in determining the maximum and minimum stock. The stock book (HMIS 083) makes it easy to calculate AMC.

Calculating an average monthly consumption is based on d three consecutive monthly consumptions (MCs) divided by 3. Use the most recent three months period preceding the date when the average is being calculated. Adjust for any days when a product is stocked out. Two methods of calculating AMC exist when there was stock out in the period and when there was no stock out in the period as illustrated below;

Monthly Consumption (when no stock-out)
Quantity issued for the month = MC

Example from the stock book: (January) = 15

MC (with adjustment for stock-out days)

$$\frac{\text{Quantity issued}}{\text{Number of days item was available}} \times 30 = \text{MC}$$

Example from the stock book: (June)

$$\frac{19}{(30 - 4)} \times 30 = 22$$

$$\text{Adjusted AMC} = \frac{\text{Sum of last 3 months MC}}{3}$$

Example from the stock book (April, May & June)

$$\frac{20 + 16 + 22}{3} = \frac{58}{3} = 19.33 \sim 19$$

3. Order quantity

The order quantity is determined by multiplying the Average Monthly Consumption by the number of months of stock required and deducting the current stock.

Maximum and minimum stock levels when ordering:

- 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
- When calculating the Order quantity, it is recommended that you follow this formula:

$$\text{Quantity to order} = (\text{Maximum stock quantities}) - (\text{Balance on hand})$$

Taking the example from the stock book for August:

Balance on hand = 27; Maximum stock quantities = 100;

$$\text{Quantity to order: } (100 - 27) = 73$$

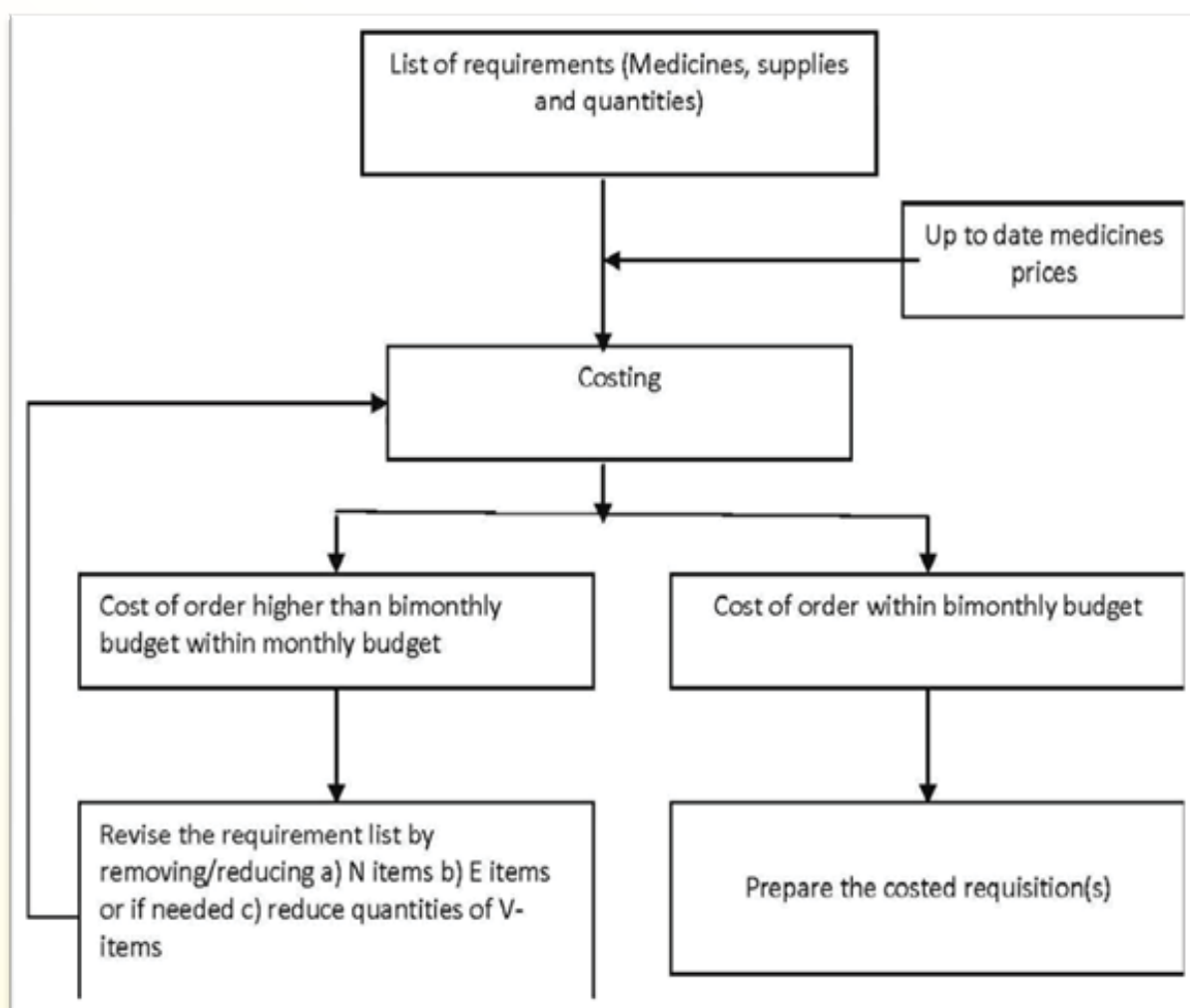
You should respect the suppliers' minimum units of issue when making an order. For example, if the minimum unit of issue is a pack of 30 doses, the quantity ordered should be in multiples of 30 (30, 90, 120, etc.). This issue is minimized by introducing pack size instead of single units such as tablets.

This health centre would never want to have more than 100 packs. If they had more than that, they would stand high chances of wastage due to damage and expiry.

4. Order cost

- This is the total cost of your order
- It is the cost per unit multiplied by the number of units you are ordering
- The figure below summarizes steps in ordering for non-full supply items

