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FOREWORD

In 1998 the World Health Organization launched the ‘Roll Back Malaria campaign’ that has since encouraged the renewal of global commitment to fight the disease that causes the single largest number of sickness and death-malaria. For populations in endemic countries, which are mainly in Africa, malaria most commonly causes its most severe effects on under five and pregnant women. In April 2000 African Heads of State agreed to the goals set out in the Abuja declaration in Nigeria which set about to reduce morbidity and mortality due to malaria.

These two most important events prompted many African countries to begin developing strategies to fight the malaria burden. These strategies are based upon international acceptable best practices hence, the introduction of combination therapy, long lasting insecticide treated nets and the commitment to reduce the morbidity and mortality caused by malaria.

With the establishment of the Global Funds to fight HIV&AIDS, TB and Malaria, coupled with debt relief, many countries that had the problem of finances to introduce more effective malaria control and prevention tools can now plan and put into place the appropriate strategies to combat the disease.

Liberia has introduced a malaria policy that is in line with international best practices. Within this framework we have worked out a strategy to scale-up the fixed dose Artemisinin-based combination therapy for first line treatment of uncomplicated malaria in Liberia. The blister pack ACT previously used should be used along with the FDC until it faces out within three to six months at which time it will no longer be recommended.

In this developmental phase of Liberia, it is our hope that we can work with our partners in scaling up for impact of these new tools and strategies for malaria control and prevention. The first step in pushing forward with this strategy is the training of staff in the use of FDC Artesunate and Amodiaquine (ACT) as first line drug to treat malaria. Additionally health workers will be trained and supervised to manage uncomplicated and severe cases of malaria.

We express thanks to partners who have worked with us to update this training manual and appreciate their participation in this process. It is our hope that with this we will again strengthen links between partners undertaking malaria control activities in Liberia.

Dr Joel J. Jones
Program Manager
National Malaria Control Program
Ministry of Health and Social Welfare
Participants’ manual for case management

PREFACE

The National Malaria Control Program (NMCP) is the technical component of the Ministry of Health and Social Welfare, responsible to train, monitor, evaluate, conduct research and among other activities recommend appropriate intervention for the prevention and control of malaria.

The revised policy set out by the Ministry of Health and Social Welfare (MoH&SW) on malaria control emphasized on prompt diagnosis and effective and adequate treatment at all levels in addition to personal and community protection.

The Malaria Control activities are integrated into the general health care delivery system of Liberia with emphasis placed on disease management, early diagnosis and prompt treatment of malaria cases.

Vision: A healthier Liberia with universal access to high quality malaria control and preventive services.

We collaborate strongly with other partners and advocate for the inclusion of strategies proven to have the greatest impact on malaria and malaria related diseases e.g. (anemia) through standardized technical guidance based upon new tools, standards and strategies developed to date by the RBM Secretariat and Technical Support Network and Technical Advisory Group like the MENTOR Initiative. It is in line with these activities that NMCP has worked in close collaboration with the MENTOR Initiative and WHO/RBM to bring about a new strategic plan and supporting policy for malaria in Liberia. As part of the national strategic plan the Ministry has planned that any health personnel who are to use the Artemisinin-based combination therapy (ACT) be trained in its use to ensure standardization and close monitoring and evaluation of the intervention.

This training manual is thus a result of collaborative efforts of partners working in Liberia. It is the fourth revised version and is based on strategies of the national strategic plan and policy. Therefore, it may be revised and amended again in the future. The readers of the manual are welcomed and encouraged to give their comments and recommendations on how we could improve on the contents. The manual is a working document which undergoes revisions to improve the course as much as possible throughout the training based on the most recent information available.
ACKNOWLEDGEMENTS

The development of this manual is the result of the hard work and guidance of the following persons and organizations:

A special thanks to:
The Hon. Minister of Health, Dr. Walter T. Gwenigale and all his Deputies, for their administrative supports,
Dr. Bernice Dahn, Chief Medical Officer, for moral support to the Program
Our major Donors (Global Funds, PMI and etc.) for their continuous financial support,
World Health Organization (WHO), for providing technical supports and needed information and materials for the development of this manual,
Dr Eugene Didi Dolopei, Chairman, department of Public Health, A.M. Dogliotti Collage of Medicine, for his technical supports, especially on the severe/complicated malaria session and facilitation role during the development,
Dr. Joel Jones, Program Manager/NMCP, for his overall technical and administrative inputs,
Mr. Tolbert Nyenswah, Deputy Program Manager/NMCP, for his oversight in the development of this module.
Dr. Tanue Duworko, for his input in the session on epidemiology of malaria in Liberia and facilitation role in the first training after the development of the first manual,
Mr. Paye Konah Nyansaiye, Asst. Program Officer for Technical Services NMCP, for his technical and supervisory role,
Mr. Alfred C. Pah, Training Coordinator, NMCP and his Trainers/Coachers Team (Hawah K. Gboyah, Hawa K. Jabateh, Railey H. Neal, Jamesetta Gilayeneh and Chea Jerboh), for their technical input,
Agnes N. Sampston, MIP Coordinator, Asatu M. Dono, Community Case Management focal person and Isaac Zeah, Technical Coordinator, MENTOR Initiative, for their technical input,
Finally we express thanks to all participants who took part in the final revision of this document. It is our hope that this will be a motivation to encourage other agencies to demonstrate similar cooperation in an effort to supporting the Liberian population in the implementation of the RBM strategies in all parts of the country.
LIST OF ACRONYM:

<table>
<thead>
<tr>
<th>Partners and programs</th>
<th>Medical &amp; Other</th>
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<tbody>
<tr>
<td><strong>WHO</strong>: World Health Organization.</td>
<td>- <strong>ANC</strong>: Antenatal care</td>
</tr>
<tr>
<td><strong>BPHS</strong>: Basic Package for Health Services</td>
<td>- <strong>IMCI</strong>: Integrated Management of childhood illness</td>
</tr>
<tr>
<td><strong>MOH</strong>: Ministry of Health</td>
<td>- <strong>PV</strong>: Pharmacovigilance</td>
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<tr>
<td><strong>RBM</strong>: Roll Back Malaria</td>
<td>- <strong>R/O</strong>: Rule out</td>
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<tr>
<td><strong>NMCP</strong>: National Malaria Control Program</td>
<td>- <strong>SAE</strong>: Suspected Adverse Event</td>
</tr>
<tr>
<td><strong>MENTOR</strong>: Malaria Emergency Technical and Operational Response</td>
<td>- <strong>ADR</strong>: Adverse drug reaction</td>
</tr>
<tr>
<td><strong>INGO</strong>: International Non Governmental Organization</td>
<td>- <strong>IV</strong>: intra venous</td>
</tr>
<tr>
<td><strong>CIT</strong>: County investigation team</td>
<td>- <strong>IM</strong>: intra muscular</td>
</tr>
<tr>
<td><strong>NESRP</strong>: National expert safety Review panel</td>
<td>- <strong>NG</strong>: naso gastric</td>
</tr>
<tr>
<td><strong>EDP</strong>: Essential drug Program</td>
<td>- <strong>LP</strong>: Lumbar puncture</td>
</tr>
<tr>
<td><strong>LMIS</strong>: Liberia Malaria Indicator Survey</td>
<td>- <strong>MIU</strong>: Million International Unit</td>
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<th>Anti malarial treatment</th>
<th>Prevention &amp; Promotion</th>
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<tr>
<td><strong>ACT</strong>: Artemisinin-based Combination Therapy</td>
<td>- <strong>IEC</strong>: Information Education and Communication</td>
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<tr>
<td><strong>AQ</strong>: Amodiaquine</td>
<td>- <strong>ITN</strong>: Insecticide treated net</td>
</tr>
<tr>
<td><strong>CQ</strong>: Chloroquine</td>
<td>- <strong>LLITN</strong>: Long lasting insecticide treated net</td>
</tr>
<tr>
<td><strong>SP</strong>: Sulfadoxine-Pyrimethamine (Fansidar*)</td>
<td>- <strong>IRS</strong>: Indoor residual spray</td>
</tr>
<tr>
<td><strong>IPT</strong>: Intermittent Preventive treatment</td>
<td>- <strong>ITP</strong>: Insecticide treated tarpaulins</td>
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INTRODUCTION

This Participant’s manual is a guide for the Malaria Case management training workshop.

SPECIFIC COURSE OBJECTIVES:

At the end of this course you should be able to:

- Assess, diagnose and treat uncomplicated and complicated / severe malaria
- Follow national anti malarial policy of Liberia
- Describe and apply the use of Rapid Diagnostic Tests (RDT)
- Describe the use of microscope
- Prescribe and apply Intermittent Preventive Treatment (IPT)
- Assess the impact of the use of combination therapy on a day-to-day basis in health facilities post-training
- Promptly refer severe malaria cases

Training approach

The course uses a participatory/problem-based approach to teaching and learning. The goals of participatory education are not only to increase knowledge and skills, but also to provide the basis for problem-solving after the teaching session ends. Its principles follow the basic tenets of adult education theory on how to promote participation and active learning, as outlined below:

- Adults retain information best when they are actively involved in problem-solving exercises and hands-on learning.
- Adults bring with them many years of experience and knowledge. Interactive training encourages sharing of this knowledge and experience.
- Education is most effective when it recognizes the context in which the course participants will apply their new skills. Training for malaria case management must be adapted to regional and national contexts.

The use of participatory methods includes activities that help participants develop critical thinking, practice problem-solving and decision-making (using hypothetical case studies that are typical of those they may face on the job) and gain the confidence to take decisive/positive action in the field.
Session 1:

Overview of malaria problem in Liberia, Roll Back Malaria Strategy, and Anti malarial Policy
SESSION OBJECTIVES

*By the end of this section participants are expected to:*

- Know the strategy for malaria control and prevention in Liberia
- Know the National Antimalarial Treatment Policy in line with Roll Back Malaria recommendations
- Know what antimalarial drugs are recommended for:—
  - Uncomplicated malaria.
  - Severe and complicated malaria.
  - Intermittent Preventive Treatment (IPT)

In this session you will be introduced through presentations to malaria in Liberia, the strategies that have been developed to control and prevent malaria and the policies to support the national strategy.

From the presentations a discussion will be initiated by the instructor/facilitator. During this discussion we would like the following questions to be addressed:

**Brain storming questions:**

**What is your experience with ACT?**

**What problems may be encountered in the introduction of ACT?**

**What solutions are there for the problems that may arise with the introduction of new therapies?**

The instructor will note your answers on the flipchart. Refer back to those questions and answers throughout the training.
MALARIA IN LIBERIA

Malaria is endemic in Liberia and the entire population of more than 3.47 million is at risk of the disease\(^1\). Children under five and pregnant women are the most affected groups. According to data from the recent Health Facility Survey (HFS, 2009) malaria accounts for over 34.6% of outpatient department attendance and 33% of in-patient deaths, compared to 37.5% and 44.3% in 2005.