Figure 13. 1: Summary of steps in Ordering medicines and supplies



Estimating antimalarial needs in the absence of consumption data

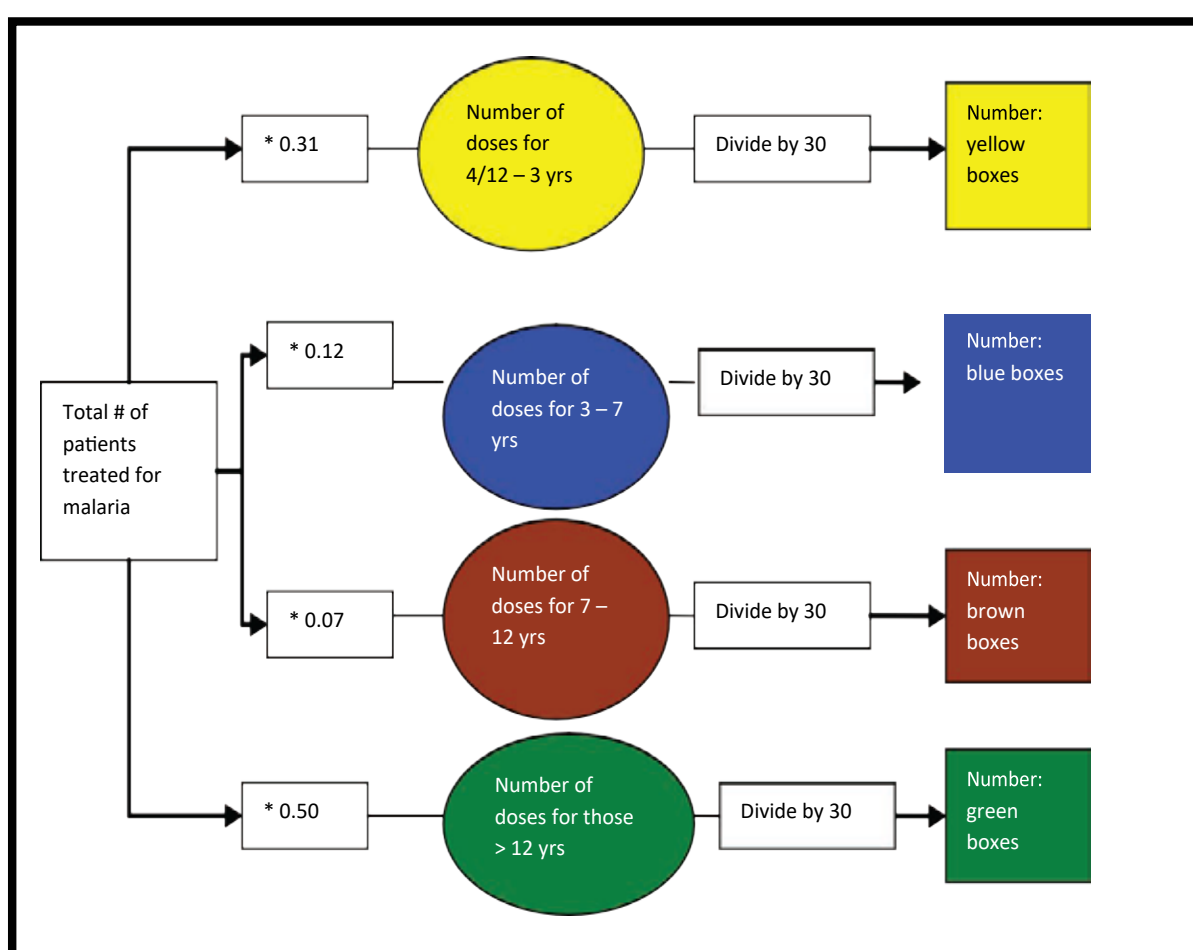
The amount of any antimalarial needed for use in a specified period can also be estimated from the total number of malaria cases seen at a facility in the previous time period and the drugs dispensed.

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 13.1: 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 years and above

Figure 13.3: 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

The following is an estimation for the medicines and supplies needed to treat a severe malaria case in an adult and in a child. Note that the supplies needed are different depending on whether Artesunate Injection or Quinine Injection is used

Table 13.2 – Estimation of IV Artesunate or IV Quinine needed to treat severe malaria

	Artesunate Injection	Quinine
Child	<ul style="list-style-type: none"> ○ 1 cannula (G 24/22) ○ 1 bottle of 5% dextrose or normal saline ○ 3 vials of injectable artesunate ○ 1 amp of Diazepam ○ Paracetamol tablets (100mg) 10 tabs 	<ul style="list-style-type: none"> ○ 1 cannula (G 24/22) ○ 1 syringe ○ 1 giving set ○ bottles of 5% dextrose or normal saline ○ ampoules of injectable quinine ○ 1 amp of Diazepam ○ Paracetamol tablets (100mg) 10 tabs
Adult	<ul style="list-style-type: none"> ○ 1 cannula (G 20/21) ○ 1 bottle of 5% dextrose or normal saline ○ 9 vials of injectable artesunate ○ 2 amps of Diazepam ○ Paracetamol tabs (500mg) 10 tabs 	<ul style="list-style-type: none"> ○ 1 cannula (G 20/21) ○ 1 syringe ○ 1 giving set ○ 3 bottles of 5% dextrose or normal saline ○ 3 ampoules of injectable quinine ○ 2 amps of Diazepam ○ Paracetamol tablets (100mg) 10 tabs

Quiz:

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:

1. How much Coartem you will need to order for a 3 months period
2. What you need to order for the ward where severe cases are admitted
3. 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

Answer:

The 500 patients per month need to be broken down into the different age-weight pack sizes:

Table 13.3: Table showing breakdown of antimalarials to order by age groups

Pack type (Age)	Average % of cases in Uganda	Number of treatments needed based on AMC of 500 treatments	Boxes to order (30 treatments per box – rounded up)
Yellow (4 months to 3 years)	31%	155 * 3 months =	16
Blue (3 – 7 years)	12%	60 * 3 months =	6
Brown (7 – 12 years)	7%	35* 3 months =	4
Green (>12 years)	50%	250* 3 months =	25

**3. The following is needed to treat 5 adults and 25 children for severe malaria
To treat with IV Artesunate:**

Item	Quantity needed for 25 children	Quantity needed for 5 adults	Total Needed
Cannula	25	5	30
5% Dextrose	25	5	30
Injectable Artesunate Vials	75	45	120
Diazepam	25	10	35
Paracetamol tablets (100mg for children and 500mg for adults)	250	50	300

To treat with IV Quinine:

Item	Quantity needed for 25 children	Quantity needed for 5 adults	Total Needed
Cannula	25	5	30
Syringe	25	5	30
Giving Set	25	5	30
5% Dextrose	75	15	90
Injectable Quinine Ampoules	75	15	90
Diazepam	25	10	35
Paracetamol tablets (100mg for children and 500mg for adults)	250	50	300

You would need 500 blood films for all malaria patients (since every patient should receive a test) and another 30 slides for severe patients because they get an extra test (25 children and 5 adults for an additional 30 patients).

Summary of the section:

In this session we have learnt that on effective supply management and estimating the amount of antimalarials needed;

- Accurate and complete record keeping of the number of patients, dispensed items and stock cards are essential.
- 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 quality orders that will prevent complete stock outs.

Appendices

Appendix	Description
1	Pre-Test/Post-Test and Answers
2	Pre-Test and Post Test Record of Participant Scores
3	Management of a Patient Presenting with Symptoms of Uncomplicated Malaria - Practical Cases
4	Management of a Patient with Severe Malaria – Practical Cases
5	Job Aid on how to Perform a Malaria Rapid Diagnostic Test
6	Handout – Historical and Physical Examination of a Patient
7	Handout – Signs of Triage Priority Groups
8	Handout – Classical definition of Severe Malaria
9	Handout – Steps for a diagnosis of Severe Malaria patient
10	Assessing Coma in adults using Glasgow Coma Scale (GCS) and in children using Blantyre Scale
11	Continuous Medical Education Kit (CME Kit)

Appendix 1: Pre and Post – Test

Name: _____		Cadre: (M/O; C/O; N/O; E/N/MW; Data; Lab; Other) Pick one: _____
Facility Name and level: _____		Percentage score:
1.	List the four, common species of malaria parasite that cause malaria in Uganda? a) _____ b. _____ b) _____ d. _____	/4
2.	Name the commonest malaria species responsible for 99% of the malaria burden in Uganda. _____	/1
3.	List three ways by which malaria can be transmitted. a) _____ b) _____ c) _____	/3
4.	List four common signs or symptoms of uncomplicated malaria in either children or adults. a) _____ b. _____ b) _____ d. _____	/4
5.	What is recommended drug in the following? i. First line treatment for uncomplicated: _____ ii. Alternative first line for uncomplicated malaria: _____ iii. Uncomplicated malaria in pregnancy – 1st trimester: _____ iv. Uncomplicated malaria in 2nd and 3rd trimesters: _____	/4
6.	Give two examples of drugs which were previously used in the treatment of malaria but are now no longer effective. i. _____ ii. _____	/2
7.	What drugs do you use in case of malaria treatment failure in the following conditions? i. Uncomplicated malaria previously on AL: _____ ii. Severe malaria from failure on AL: _____ + _____ iii. Severe Malaria previously on Inj. Quinine: _____ + _____	/4
8.	What is the recommended first line treatment and dosage for Pneumonia in children? Drug: _____ Dose: _____ Frequency _____ Days: _____	/4
9.	What is severe malaria? _____ _____	/2
10.	List four complications of severe malaria common in children? a) _____ b. _____ c.) _____ d. _____	/4
11.	List four complications of severe malaria common in adults? a) _____ b). _____ c.) _____ d). _____	/4