Since August 2005, as part of the previous National Malaria Strategic Plans with funding largely from the Global Fund, some progress has been made in malaria control and prevention based on WHO Roll Back Malaria recommendations to use more effective strategies. The major achievements\(^2\) from August 2005 to October 2009, documented in the 2009 Malaria Indicator Survey (LMIS) include:

- 17% of children under five are receiving prompt and effective treatment for malaria within 24hrs from the onset of fever, up from 5.26% in 2005
- 45% of women are receiving two or more IPTp during their most recent pregnancy, up from 4.5% in 2005
- 47% of households have at least one ITN, up from 18% in 2005
- 27% of children under five slept under an ITN the previous night, up from 2.6%
- 33% of pregnant women slept under an ITN the previous night, up from 31%

This third Liberia National Malaria Strategic Plan for 2010 – 2015 addresses the need to scale-up these malaria control and prevention activities to achieve the Roll Back Malaria (RBM) target of reducing malaria morbidity and mortality by half by 2010, as well as the Millennium Development Goals (MDG) of sustaining this progress and beginning to reverse the incidence of malaria by 2015. The third Strategic Plan addresses any gaps observed in the implementation of the First and Interim Strategic Plans and also puts forth a more detailed and well-assessed strategy in dealing with the malaria situation in Liberia by these target dates.

The objectives and activities set out in this document reflect the recommendations of WHO, the Roll Back Malaria Program and best practices and successes from other African countries, to scale-up the most effective malaria control and prevention measures, from the health facility down to the community level, and to involve the private sector and all partners supporting health care delivery in Liberia.

The first strategy for more effective malaria control and prevention is improved treatment through scaled up availability and use of Artemisinin-based Combination Therapy (ACT) as the 1\(^{st}\) line treatment for malaria, a product first introduced in 2003. The scale-up is three-tiered: firstly, making available these fixed-dose combination therapies to all health facilities and training the health staff in their use; secondly, reinforcing the role of the community, the community health workers, and community volunteers for Community Case Management of malaria by providing malaria control tools and training these workers for this task; and thirdly, making the same ACT drugs available to the private sector: the private health care providers, pharmacies and drug/medicine stores.

The second strategy is an Integrated Vector Management approach that is also three-tiered. IVM will provide long lasting insecticide mosquito nets through mass distribution to all family units and targeted distribution to pregnant women and children under five, to

\(^1\) National Population and Housing Census, LISGIS 2007, estimate.
\(^2\) Libéria Malaria Indicador Survey, NMCP 2009
achieve maximum results for prevention of transmission of malaria. The strategy will also continue targeted indoor residual spraying (IRS) of households and will consider other vector management strategies for environmental control as the complete package to achieve maximum results.

The third strategy will be to increase support for advocacy, health education and behavior change communication at all levels of society – using TV, radio, schools, places of worship – on the importance of ACT therapy, LLIN and other vector management, and the role of the community in malaria control and prevention activities. Cross-cutting strategies with other programs of the MOH&SW will include strengthened health information and capacity building for monitoring and evaluation, strengthened procurement and supply chain management and targeted operational research to review the strategies and activities in place and to identify other activities specific to Liberia’s efforts to Roll Back Malaria.

To support these strategies and provide the necessary oversight, the capacity of the National Malaria Control Program (NMCP) and its staff will be strengthened to assure the implementation, scale-up, and success in reaching or exceeding the RBM and MDG targets for malaria control and prevention. The NMCP will coordinate the decentralization of malaria control activities throughout the Country and to the County and Community Health Teams. It will lead coordination efforts with all health partners in Liberia, bilateral, INGO, NGO, and the private sector to accomplish this.

This six-year National Malaria Strategic Plan builds on the achievements made thus far while recognizing the challenges and addresses the essential actions to be taken to reduce the morbidity and mortality trend of malaria in Liberia.
“I propose that together we Roll Back Malaria not as a revamped vertical programme but by developing a new health sector-wide approach to combat the disease. Why now? Because the call is there. We have enough knowledge, skills and tools to launch a new concerted effort”

Dr. Gro Brundtland
Director General - World Health Organization

WHAT IS RBM?

RBM is an initiative of World Health Organisation, which was established on the 31st July 1998.

The main strategies of Roll Back Malaria are:

• Early detection of cases
• Drug resistance alert by efficacy studies
• Rapid and effective treatment of malaria cases
• Multiple-preventive Interventions
• Well co-coordinated strategy
• Operational research
• Concerted effort to work in partnership with communities and other development sectors.

In Liberia, these strategies have been incorporated into the national strategic plan in the following ways:

Early detection of cases and drug resistance alert by efficacy studies

• Provide appropriate messages to communities including caregivers, traditional healers, and IDP camps on how to recognize the Signs and Symptoms of malaria and seek health care service.
• Ensure that at least 60% of all fever cases in accessible communities have correct, affordable and appropriate treatment within 24 hours of onset of symptoms through community mobilization and health facility reinforcement.

Rapid and effective treatment of malaria cases

• Train health staff in the use of Artesunate and Amodiaquine for the treatment of uncomplicated malaria and the use of IM artemether in the treatment of severe malaria.
• Ensure that efficacious antimalarial drugs are available, accessible and affordable at all level of health care delivery system, phasing in combination therapies as first line treatment in the place of chloroquine hitherto has been used.
• Train health staff in the use of practical tools in the confirmation of diagnosis of malaria cases at clinic levels.
• Ensure that malaria control and prevention is incorporated into the curriculum of all health training institutions in Liberia.
Multiple-preventive Interventions

- Promote access to LLITNs services for pregnant and children under five years old through community sensitization, IEC and community or ANC distribution
- Ensure that 80% of all dwellings in the IDP and refugee camps are protected by Insecticides Residual Spray (IRS).
- Ensure and encourage the use of Intermittent Preventive Treatment for pregnant women.

Well co-coordinated strategy

- Multiple strategies targeted to meet local malaria control needs through the National Malaria Control Division.
- Collaboration with the Malaria Steering Committee to address issues relating to the implementation of national policy on malaria control and prevention.