12.	List five groups of people in the population who vulnerable to develop severe malaria. a) _____ b. _____ c.) _____ d. _____ e.) _____	/5
13.	List five of the most common causes of death among children less than 5 years. a) _____ b. _____ c.) _____ d. _____ e.) _____	/5
14	What is the anti-malaria drug of choice, dose and route of administration for management of severe malaria and what are the alternative drugs for management of severe malaria?? a) Drug of choice: _____ b) Route of administration: _____ c) Dose in Children under 20kgs: _____ d) Dose in children adults: _____ e) Alternative drugs: _____	/5
15.	List four conditions in children that may be confused with malaria a) _____ b. _____ c.) _____ d. _____	/4
16.	State four common effects of malaria on pregnancy a) _____ b. _____ c.) _____ d. _____	/4
17.	How does pregnancy affect malaria? _____ _____	/1
18.	What is the recommended drug for Intermittent Preventive treatment (IPTp) of malaria in pregnancy? Drug: _____ Dose: _____ Timing: _____ Frequency: _____	/2
19	List four groups of people recommended to have malaria prophylaxis? a) _____ b. _____ c.) _____ d. _____	/4
20.	List four ways in which you think malaria can best be controlled in your area. i. _____ ii. _____ iii. _____ iv. _____	/4
	TOTAL SCORE	/70

Appendix 2: Management of a Patient Presenting Symptoms of Uncomplicated Malaria - Practical Cases

Learning Objectives

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

1. Identify the symptoms of both uncomplicated malaria and other febrile illnesses
2. Decide the appropriate investigations that need to be carried out to distinguish between malaria and other febrile illnesses
3. Determine the appropriate treatment to give and its dosage
4. Provide appropriate follow up of the patient

Content

Unit	Content	Activity	Time
Case A:	Uncomplicated malaria	Role Play	20 minutes
Case B:	Negative RDT	Peer review and discussion of cases	15 minutes
Case C:	Co-infection	Peer review and discussion of cases	15 minutes
Case D:	Negative RDT	Peer review and discussion of cases	15 minutes
Discussion	Q&A		15 minutes

Materials needed for this session

- Cases
- Paper and Pens to make notes

Case Study - Patient A (Time = 20 minutes)

Patient Scenario

A woman aged 25 years is brought into the outpatient department of the hospital. The patient became ill two days ago with chills, sweating and headaches. That patient thinks she has malaria.

Questions to be discussed by each group

Question 1: What should you do?

Answer: _____

Question 2: An RDT is performed and the result is positive. What should be done next?

Answer: _____

Question 3: The patient is given Artemether/Lumefantrine. However, the patient returns after three days and the condition has gotten worse. What should be done?

Answer: _____

Case Study - Patient B (Time = 15 minutes)

Patient Scenario

A child aged 7 months is brought in to the clinic with a fever that has been present for 2 days. The child's temperature is quite high (38.1oC), and the mother is worried that it appears to be quite ill and thinks that it is malaria. She is asking for ACTs.

Questions to be discussed by each group

You perform an RDT which yields a negative response.

Question 1: Should you give the child an ACT, as the mother asks?

Answer: _____

Question 2: If not malaria, what is most likely to be causing the child's fever?

Answer: _____

You suspect that the child has pneumonia. You observe and see that when the child breathes in, it must strain so hard that the chest wall seems bend inwards and its head moves up and down with every breath. You take the respiratory rate and find that it is 58 breaths per minute.

Question 3: What would you say is wrong with the child?

Answer: _____

Question 4: What should you do next?

Answer: _____

Case Study – Patient C (Time = 15 minutes)

Patient Scenario

A 2-year-old boy is brought by the mother to your health facility at 9.00 am. The mother reports that the child has had fever for 3 days. The child’s temperature is quite high (38.8o), and the child appears to be quite ill.

The health worker on duty quickly does an RDT which turns out to be positive and gives the boy a full dose of AL and paracetamol and sends them home.

Questions to be discussed by each group

Question 1: Was the patient correctly assessed and given the right treatment?

Answer: _____

Later, in the evening the mother comes back to the clinic and reports that the child is not improving (fever persists) and is still coughing a lot.

Question 2: What could be making the child become more ill?

Answer: _____

You remember that you did not ask the mother about any respiratory symptoms and you did not conduct a physical examination on this patient in the morning. The child has no chest in- drawing or cyanosis but has a respiratory rate of 42 breaths per minute

Question 3: What could be wrong with this child?

Answer: _____

Question 4: What treatment should have been given to the child together with the AL?

Answer: _____

Case Study – Patient D (Time = 15 minutes)

Patient Scenario

A 19-year-old man walks into the OPD. He has had pain and discharge in the right ear for three weeks. He now complains of fever and mild headache but no weakness, joint pains. His appetite is good and he does not vomit. The clinician sends him to the lab for an RDT which turns out negative. The patient is prescribed Amoxicillin for 5 days but insists that he should be given AL since he knows he has malaria and that he has always suffered from malaria.

Questions to be discussed as a group

Question 1: Would you send this patient to the lab to have an RDT? If yes, why?

Answer: Yes/No:

Why? _____

Question 2: What is the possible diagnosis in this patient? State the reasons for your answer.

Answer: _____

Question 3: Should the patient be given antimalarial treatment (i.e. an ACT)?

Answer: _____

Question 4: What advice would you give this patient during health education?

Answer: _____

Appendix 3: Management of Patient with Severe Malaria: Practical Cases

Learning Objectives:

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

1. Identify the various manifestations of severe malaria
2. Assess the severity of the disease in adults and children
3. Decide the appropriate investigations that need to be carried out and when
4. Interpret correctly the results of the investigations
5. Determine the appropriate malaria specific and supportive treatments (especially injectable artesunate) to give, by which route and their dosages
6. Provide appropriate follow up of the patient

Content

Unit	Content	Activity	Time
Case A:	Child with Severe Malaria	Peer review and discussion of cases	30 minutes
Case B:	Reviewing Poor Diagnosis	Peer review and discussion of cases	30 minutes
Case C:	Pregnant Woman	Role Play	30 minutes
Case D:	Referral	Peer review and discussion of cases	15 minutes
Case E:	Potential Immunity	Peer review and discussion of cases	15 minutes
Discussion	Q&A	Review any questions provided by the participants	15 minutes

Materials needed for this session

- Cases
- Paper and Pens to make notes

Case Study A – Child with Severe Malaria (Time = 30 minutes)

Patient Scenario

A four-year-old girl is brought to the outpatient department of your hospital by her mother, late in the evening.

The child was well until yesterday morning (36 hours ago), when she began to have fever. Yesterday she took meals but seemed indifferent; today she has refused food but has drunk a little. The mother says the child had a “fit” this morning; she regained consciousness immediately. For the past few hours the child has been increasingly drowsy, and for the last hour has been unconscious.

At the examination the child is well-nourished, unconscious, and not dehydrated. No rash. Some yellowish sticky fluid is seen filling the left external auditory meatus. The axillary temperature is 40.2°C; pulse 120/beats/min, regular; blood pressure 90/70 mmHg. No neck stiffness. Reflexes are normal. The pupils are equal; a few retinal haemorrhages seen; no papilloedema.

Questions to be discussed by each group

Question 1: If facilities are limited, which laboratory tests are essential for this child as a guide for immediate action?

- Answer:**
- Blood films for malaria parasites.
 - Blood glucose. Hypoglycaemia may complicate any childhood fever, including malaria. Immediate correction can reverse coma and prevent cerebral damage.
 - Lumbar puncture
 - Haematocrit and/or haemoglobin concentration

Note:

Whether other tests are done may depend on the results of the above tests and on available facilities – blood culture, chest X-ray, biochemical studies. They are less likely to add substantially to the value of careful clinical assessment in the planning of immediate treatment.

Question 2

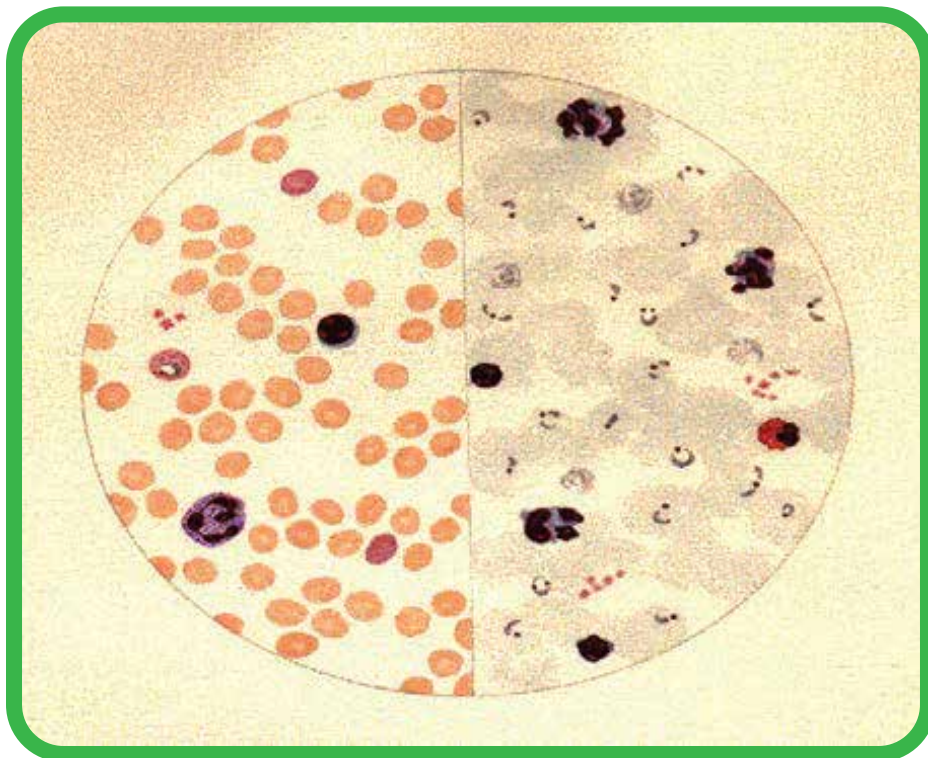
In this child the blood glucose level was 1.0 mmol/l (18 mg/dl). A bolus of 25% dextrose was given intravenously, but the child remained unconscious.

What could be the explanation for this?

Answer:

There is another cause of coma in addition to hypoglycaemia. The dose of dextrose given may have been insufficient; or hypoglycaemia has already been prolonged enough to cause brain damage. However, in this case, it is likely that continuing coma is due to malaria itself.

Figure 1: Thick blood film from this patient as seen under the high-power microscope (magnification x700)



QUESTION AND ANSWER SESSION

Figure 1 is the thick blood film from this patient as seen under the high-power microscope (magnification x700).

Question	Answer
<p>What does the film show? How heavy is the infection?</p>	<p>Malaria: all parasites at the “ring” stage; The infection is extremely heavy (“++++”). It is important to have a rough idea of how heavy the parasitaemia is because children with heavy parasitaemia are at greater risk of death. A patient with heavy parasitaemia may have a large drop in haemoglobin level over the next few hours.</p>
<p>In this child who has parasitaemia and hypoglycaemia; Does this exclude a diagnosis of meningitis? Explain</p>	<p>No. In highly endemic areas the children may have heavy parasitaemia without severe illness. The fever and coma in this child may be due to something else and meningitis is a possibility.</p>
<p>Neck stiffness was assessed in this patient. Is it still necessary to do the lumbar puncture?</p>	<p>Yes! The absence of neck stiffness does not exclude meningitis, since young children with meningitis may have no neck stiffness especially if deeply unconscious, sedated or post-ictal. Therefore, lumbar puncture is still indicated.</p>
<p>Does clear colourless cerebrospinal fluid exclude meningitis? Explain</p>	<p>Not quite but it makes it less likely. A child as ill as this from meningitis would be highly likely to have cloudy CSF. But remember, you need 400 cells/mm³ in cerebrospinal fluid to make it visibly cloudy, so a fluid containing 300 cells/mm³ might be clear. Microscopy of the fluid must therefore be carried out.</p>
<p>In this patient the cerebrospinal fluid was clear and colourless and not under pressure, microscopy showed 3 wbc/mm³ (normal) and 7 rbc/mm³ (normal). Gram stain and Indian ink were negative.</p> <p>How would you interpret this result?</p>	<p>If the child has chronic middle ear disease, a cholesteatoma may have developed and infection could have spread to the brain or meninges. Intracerebral, subdural or extradural abscess – or meningitis – could result. The normal CSF findings exclude meningitis, but the other complications of middle ear disease remain a possibility.</p>

Question	Answer
What should be done about the ear discharge in this patient?	The external meatus must be cleaned out carefully so that the ear drum can be examined. If middle ear disease had been found, antibiotics would have been indicated.
What is your decision on how to proceed with antimalarial treatment?	
Which drug(s) and route of administration would you use?	Artesunate injection. IV injection is preferred for artesunate. If IV is not possible artesunate can be given IM. (Quinine or artemether are acceptable alternatives if artesunate is not available)

a) What is the correct dosage and schedule?

Answer:

Artesunate IV, 2.4 mg/kg upon arrival, and 12-hourly for the first day. 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)

After that, once daily till the patient can take orally, then a full course of Artemether/ Lumefantrine or another ACT.

Question 7

Apart from antimalarial drug(s), is any other drug therapy indicated for this patient?

Answer:

Consider specific treatment for:

Fever. Paracetamol is an effective antipyretic and can be given by suppository. While waiting for this to have an effect (or if it is unavailable), apply tepid-sponging and fanning the child's caretaker (mother, father, etc) may help with this. Fever is only dangerous if very high, moderate fever (<39°C) may have some beneficial effects on host response and some anti-parasitic action.

Convulsions. Observe this child carefully for convulsions (including subtle convulsions) and treat accordingly. In children with convulsions due to high fever or hypoglycemia, correcting these abnormalities may be sufficient to prevent further convulsions.

Complicating infection. Septicemia occasionally complicates severe malaria. Other potential bacterial infections include aspiration pneumonia and urinary tract infection if the patient is catheterized. These must be looked for and only treated if they develop.

Question 8

How should fluid replacement be given?

Answer:

Assess individual requirements. Pay special attention to:

Prevention or correction of hypovolemia, because the patient with severe malaria is at risk of developing acute renal insufficiency.

Prevention or correction of fluid overload, especially if renal failure has developed;

pulmonary oedema may result from fluid overload and may also be a direct complication of severe malaria.

Prevention of hypoglycemia. Children who are fasting are liable to develop hypoglycemia, especially during a febrile illness. The likelihood of hypoglycemia developing can be reduced by maintaining a continuous 10% dextrose infusion (e.g. 80 ml/kg/24hr).