Operational research

- Efficacy studies to monitor antimalarials which are being used in the new policy such as SP and Amodiaquine
- Feasibility studies on the use of rectal artesunate as a pre-referral treatment in health facilities

By rolling back malaria we help roll out under development

- It is time to stop paying the malaria “disease tax” on human and economic development
- Protect the most vulnerable groups (pregnant women and children under five years old).
- Safeguard attendance at schools
- Preserve the learning capacity of children

THE PRICE

- Malaria burden Reduced
- Human development
- Poverty reduction
NATIONAL ANTI MALARIAL TREATMENT POLICY

In Liberia high mortality due to malaria can be directly linked to the absence of appropriate drugs and adequately trained personnel at all levels of the health care delivery system to treat patients diagnosed with the disease. This situation was exacerbated by the fact that the recommended first and second line antimalarials have been shown to be compromised.

After careful consideration and having researched similar moves in other African areas and countries with resistance problems (Burundi, Zanzibar and Southern Sudan) it has been decided that recommendations from WHO/RBM in complex emergencies be followed in order to help reduce mortality due to malaria. The Ministry of Health has therefore endorsed the use of the Artemisinin-based combination therapies (ACT) in conjunction with Rapid Diagnostic tests for malaria. This endorsement is applied to both uncomplicated and severe malaria.

In October 2009, the Ministry of Health and Social Welfare approved the use of Artesunate and Amodiaquine Fixed Dose Combination for uncomplicated Malaria in Liberia. The approval is in line with the efficacy study conducted by Drugs for Neglected diseases Initiative (DNDI) and MSF in Saclapea, Nimba County.

While the introduction of new therapies goes a long way towards alleviating the situation, significant difficulties remain with access. Access to health facilities is difficult not only due to physical distance from a functioning health center, but also the costs associated with health care. In Liberia 41% of the population has access to adequate health care services.

Further to this and in an effort to improve diagnosis at referral level all referral hospitals must be fully equipped with the appropriate equipment and reagents to be able to effectively diagnose cases referred.

At this time, with little or no referral taking place, priority will be placed on training community health workers in the management of malaria and training peripheral health care staff in the use of IM Artemether, IV quinine and IV/IM Artesunate.

INTERMITTENT PREVENTIVE TREATMENT

An important component of the malaria control strategy now recommended by WHO is the provision of Intermittent Preventive Treatment (IPT) for pregnant women has been shown that the use of IPT by pregnant women can improve the outcome of pregnancies both for the mother and the fetus. However, this method of chemoprophylaxis has not been compatible with the National Malaria Control Policy of Liberia. This strategy intends to put the Malaria Control Policy in line with best practices as recommended by World Health Organization (WHO). This will involve the revision of the present policy and the provision of the Sulphadoxine-Pyrimethamine (SP) at all accessible health facilities and communities. Although SP resistance has been reported in Liberia, its use as intermittent preventive treatment will remain efficacious. The aim in using SP is to suppress rather than clear parasitemia to prevent severe malaria in pregnancy. As a way of ensuring maximum adherence, women given SP shall be encouraged to take the drug in the presence of the health worker.

---

3 National Health Policy, 2006.
POLICY

1. The Government of Liberia shall ensure that potent and adequate antimalarial drugs are available, accessible and affordable at all levels of the health care delivery system.

   Artemisinin based combination therapy in conjunction with Rapid Diagnostic Tests should be available for use by trained health personnel in coordination with the Ministry of Health.

2. The Government of Liberia shall ensure that malaria prevention and control is incorporated into the curriculum of all health-training institutions in the country (medical and paramedical health training institutions) and that all health personnel are trained in the appropriate management of malaria.

3. The Government of Liberia shall ensure the development and the dissemination of appropriate malaria control health messages in facilities and to communities to reinforce effective treatment seeking behavior within the first 48 hours of the onset of symptoms and maximize the appropriate use of suitable and effective malaria prevention and control methods.

4. The Government of Liberia shall ensure that all cases of fever presenting at health facility level receive initial treatment within 4 hours.

5. The government of Liberia shall improve treatment of severe malaria cases through introduction of WHO/RBM recommended ‘usable and effective’ pre-referral treatments in peripheral health facilities (and full treatment where referral is not possible) and strengthen referral mechanism where feasible to treat those that cannot be treated at the peripheral level.

6. The Government of Liberia shall ensure that SP is provided at all accessible health facilities at no cost to pregnant women utilizing antenatal services at public health facilities.

---

4 The National Strategic Plan for the Control and Prevention of Malaria in Liberia May 2003
The National Policy for the control and Prevention of Malaria in Liberia, August 2003

5 MoU should be signed between MoH and all health facilities in order to provide free of charge drugs.
The transmission of Malaria in Liberia is perennial with slight variations in prevalence in different counties.
SESSION TWO: EPIDEMIOLOGY OF MALARIA IN LIBERIA

SESSION OBJECTIVES:

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

- Explain the epidemiology of malaria in Liberia.
  - a) List the common vector species in Liberia;
  - b) List the common parasite species in Liberia
- List the basic concepts regarding malaria transmission
- Define related terms for malaria transmission

This session introduces the epidemiology of malaria in Liberia. Firstly, the instructor/facilitator will ask you about what you know of the epidemiology of malaria in Liberia.

MALARIA EPIDEMIOLOGY IN LIBERIA

Malaria endemicity varies greatly throughout Africa, resulting from varying climatic and environmental influences. In areas of low transmission, such as desert fringes and highland regions, malaria endemicity is low due to the adverse climatic factors effecting the development of the mosquito vector and the malaria parasite within it. Low transmission areas are prone to malaria epidemics because of the low levels of immunity that builds up in the population. Areas that support higher transmission levels are not considered to be at high epidemic risk because of the high levels of immunity that build up in the human population to the malaria parasite.