Question 9

The haematocrit is 19%. What are the implications of the levels of parasitaemia and haematocrit in this patient?

a) Would you transfuse? Explain

Answer:

Blood transfusion may be life-saving, but because of its dangers should only be used if strongly indicated. Do not apply rules of thumb (e.g. a haematocrit level) but assess the individual. In this case, the degree of parasitaemia will help with the decision. A count on the thin film indicates 29% of red cells are parasitized.

Many of this child's red cells will soon be destroyed because of the high parasitaemia and also because non-parasitized RBCs may also be destroyed.

Because the total body parasitemia may be considerably higher than 29%, with many parasitized RBCs being sequestered in deep tissues you can predict a large fall of haematocrit values. Transfusion is therefore indicated.

b) If blood transfusion is or becomes necessary, how would you give the blood?

Answer: The need in this child will be for red cells, not blood volume or plasma factors. It is therefore preferable to give packed cells.

Question 10

What clinical observations would you make during treatment in this patient? Answer: Important physical signs to record include:

Vital signs (temperature, pulse, respiratory rate, blood pressure).

Level of consciousness (we suggest Blantyre coma scale – see Learner's Guide).

Occurrence of any convulsions or other clinical events.

Urine output.

Signs of dehydration or overhydration (skin, jugular venous pressure, heart, lung bases, liver size).

Question 11

What laboratory investigations would you repeat (and when) during treatment?

Answer:

Hematocrit and/or hemoglobin level at least 12 hourly. Parasite count 24 hourly until negative.

Blood glucose level–frequency depends on condition. Repeat immediately with any convulsion or deterioration of consciousness.

Creatinine, electrolytes if urine output impaired.

Blood culture if fever and coma fail to resolve or if state of shock develops.

Question 12

What should be followed up after the child has recovered?

Answer:

Assess neurological recovery. Sequelae may occur, especially in children who have been hypoglycemic or have had repeated convulsions. Neurological sequelae include blindness, deafness, motor impairments and disorders of behaviours and intellect. There is often considerable recovery over time.

Case Study B – Reviewing Poor Diagnosis (Time = 30 minutes)

Patient Scenario

A nineteen-year old woman was brought to a health facility in the malaria-endemic area. The patient gave a history of fever for the past three days with rigors and vomiting. On examination, she was febrile with an axillary temperature of 40.0oC and slightly jaundiced. She was fully conscious. The doctor considered it unlikely that she was suffering from severe falciparum malaria, but nevertheless checked a thin blood film. No malaria parasites were seen on the film so he diagnosed hepatitis and advised rest and a fat-free diet.

Questions to be discussed by each group

Question 1

Do you think the doctor was right to decide that this patient did not have severe malaria? Explain.

Answer:

No! Because the doctor did not take into consideration the history of malaria endemicity and did not perform the necessary investigations in view of the negative thin blood film.

Could the doctor have done better with:

a) The history?

Answer: Yes. He/she should have enquired about the patient's travel history: if the patient had lived all her life in the low endemic area, she would be highly susceptible to malaria when visiting a high endemic area. The possibility of blood transfusion and contact with jaundiced persons should also be looked at.

b) The investigations?

Answer: Yes. A diagnosis of malaria was dismissed because there were no malaria parasites on the thin film. It is much easier to identify a scanty parasitemia on a thick film than a thin film. A thick film should have been done. Even if that was negative for malaria parasites, the doctor should have been prepared to consider a diagnosis of malaria and repeat the film after a few hours. If facilities allowed, liver enzymes could be measured to help diagnose acute hepatitis.

Question 2

Two days later the patient was brought back to the clinic by anxious relatives. She had become drowsy and was not answering questions properly. On examination the patient was afebrile, slightly jaundiced and confused. She could not answer questions but could withdraw her hand from a painful stimulus. The possible diagnoses considered were fulminant hepatitis, sickle-cell crisis, relapsing fever and cholecystitis. Malaria was ruled out because she was afebrile. Treatment was started urgently with tetracycline intravenously and enemas to empty the large bowel. She remained unconscious and her temperature rose to 38°C; a blood film now showed scanty *P. falciparum* parasitemia. This was considered "probably incidental" because low-grade parasitemia was common among young adults in the area, but "to cover malaria" a course of oral CQ/SP combination was prescribed.

What errors were made:

a) In clinical judgment?

Answer:

First, malaria was ruled out because she was afebrile. Malarial fever is variable, and a single measurement is never sufficient to indicate the absence of malaria. Occasional patients with severe malaria remain afebrile for long periods despite being severely ill.

Second, the low-grade parasitemia was considered unimportant. Patients with severe malaria usually do have heavy parasitemia, but some patients have low-grade peripheral parasitemia despite having severe malaria.

b) In the treatment of the patient?

Answer:

First, a young woman should not be treated with tetracycline unless she is definitely known not to be pregnant. No mention is made of any attempt to discover whether the patient was pregnant. Tetracycline is also likely to be harmful in viral hepatitis, thus this disease should first have been excluded.

Second oral CQ + SP combination treatment was prescribed. Since the patient was ill enough to require parenteral treatment, intravenous artesunate would have been preferable. Intravenous quinine and IM artemether could be used as alternatives.

Question 3

The next day the patient was increasingly febrile and the parasitemia had increased, so quinine 20 mg base/kg was given to run intravenously over one hour in normal saline, to be repeated 8-hourly. Twenty-four hours later the patient became increasingly breathless. There were no signs in the chest but pneumonia was diagnosed and treated with penicillin. After a further twelve hours the patient was still breathless and suddenly had a convulsion. Her level of consciousness deteriorated and she died ten hours later.

Answer:

IV Artesunate is the recommended treatment and should have been used. It can be administered intravenously at 2.4 mg/kg. Quinine is an acceptable alternative if artesunate is not available.

Assuming artesunate was not available, the dose of Quinine (20 mg base/kg) in one hour is too fast for an intravenous infusion of quinine; duration of four hours is preferable. Also, it is not recommended to use a loading dose of quinine (20mg/kg).

a) What errors were made in diagnosis of clinical complications?

Answer:

When the patient became breathless a diagnosis of pulmonary oedema, or of adult respiratory distress syndrome (ARDS), should have been considered, especially in this patient with severe malaria who has been on a saline infusion: assess venous pressure, review fluid balance and if possible take a chest X-ray.

When a patient on a quinine infusion has a convulsion or becomes more deeply unconscious – especially if she is or may be pregnant – the blood must be tested for glucose concentration.

Hypoglycemia often accompanies quinine use and requires immediate correction. Side effects of quick administration of IV Quinine should also be considered.

Case Study C – Pregnant Woman (Time = 30 minutes) Patient Scenario

A woman aged 25 years is brought to the outpatient department of the hospital. She is in the seventh month of her first pregnancy.

The patient became ill five days ago, with chills, sweating and headaches. An antibiotic was prescribed, and her condition seemed to improve, but yesterday she developed rigors and persistent vomiting. A blood film at the local clinic showed malaria parasites, and oral quinine (600 mg every 8 hours) was prescribed. She had so far taken two doses of quinine tablets.

Today she has been referred to your hospital because of restlessness and increasing mental confusion. Examination shows a semiconscious woman, who is unable to speak. She withdraws her hand from a painful stimulus but cannot localize a stimulus applied to the sternum or forehead. There is no neck stiffness, jaundice, pallor or rash. Axillary temperature is 39°C, pulse 90 beats/min., blood pressure 110/70 mmHg. The uterine fundus is palpable (26-28 weeks), and the foetal heart can be heard.

Questions to be discussed by each group

Question 1

List the differential diagnoses in this patient.

- hypoglycemia
- severe malaria
- meningitis
- septicemia

Question 2

What immediate actions should be taken in this case?

- Ensure a clear airway
- Put up an intravenous line
- Correct for hypoglycemia

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.

- lower the temperature (tepid sponging, fanning, paracetamol)
- start antimalarial treatment (Reminder: IV Artesunate is the preferred treatment for Severe Malaria)
- request urgent investigations
- observations (BP, foetal heart, temperature, pulse, level of consciousness)

Question 3

Which investigations are urgently required?

Answer:

Blood glucose - Pregnant women are susceptible to hypoglycemia with any stress or infection, and they are particularly likely to develop hypoglycemia (due to hyper-insulinemic) during treatment with quinine. This patient is pregnant and has already received some quinine; she has altered consciousness. Hypoglycemia is therefore a strong possibility and must be checked for urgently.

Blood slide for malaria parasites – To confirm malaria

Hemoglobin estimation - Because she is pregnant she may already be anaemic due to iron or folate deficiency and increased plasma volume. Malaria may rapidly exacerbate Anaemia.

Lumbar puncture – To confirm or exclude meningitis which may co-exist with malaria.

Blood culture - Septicemia may complicate severe malaria. In pregnancy there is increased susceptibility to bacterial infections – e.g. pneumococcal infections – including

septicemia and meningitis.

Question 4

If the blood glucose is 1.2 mmol/l (22 mg/dl) what treatment will you give and in what dose?

Answer: Intravenous dextrose. Remember, hypoglycemia may be recurrent and severe in pregnancy. Monitor the blood glucose level frequently.

Question 5

If the blood film shows *P. falciparum* rings "+", and the cerebrospinal fluid is normal except for low glucose, then:

a) What antimalarial medicine will you administer and by which route?

Answer:

Artesunate by intravenous infusion. An alternative route for Artesunate is intramuscular, but the intravenous route is proffered.

b) Would you prefer an alternative to artesunate because the patient is pregnant? Why?

Answer:

No. Artesunate should be used as it is the recommended treatment for severe malaria. Quinine or artemether can be used if artesunate is not available.

a) What nursing procedures are important throughout this treatment?

Answer:

Care of the semiconscious patient is essential. As she is restless, she must be protected from falling and from pulling out drip lines. Monitoring of the fetal heart is very important.

b) If you were in a health unit without facilities for IV treatment, what alternative treatment could you consider?

Answer:

Treat with artesunate suppository (rectal artesunate). If not available, administer IM quinine or artemether. Make urgent efforts to refer the patient to a facility where IV treatment and adequate monitoring and management of the pregnancy is possible.

Question 6

After six hours the patient becomes increasingly restless. The respiratory rate increases to 40/minute. The blood glucose level is normal. Under these conditions, what diagnostic steps would you take?

Answer:

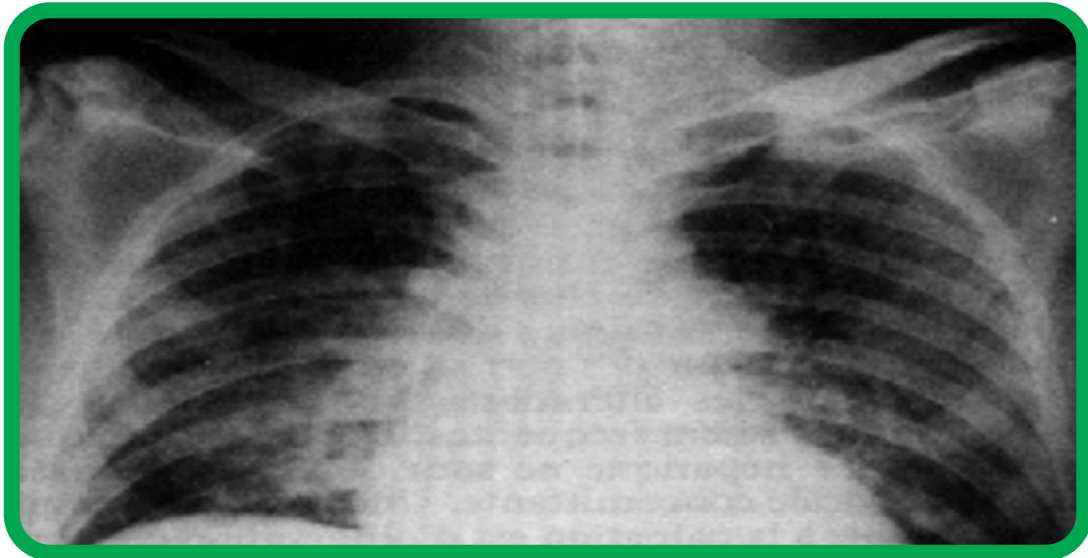
Look for evidence of pulmonary oedema, which may complicate falciparum malaria, especially in pregnancy.

Review the urinary volumes passed, the volumes of intravenous fluid (including dextrose) given, and the fluid balance. Assess the central venous pressure (clinically or, if possible, with the help of a central venous pressure line).

Examine carefully for gallop rhythm, basal crepitations and liver enlargement.

Question 7

Figure 2



A chest X-ray gives the picture shown (Figure 2). What is the possible diagnosis and treatment?

Answer:

This X-ray suggests pulmonary oedema or acute respiratory distress syndrome (ARDS). The mechanisms of these two conditions are different, but the clinical and radiological pictures are similar. Both are serious complications. The most important treatment is to correct fluid overload if present, using intravenous diuretics and fluid restriction. ARDS can only be diagnosed on the basis of arterial blood gas measurements. It requires assisted ventilation with careful attention to blood gases and even with these facilities the prognosis is poor.

Question 8

How would you assess recovery in the patient?

Answer:

Group should identify patient's vital signs normalizing (temperature, BP, pulse and respiration), and an improvement in the patient's presenting features (no vomiting, fully conscious, not restless, normal foetal heart). Finally, the patient should be able to sit, stand, walk, eat, drink and talk normally.

Case Study D – Referral (Time = 15 minutes)

Patient Scenario

The place: a rural clinic in Apac district with hyperendemic *P. falciparum*. Various antimalarial drugs are available, but intravenous infusions cannot be given.

A child aged 20 months became feverish two days ago and has vomited several times today. One hour ago the child had a convulsion, described by the mother as a repetitive twitching of limbs and mouth, followed by unresponsiveness for a few minutes. The child is now febrile (39.3°C), conscious, and able to localize and respond to a painful stimulus. A blood film shows

P. falciparum rings “++”. The mother attempted to give oral anti-malarials several times, but the child vomited them each time.

Questions to be discussed by each group

Question 1

a) Does the child have cerebral malaria? Explain.

Answer:

No! The fact that the child is now fully conscious suggests that the convulsion was a “febrile convulsion rather than a component of cerebral malaria. Convulsions occur in cerebral malaria, but they are not usually followed by a rapid recovery of consciousness.

b) What is likely to be the cause of convulsion in this child?

Answer:

This was a febrile convulsion due to the high temperature.

c) What appropriate action needs to be taken about the convulsions?

Answer:

Make sure that the risk of a further convulsion is minimized by reducing the child's temperature (paracetamol and tepid sponging).

Question 2

The district hospital is 30 km away; the journey will probably take several hours by bus.

a) Should the patient be referred to hospital? Explain

Answer: The decision to refer will depend on facilities at the health centre. This child needs antimalarial drugs and fluids and should receive these at a centre able to give them and able to observe the child's progress carefully.

b) What treatment will you give in the meantime?