The current data on the malaria situation in Liberia indicates that malaria is still responsible for most health center and hospital visits. The results of previous studies on the prevalence of malaria in Liberia suggest that malaria transmission ranges from meso to holoendemicity. The transmission is considered mesoendemic, if it involves typically small rural communities in subtropical zones with a wide geographic variation in transmission risk; here, the parasite rate ranges from 11% to 50% in children aged 2-9 years. Where its perennial intense transmission provides considerable immunity outside early childhood, it is considered holoendemic; holoendemicity rates constantly over 75% in infants aged 0-11 months. Other types of endemicity are the hypo- and hyper-endemicities. Hypoendemic transmission is low transmission with a parasite rate of less than 10%; thus, its effect during the average year on the population is unimportant. On the other hand, the transmission is hyperendemic, if it is intense but seasonal; the immunity obtained with respect to this transmission type is insufficient to prevent malaria in all age groups. Here, the parasite rate is constantly over 50% in children age 2-9 years.

High levels of transmission throughout the year, due to climatic conditions, are maintained by the presence of efficient malaria vectors. Reports have been made concerning a few studies that have been carried out in recent years to determine the prevalence, including levels of transmission, of malaria in Liberia.6

Table 2.1

---

6 LMIS report, 2005
DEFINITIONS

1. **Vector** is any item that carries and transmits a disease. It can be a human being, an animal or micro organism. e.g. Mosquitoes are vectors of malaria.

There are 3 types of vector species:

A. Anopheles *gambiae*: Found in forest region.
B. Anopheles *funestus*: Found along large bodies of water
C. Anopheles *melas*: Found in coastal-based areas.

2. **Species** is a distinct sort or kind

3. **Parasite**: is an organism that lives in, or on another organism (host). It obtains nourishment from the host.

4. **Plasmodium** is a parasite that causes malaria.

There are 4 malaria species that affect man:

a. Plasmodium *falciparum*
b. Plasmodium *malariae*
c. Plasmodium *ovale*
d. Plasmodium *vivax* NB: Plasmodium vivax is not in Liberia.

5. **Transmission**: Passing of a disease from one person to another. e.g. malaria is passed from one person to another through the bite of an infected female anopheles mosquito.

6. **Topography**: is the detailed mapping or charting of the physical features of an area.

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<th>Altitude</th>
<th>Liberia</th>
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<tbody>
<tr>
<td></td>
<td>500m – 1385 m (highest point)</td>
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</table>

| malaria Vectors | An. *Funestus*
|                | An. *gambiae s.s.*
|                | An. *Melas* |

| Parasite species | *P. falciparum* (95%)
|                 | *P. ovale*
|                 | *P. malariae* |

| Transmission | Most recent data suggests Meso-Holoendemicity
|             | Parasite rate ranges (2009) 28.5%-66%

| Topography | Flatland savannah area with a long coastline with many mangrove and brackish areas. Higher areas towards the East reaching up to 1385 m |
Below are some examples of health facility data on malaria from August – September 2003. The figures represent an average of cases presenting at various health centers

<table>
<thead>
<tr>
<th>Suspected cases of malaria</th>
<th>Confirmed cases of malaria (using Rapid Diagnostic Tests)</th>
<th>Confirmed cases of malaria in under fives (using Rapid Diagnostic tests)</th>
<th>Confirmed cases of malaria in over fives (using Rapid Diagnostic Tests)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50% of consultations</td>
<td>20% of consultations</td>
<td>50%</td>
<td>25%</td>
</tr>
</tbody>
</table>
Session 3:

Clinical assessment and Diagnosis of uncomplicated malaria
SESSION THREE: CLINICAL ASSESSMENT and DIAGNOSIS OF UNCOMPLICATED MALARIA

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

- Take appropriate case history
- Carry out a good clinical assessment of patients
- Classify fever.
- Exclude other common causes of febrile illnesses
- Promptly and effectively treat to avoid progression to severe disease
- Identify diagnostic tools for malaria

Instructions: In this session, your facilitator will lead a discussion on clinical assessment, the choice of diagnostic practices, key problems associated with misdiagnosis of malaria and signs and symptoms of uncomplicated malaria. The discussion will be done using a participatory approach where questions will be asked to participants followed by brainstorming in plenary.

Group activities:

- Divide participants into two or more groups
- Give them 10 to 15 minutes to answer the following questions
- When participants have completed, each group will make a five minutes presentation followed by discussion.

Question 1:
Identify and list the key steps in the assessment of uncomplicated malaria

Question 2:
List the signs and symptoms of uncomplicated malaria?

DEFINITION OF UNCOMPLICATED MALARIA

Malaria is an illness usually characterized by fever without any signs of severe disease but its clinical presentation may mimic/resemble other diseases, which often makes diagnosis difficult. It is however important to note that some patients may just feel unwell with vague body pains and loss of appetite. In children, they may present with refusal to eat or feed decreased activity and sometimes the symptoms may be non-specific. In addition, patients often have more than one underlying disease, (for example, malaria and pneumonia) and it is essential that all diseases are diagnosed and treated appropriately.

A complete history should include, in addition to the presenting symptoms, the age, and place of residence should be noted.

Standard Case definition for uncomplicated malaria
Malaria is defined as fever (greater than 37.5°C) or history of fever in previous two days

**Plus** one or more of the following symptoms and exclusion of other possible causes of disease.

### Symptoms
- Chills (feeling cold) and rigors (shaking of the body)
- Headache
- Diarrhea (especially in children)
- Vomiting
- Body pains
- Joint weakness or tiredness

Remark: You should also ask for the common main symptoms in children, especially cough or difficult in breathing, diarrhea, ear pain and measles in the last three months to rule out other causes of symptoms.

### Signs
- Increased body temperature > 37.5°C (hot body)
- Enlarged spleen or liver, especially in children.
- Pallor (children/pregnant women)/anemia
- Vomiting
- Diarrhea

### Clinical Diagnosis

Most cases of malaria are still treated on clinical grounds and it is inevitable that many patients with out malaria are treated with anti malarial drugs. Clinical diagnosis of uncomplicated malaria is based on exposure to malaria and history of fever (**fever for which no other cause has been established**). However, in areas with stable malaria or high transmission season, a history or recent history of fever is enough of a criterion for diagnosis of uncomplicated malaria.

In children below five years, the IMCI guidelines provide clinical criteria for the management of fever in both low and high-risk areas. There is significant overlap in the clinical presentation of acute respiratory infections and malaria. Thus, in areas of high transmission fever can be used as an entry point in the syndromic approach, the diagnosis of malaria can be made in spite of the presence of other diseases.

In pregnancy, the level of immunity is reduced and as a result the pregnant woman is prone to acute symptomatic disease more severely.

### Exclude other causes of fever:

**Viral infections:-**
- URI: Cough or cold (running nose)
- Measles (high fever, generalized skin rash with cough, red eyes or mouth sores).
- Mumps (usually have swelling at the angle of the jaw)
- Chicken pox (will have a vesicular rash).
- Enteritis

**Bacterial infections:-**
- Pneumonia (cough with fast breathing)
- Acute ear infection in children
- Urinary tract infection (frequency or pain on passing urine, loin pains)
- Typhoid (persistent fever for over 7 days)
- Enteritis

**Differential Diagnosis:** Diseases which present similar signs and/or symptoms of other diseases.

The differential diagnosis of malaria should include influenza, enteric fever, typhus, leptospirosis, pneumonia, cholangitis and pyelonephritis. Other considerations include hepatitis, bacterial or viral meningoencephalitis, psychosis, cerebrovascular accidents (CVA), hepatic, diabetic or uraemic comas, epilepsy, eclampsia, heat stroke and drug intoxications. Therefore, **blood smears** must be performed in any febrile patient who lives in a malarious area or returns from one. Cerebral spinal fluid should always be obtained for examination in comatose patients where applicable.

**ASSESSING A CHILD WITH FEVER**

- **Look for general danger signs**

<table>
<thead>
<tr>
<th>Danger signs:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IMCI DANGER SIGNS:</strong></td>
</tr>
<tr>
<td>A. unable to drink or breast feed</td>
</tr>
<tr>
<td>B. Vomiting everything</td>
</tr>
<tr>
<td>C. History of convulsion with present illness</td>
</tr>
<tr>
<td>D. Lethargic or unconscious</td>
</tr>
<tr>
<td>E. Convulsing now</td>
</tr>
<tr>
<td><strong>Convulsion:</strong> involuntary spasms of body parts.</td>
</tr>
<tr>
<td><strong>Prostration (to be actively tested):</strong> extreme weakness.</td>
</tr>
<tr>
<td>A. Unable to drink or breastfeed (if aged less than 1 year old)</td>
</tr>
<tr>
<td>B. Unable to sit unsupported (if aged 1 year old or above)</td>
</tr>
<tr>
<td><strong>Coma or altered consciousness</strong></td>
</tr>
<tr>
<td>A. Unable to localize a painful stimulus (if aged 8 months or above)</td>
</tr>
<tr>
<td>B. Unable to fix/follow objects with eyes (if aged less than 8 months)</td>
</tr>
<tr>
<td><strong>Respiratory distress</strong></td>
</tr>
<tr>
<td>A. Deep breathing, in drawing of the lower chest wall</td>
</tr>
<tr>
<td>B. Nasal flaring</td>
</tr>
</tbody>
</table>

- Ask the caregiver or parent accompanying the child
- Examine the patient

- Temperature, pulse, respiration rate, blood pressure (if equipment available and especially proper cuff sizes)
- Weight and height
- Check nutritional status
- Check level of consciousness (restless, irritable, lethargic or unconscious) using the Blantyre or Glasgow coma scale
- Check for signs of dehydration
- Check for palmer pallor
- Check skin for rashes, anterior fontanel, eyes, ears, nose and throat
- Check lungs and heart
- Check for enlarged lymph nodes on the neck, armpit and groin
- Check the abdomen, genitals and extremities

AESSING AN ADULT WITH FEVER

- Look for signs of severe disease

Severe signs:

- **Convulsions or altered consciousness**

- **Prostration** – Unable to sit unsupported

- **Coma** - unable to localize a painful stimulus

- **Respiratory distress** - Deep breathing, difficulty breathing or nasal flaring (Rapid RR)

- Ask the patient about

- Duration of fever
- Previous place of residence
- Occupational hazards
- Appetite
- Cough
- Vomiting and Diarrhea
- Painful urination
- Sexually Transmitted Infection history (e.g., Vaginal discharge or itching, urethral discharge or itching)
- Menstrual history (LMP and any menstrual problem)
- Nature of previous treatment for present illness, if any
- Allergy to food or drugs
- Contact with any ill persons in the neighborhood
- Use of mosquito net and other personal protection method against mosquito bites

- Examine the patient

- Check temperature, weight, pulse, respiration rate, blood pressure
- Check for signs of dehydration and shock
- Check for stiff neck
- Check skin for rashes, eyes, ears, nose, and throat
- Check for enlarged lymph nodes in the armpit, neck, and groin
- Check the lungs and heart
- Check the abdomen, genital, and extremities

**GROUP ACTIVITIES**

**CASE SCENARIO**

**Instructions:**

- In the session below, lead a discussion on the signs and symptoms of malaria.
- Divide the participants into two or more groups
- Assign the case scenario below and allow them to discuss and present their findings
- Give participants 30 minutes for this session

**Case scenario—Does this person have malaria?**

You are a health worker in a clinic in a town in Lofa County. You’re living in a village where houses are poorly constructed.

Isaac, a 12-month-old boy, is brought to your clinic by his mother. He weighs 6.2 Kg. His temperature is 38.5°C. His mother came to see you today because Isaac has felt hot for the last 2 days. Yesterday, he cried all night.

You complete your examination and find the following:

Isaac has no danger signs. He has no cough nor does he have difficulty breathing. He does not have diarrhea or vomiting. He is drinking well. His immunization schedule is up-to-date. He has no rash, but during the examination you notice that Isaac is pulling at his left ear, from which there is a small purulent discharge. Isaac also seems very thin. There is no edema when you press on his feet. He has not received treatment or medical care recently.