Answer: Because the child is persistently vomiting, give rectal artesunate and refer to health center with adequate facilities. If not possible in this case, give quinine intramuscular injection. Make sure that the child is given dextrose by mouth or nasogastric tube during the period of travel

Case Study E – Potential Immunity (Time = 15 minutes)

Patient Scenario

The place: an area where *P. falciparum* is hyperendemic.

The patient, a 28-year-old male economist, was born and brought up locally, but attended university in Northern Europe for five years. He returned home last month.

One week ago, he developed fever. He decided this could not be malaria because he had grown up in a malaria endemic area and believed he was therefore immune. Two days ago, he became confused, especially at night. He stayed in bed and was attended to by a servant who today brought the patient to the hospital because the patient was increasingly confused. The last urine he had passed was a small volume of very dark fluid 24 hours ago.

On examination, the patient was a well-nourished adult man. He was afebrile with a temperature of 36.5°C. He was restless but could give brief appropriate answers to questions and could localize the site of a painful stimulus. He was jaundiced, and his mucous membranes were pale. There was some bleeding from the gums, and there were a few retinal hemorrhages in each eye on fundoscopy.

Questions to be discussed by each group

Question 1

a) List the differential diagnoses in this patient?

Answer:

Consider all diseases that may progress to encephalopathy with jaundice: severe malaria, fulminant hepatitis, yellow fever, other viral fevers, relapsing fever, septicaemia, lobar pneumonia (which is commonly accompanied by jaundice), leptospirosis, alcohol excess, sickle crisis, trypanosomiasis, etc.

Nevertheless, severe falciparum malaria must be the most likely diagnosis in this case. Retinal hemorrhages are common in severe malaria, and do not on their own indicate the presence of abnormal bleeding tendency.

b) Was the patient right to think he was immune to malaria? Explain.

Answer: No. Immunity to malaria is partial and may be almost completely lost after an absence of a few years from the endemic area.

Question 2

The blood film shows *P. falciparum* rings “++++” and the thin blood film shows that about 26% of red cells are parasitized.

What other information could be obtained from the thin blood film?

Answer:

Platelets. Thrombocytopenia is usual in falciparum malaria but may be particularly severe in this patient who has signs of a bleeding tendency. Severe thrombocytopenia may be evident on a thin blood film.

Neutrophils. Usually increase in bacterial infections.

Question 4

15 ml of dark brown urine was obtained by catheter. The urine ‘Sticks’ tests showed albumin “++” blood “++++”, conjugated bilirubin “++”, urobilinogen “++”. Microscopy of the urine showed no cells and a few casts.

How do you interpret the results of the urine test?

Answer:

The presence of “blood” in the urine (i.e. hemoglobin) in the absence of red blood cells indicates that there is free hemoglobin in the urine, as a result of intravascular hemolysis,

a complication of severe falciparum malaria. Bilirubinuria indicates that there is some increase in the conjugated bilirubin in the plasma, as a result of hepatic involvement in malaria. Urobilinogen appears in the urine when there is unconjugated hyperbilirubinemia, as in hemolysis. Proteinuria is usual in the presence of acute tubular necrosis, which is the commonest form of renal failure to complicate falciparum malaria.

Question 5

a) Acute renal failure is confirmed. Outline how you would manage the acute renal failure.

Answer:

Step 1: Exclude the pre-renal causes such as shock or hypovolaemia (commonly due to dehydration and/or bleeding).

Step 2: Check the fluid balance (input and output) and urinary sodium. If urine output is inadequate despite sufficient fluid replacement, give a diuretic or dopamine.

Step 3: If this fails, the patient should be referred to peritoneal dialysis and haemodialysis.

Note: In adults with proven acute renal failure, give a starting dose of frusemide 40 mg of IV. Wait for 30 minutes and if no significant amount of urine is passed during this period then give 80 mg. Wait 1 hour more if still no significant amount of urine is passed then give 160 mg and wait for another 2 hours. If there is still no significant urine passed refer the patient for dialysis (hemodialysis or peritoneal dialysis depending on availability).

b) Is it possible that the kidneys may recover? Explain

Answer:

Yes. In acute tubular necrosis, recovery commonly takes place within a period of a few weeks.

Further Reading

1. Basic Malaria Microscopy. Part I: Learner's Guide. Geneva, World Health Organization, 1991. ISBN 92 4 154430 9
2. Basic Malaria Microscopy. Part II: Tutor's Guide. Geneva, World Health Organization, 1991. ISBN 92 4 154431 7
3. Bench aids for the diagnosis of malaria infections. 12 colour plates. Geneva, World Health Organization. 1991. ISBN 92 4 154524 0
4. International travel and health: Situation as on 1 January 2002. Geneva, World Health Organization, 2002. ISBN 9241580275 (updated annually).
5. WHO model prescribing information: drugs used in parasitic diseases, second edition, Geneva, WHO, 1995. ISBN 9241401044
6. WHO. Practical chemotherapy of malaria: report of a WHO scientific group. Technical Report Series, No 805, 1990. ISBN 9241208058
7. WHO. Management of severe falciparum malaria: A practical handbook. Second edition, Geneva, World Health Organization, 1998. ISBN 924154523 2
8. World Health Organization (2000). Severe falciparum malaria. Transactions of the Royal Society of Tropical Medicine and Hygiene 94, supplement 1 (especially pages S1/20-S1/30).
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10. Indicators of life-threatening malaria in African Children. Kevin Marsh et al. New England Journal of Medicine. Vol. 332 (21) 1399-1404, 1996. www.nejm.org
11. Management of severe falciparum malaria. Njuguna P W and Newton CRJC. J Post grad Med. March 2004 Vol 50(1), 45-50. www.jpgmonline.com
12. National Malaria Control Programme; Ministry of Health; 2018 (Unpublished)
13. Prognostic indicators of early and late death in children admitted to district hospital in Kenya – cohort study. JA Berkeley et al. BMJ 326, 2003, www.bmj.com
14. Neurological aspects of tropical disease – Cerebral malaria. CRJC Newton. J Neurol neurosurg Psychiatry 2002; 69: 433-441 www.jnnp.com
15. Management of uncomplicated malaria – Practical guide for health workers 3 edition, MOH Uganda
16. World Health Organization (2010), Guidelines for the Treatment of Malaria, Second Edition

Appendix 4: Job Aid on how to Perform a Malaria RDT

How To Do the Rapid Test for Malaria

Modified for training in the use of the **Generic Pf Test** for falciparum malaria



Collect:

- NEW unopened test packet
- NEW unopened alcohol swab
- NEW unopened lancet
- NEW pair of disposable gloves
- Buffer
- Timer



Disposable gloves



Alcohol swab



Lancet



Timer



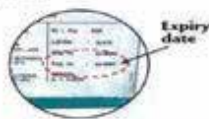
Buffer



Test packet

READ THESE INSTRUCTIONS CAREFULLY BEFORE YOU BEGIN.

- Check the expiry date on the test packet.
- Put on the gloves. Use new gloves for each patient.
- Open the packet and remove:
 - Test
 - Capillary tube
 - Desiccant sachet
- Write the patient's name on the test.



Expiry date

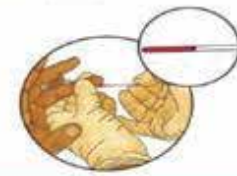


- Test
- Capillary tube
- Desiccant sachet



Patient Name

- Open the alcohol swab. Grasp the 4th finger on the patient's left hand. Clean the finger with the alcohol swab. Allow the finger to dry before pricking.
- Open the lancet. Prick patient's finger to get a drop of blood.
- Discard the lancet in the Sharps Box immediately after pricking finger. Do not set the lancet down before discarding it.
- Use the capillary tube to collect the drop of blood.



- Use the capillary tube to put the drop of blood into the square hole marked "A."
- Discard the capillary tube in the Sharps Box.
- Add buffer into the round hole marked "B."
- Wait 15 minutes after adding buffer.