**Question 1:**

What would be your clinical diagnoses for Isaac?
Question 2:
Do you think Isaac has malaria? Explain your answer.

Take into account
- The local situation – is malaria present (is it endemic?)
- Is the patient asymptomatic or symptomatic?
- Clinical diagnosis – signs and symptoms
- What species of malaria might be present? (Important for some treatment regimes)
- Do you know of any drug resistance in the area where people come from?

Identify signs and symptoms of uncomplicated malaria on a flip chart.

STAGES OF FEVER:

Cold stage
- Shivering and feeling of intense cold
- Teeth chattering
- Rapid and weak pulse
- Lips and fingers become cyanotic (blue)
- Skin dry and pale with goose-flesh appearance
- Vomiting may occur and children often have convulsion

Hot stage
- Face flushed
- Skin dry and burning
- Headache
- Nausea and vomiting are common
- Pulse is full and bounding
- Intense thirst
- High temperature

Sweating stage
- Profuse sweating
- Temperature falls below normal level
- Deep sleep and upon waking feels weak but normal lasting two to four hours
Session 4

Confirmatory Diagnosis of malaria
RDT & Microscope
SESSION FOUR: CONFIRMATORY DIAGNOSIS OF MALARIA

SESSION OBJECTIVES

At the end of this session the participants should be able to:

- Understand how to use RDT
- Perform RDT and analyze results
- Understand the use of microscopy for the diagnosis of malaria.

Issues Regarding Malaria Diagnosis
The facilitator will lead a discussion on the following questions regarding malaria diagnosis.

1. How can you confirm whether someone has malaria or not?
2. How do you choose which diagnostic tool to use?
3. How do the epidemiology of malaria and other diseases influence the choice of diagnostic practice?
4. What are the key problems associated with misdiagnosis of malaria?

MICROSCOPE

Performance
A microscope is an instrument used to detect very small objects, such as germs, bacteria or other organisms that can not be seen by or with the naked eyes.

Microscopy is the gold standard, and most commonly used, laboratory diagnostic tool in malaria endemic areas or regions.

When to use Microscope

- Routine confirmatory diagnosis
- Investigation of suspected treatment failure
- Drugs efficacy studies

In dark purple, cell infected by plasmodium falciparum
RAPID DIAGNOSTIC TESTS (RDT)

In many situations, the diagnosis of malaria is made on the basis of clinical features alone. However, this can be very inaccurate, and is likely to result in significant over treatment or undertreatment of malaria. It is therefore important to establish, at the start of an emergency intervention, the capacity for confirmatory diagnosis. Malaria treatment should be based on RDTs or Microscopy positive results. Except in a remote area where RDTs or Microscopes are not available.

Negative RDT or blood smears
In the case of negative laboratory test, the health worker should reassess the patient for other causes of fever.

Effective confirmatory diagnosis can help to:
- Identify patients that need antimalarial treatment.
- Reduce unnecessary use of antimalarial drugs for patients without malaria.
- Identify malaria species
- Identify treatment failures.

Design

Rapid diagnostic tests (RDT) for malaria use a dipstick, test strip, test card or device design to detect malaria parasite antigens in the blood of an infected individual. Three main types of RDT are commercially available:

- Those that detect histidine-rich protein II (HRP-II), a water-soluble protein produced by *P. falciparum* infected red blood cells only.
- Those that can detect Histidine-rich protein II (HRP-II), plus a non-specific pan malaria antigen (detects all 4 malaria species).
- Those that detect parasite Lactate Dehydrogenase (pLDH), which is produced by all four human malaria parasites. These kits can distinguish *P. falciparum* from non-*falciparum* species

Performance
Evaluation of the performance of RDT in different epidemiological and clinical settings has shown that:

Accuracy in the detection of *P. falciparum*
At parasite densities above 100 parasites/µl blood, RDTs can detect *P. falciparum* with sensitivity of >90%. This means that more than 90% of cases with malaria parasitemia will test positive on RDT. This is equivalent to the sensitivity that can normally be achieved with skilled microscopy. However, in cases with below 100-parasites/µl blood, RDT sensitivity in detection of *P. falciparum* decreases markedly7.

In severe malaria, parasites may become trapped in the deep tissues or brain, but it is very rare to find that the RDT test is positive in the absence of microscopically detected parasites or pigment on peripheral blood slide.

False positives
RDT detecting HRP-II may continue to produce positive test results for up to 14 days after effective treatment of a malaria infection, even though patients no longer have detectable parasites on microscopy. These tests should not therefore be used for follow-up in drug efficacy trials.

How to use the RDT

Prepare and use RDT(cassette):
1. Open pack and set out materials on a flat surface.
2. Make sure the clearing buffer is near by.
3. Clean the finger with the alcohol swab provided or with 70% alcohol and cotton.
4. Prick the finger with lancet.
5. Collect around 5 µl of blood with the plastic tube or applicator included in the kit. Do this by touching the end of the tube/applicator to the patient’s finger until some blood is collected in the tube/on the applicator.
6. Immediately transfer the blood in the tube to the test device in the square marked with A (A □).
7. Next add 6 drops of the clearing buffer into the circle marked with B. Be sure to hold the bottle vertically.

Prepare and use RDT (Dipstick)
1. Bring the pouch to room temperature.
2. Open the pouch just prior to testing and remove the dipstick.
3. Collect 5µl of whole blood to be tested using a micropipette or sample applicator provided.
4. Blot the blood on the sample pad just below the arrows on the dipstick.
5. With arrows pointing downwards place the dipstick in a tube containing 4 drops (200µl) of clearing buffer.

Wait 15-20 minutes for the buffer to travel through the dipstick.