Count correct number of drops

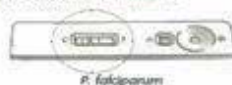


- Read test results. (NOTE: Do Not read the test sooner than 15 minutes after adding the buffer. You may get FALSE results.)

14. How to read the test results:

POSITIVE

A line near letter "C" and a line near letter "T" means the patient is POSITIVE for malaria.



P. falciparum

The test is positive even if the line near "T" is faint.)



P. falciparum (faint +)

NEGATIVE

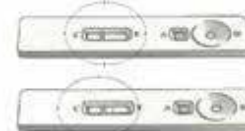
A line near letter "C" and NO LINE near letter "T" means the patient DOES NOT have malaria.



Negative

INVALID RESULT

NO LINE near letter "C" and one or no line near letter "T" means the test is INVALID.



Repeat the test using a new RDT if no control line appears.

If no line appears near the letter "C," repeat the test using a NEW unopened test packet and a NEW unopened lancet.

- Dispose of the gloves, alcohol swab, desiccant sachet and packaging in a non-sharps waste container.
- Record the test results in your CHW register. Dispose of cassette in non-sharps waste container.



NOTE: Each test can be used ONLY ONE TIME. Do not try to use the test more than once.



Appendix 5: Handout–Checklist for Patient Assessment

Step 1: History taking in a patient with Fever

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 diarrhea 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 any pain and / or muscle weakness

■ **Musculoskeletal**

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

Appendix 6: Handout – Signs of Triage Priority Groups

Triage Priority Groups:

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 color 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 color 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 color code.

Instruction

Take the symptoms provided below and write down whether this symptom indicates an Emergency case (write “E”), or a Priority case (write “P”).

E / P	Signs and symptoms	General danger signs including
	Obstructed breathing	Convulsions or fits in the last 2 days
	Central cyanosis	Not able to drink or breast feed
	Severe respiratory distress	Vomiting everything
	Rapid weak pulse	Altered mental state (lethargy, drowsiness or confusion)
	Cold and blue hands (cold extremities)	Prostration or extreme weakness (unable to stand or sit without support)
	Feet capillary refill more than 3 seconds	Respiratory distress
	Lethargy or unconsciousness	Dehydration (coated tongue, lethargy, inability to drink)
	Sunken eyes	Severe malnutrition
	Very slow skin pinch	A sick young infant (less than 2 months)
	Convulsions now	Cases that have been assessed and referred from another health facility.
	Severe anaemia (severe pallor of palms and mucous membranes)	Temperature (very hot)
		Trauma
		Poisoning
		Restless
		Burns
		Oedema of both feet

Appendix 7: Handout – Classical definition of Severe Malaria

COMPLICATION	CRITERION FOR DIAGNOSIS
Defining manifestations	
Cerebral malaria	Deep coma (unable to localize a painful stimulus), Normal CSF, parasitaemia.
Severe anaemia	Hb < 5g/dl with parasitaemia
Respiratory distress	Tachypnea, nasal flaring and intercostal recession in a patient with Parasitaemia
Hypoglycaemia	Blood glucose < 40 mg/dl (2.2 mmol/L) with parasitaemia
Circulatory collapse	Clinical shock (systolic pressure <50 mmHg for children and < 80mmHg for adults, with cold peripheries, clammy skin) with parasitaemia
Renal failure	Urine output < 12 ml/kg/24hrs and plasma creatinine > 3.0mg/dl, with parasitaemia
Spontaneous bleeding	Parasitaemia 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)
Supporting manifestations	
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 > 39.50 C, with <i>parasitaemia</i>
Hyper parasitaemia	Parasite count > 250,000 /ul

Appendix 8: Handout – Steps to Diagnose Severe Malaria

Step 1: Take the History of the Patient

1. Understand the Symptoms

- Fever
 - When did the fever start?
 - What other symptoms are associated with the fever?
 - Is there a pattern to the fever?
- Change of Behavior (can be asked to relatives or guardians)
Has the behaviour of the patient changed in the last 4 weeks?
- Altered state of consciousness
Is there an altered state of consciousness? For example, is there drowsiness or a deteriorating level of consciousness or coma?
- Convulsions
 - Have there been convulsions? What type, when, how many, and how long?
 - Is there abnormal movements and posture? Try to distinguish from unconsciousness for which the same word is used in many languages
- Urine
Is there passing of dark urine, little or no urine? Dark urine looks like dry tea.
- Other symptoms
 - Is there general weakness, inability to eat or drink, to talk, to sit, to stand or to walk?
 - Is there a feeling of extreme hunger or cold sweats?
 - Is there paleness, easy fatigability, palpitations, dizziness?
 - Is there vomiting?
 - Is there any spontaneous bleeding? For example, from the gums or prolonged bleeding from venipuncture sites etc.
 - Is there yellowing of the eyes or skin?

- Understand the drugs taken for current illness
 - What anti-malarial and other drugs is the patient currently taking for this illness or other illnesses?
 - What have been the dosages and the duration?
 - Have there been any adverse reactions to drugs taken in the past?

- 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.
 - Does the patient have any chronic illnesses? For example, sickle cells disease, diabetes mellitus, HIV/AIDS and other co morbidities.
 - What current medications is the patient on? For example. ARVs, anti-epileptics, anti- hypertensives, anti-psychotics
 - Has the patient been admitted previously and why?
 - 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

- Geographical, travel and family social history
 - Pregnancy
 - Where have they been? (Travel up-country?)
 - What have they been doing? (Contact with animals?)
 - What has been their type of housing / sleeping arrangements?
 - Have they been near heavy vegetation, water bodies and possible breeding sites for mosquitoes?
 - How many people live in their home, what do they do, and what is their diet like? 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, chickenpox, tuberculosis.
 - 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. 7 If the patient is between the ages of 15 – 45, it should be assumed that the patient is pregnant.

Step 2: Conduct a Physical Examination of the Patient

Like the history, a complete physical examination aims at;

- Identifying other possible diagnosis.
- Assess for complications
- Record the vital signs
These include temperature, pulse rate, blood pressure, respiratory rate, level of consciousness (coma score) and hydration status.
- 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 venepuncture 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.

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.*
- *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 characterized by a sweet smell, or chest indrawing.*
- *Listen to the breath sounds for air entry, abnormal sounds such as crepitation.*
- *Every woman aged 15-45 years is presumed pregnant until proved otherwise. A pregnant patient is at special risk both from malaria and it's treatment.*

■ **Cardiovascular 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.*

Appendix 9: Assessing Coma in adults and children

The Glasgow coma scale for adults and older children

Observation		Score
Eyes opening Response:	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 ¹	2
	Withdraws limb from pain ²	1
	Non-specific or absent response	0
Verbal response	Appropriate cry	2
	Moan or inappropriate cry	1
	None	0
Eye movements	Directed (e.g. follows mother's face)	1
	Not directed	0
Total		0-5

¹rub your knuckles firmly on the patient's sternum

²press firmly on the patient's thumbnail bed with the side of a horizontal pencil

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

Appendix 10: Answers to the mRDT reading Quiz

Answer keys for sample tests

Sample test #1
Generic Pf RDT

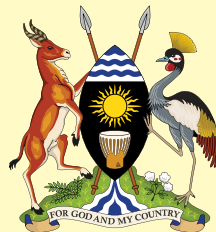
	Positive (+)	Negative (-)	Invalid
1.	✓		
2.		✓	
3.		✓	
4.	✓		
5.	✓		
6.	✓		
7.		✓	
8.			✓
9.	✓		
10.	✓		

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.			✓



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