Read the results

Group activities:

Demonstrate the use of RDT
Instructions:
- Divide participants into groups consisting of two persons each
- Provide RDT kits and other materials to each person
- Let each one perform RDT on the other until everyone has learned how to use the kit and to interpret the results
- Allow 30 minutes for this activity
RESULTS OF RDT (Cassette):

- **POSITIVE**
  - [Diagram]

- **NEGATIVE**
  - [Diagram]

- **INVALID (no control)**
  - (Repeat Test)
  - [Diagram]

- **INVALID (no lines seen)**
  - (Repeat Test)
  - [Diagram]

- **INVALID**
  - (Repeat Test)
  - [Diagram]

RESULTS OF RDT (Dip stick):

- **NEGATIVE**
  - (Only one pink purple colored band appears on the dipstick.)
  - [Diagram]

- **POSITIVE**
  - (Two distinct pink purple colored band appear on the dipstick.)
  - [Diagram]

- **INVALID (no control)**
  - (The test should be considered invalid if no Band appears on the dipstick. Repeat the test with a new dipstick.)
  - [Diagram]

Comparison of Microscope and RDT
Advantages

- Investigation of suspected treatment failure
- Use for drug efficacy studies
- Effective to detect all species of parasites
- Easy to transport
- Quick to perform and produce reliable results in 15-20 minutes
- Sensitive at detecting p. falciparum which causes malaria
- Does not need skilled laboratory technician and can be used by any trained health workers

Disadvantages

- Requires long time training
- Expensive
- Finger prick is painful
- False positive results.
- less expensive
- required short time training
- Detects only P. falciparum
- Has expiration date
- Finger prick is painful

USING RDT IN LIBERIA:

**Confirmatory diagnosis of suspected malaria cases**

In high transmission settings such as Liberia, RDT may be used until the situation is stabilized and good quality microscopic services are established. RDT should also be used when it is impossible to establish or maintain effective microscopic services as Indicated in the BPHS.

In Liberia, people who have been regularly exposed to malaria since infancy have developed a partial degree of immunity. In areas of high perennial transmission, a high proportion of the population throughout the year may have malaria parasites in their blood, yet a relatively small number of these individuals will become ill.

In these situations, any decision to give anti malarial treatment must be based on the presence of clinical symptoms in addition to a positive RDT or blood smear. Treatment based on a positive test result will prevent unnecessary treatment of those with asymptomatic infection. According to the WHO, all malaria treatment should be based on the positive results of malaria test, except where diagnostic tool/test is not available or accessible. (WHO Treatment Guidelines third edition, page 54).
* Remarks: If RDT is negative, order for microscopy blood smear if available. If still negative, review differential diagnosis and treat accordingly. However, if there is a nearby health facility with a functional microscope and a competent laboratory technician, refer patient for further investigation to rule out other causes.

**Other things to know about RDT**

- **Mixed species infections**
  
The rapid diagnostic test that is used in Liberia can detect only *Plasmodium falciparum*, but not the other species (*P. ovale* and *P. malariae*) which have the prevalence rates of less than 5%.

- **Malaria in pregnancy**
  
In pregnant women living in areas of moderate to high transmission, who therefore have a degree of pre-existing immunity, often develop asymptomatic infections. In many asymptomatic cases, few or no parasites may be detected in the peripheral blood, although the placenta may be heavily infected. Under these circumstances, the RDT may be negative, and the woman should be treated although no parasites are seen on peripheral blood films.

**When not to use RDT**
Investigation of suspected treatment failures
RDT should not be used to diagnose malaria in patients who, within 14 days of anti malarial treatment, returns with fever. In such cases, the RDT may give a positive result, even if treatment has been successful, and microscopy should therefore be used to confirm treatment failure. When microscopy is not possible, the decision to give further anti malarial treatment depends upon the history of first-line treatment.
Session 5:

Treatment of uncomplicated malaria
SESSION FIVE: TREATMENT OF UNCOMPLICATED MALARIA

SESSION OBJECTIVES

At the end of this session the participants should be able to:

- List and describe in detail the antimalarial drugs which are used in Liberia
- Explain the side – effects of anti-malaria therapies to patients
- Instruct patients on the contraindications of artesunate and amodiaquine
- Explain the administration of the drugs to patients in order to enhance compliance of prescribed antimalarials.
- Explain the advantages of anti-malarial therapy available
- Explain the disadvantages of not taking the drugs correctly

Group activities:

Give a brief lecture on the treatment of malaria in Liberia.
Involves the participants in the discussion
Following the discussion of the questions below with the participants, divide them into three or more groups to read and discuss the case scenario below.
After 30 minutes each group will present to the class

What is your experience of using artesunate and amodiaquine FDC compared to the blister pack

Were there many revisits when you were using the blister pack?

Were there any side-effects of the drugs (Fixed Dose ACT) reported?

BACKGROUND OF ANTIMALARIAL TREATMENT

Background of Artesunate
It is accepted that the best current malaria treatment is a combination of drugs that includes artemisinin derivatives, extract of a Chinese plant, Artemisia annu. The Artemisia plant is usually known by its common names of sweet wormwood or Chinese wormwood. Traditionally, called (qinghaosu) was discovered by the Chinese 2000 years ago who used it as herbal tea to reduce fevers and other symptoms associated with malaria.

However, the Chinese treatments using sweet wormwood were lost over time, and artemisinin was only recently scientifically identified as the active ingredient.

Artemisinin and its derivatives (artesunate, artemether, and dihydroartemisinin) are the most potent and rapidly acting of all the antimalarial drugs. They reduce the number of infecting malaria parasites by approximately 10,000-fold per asexual (two day) life cycle compared to 100 to 1,000-fold for other antimalarials. Artemisinin and its derivatives are remarkably well tolerated and, so
far, no significant resistance has been reported either in clinical isolates or in laboratory experiments.

**As a summary Artesunate has shown:**
- Rapid substantial reduction of the parasites
- Rapid resolution of clinical symptoms
- Effective action against multidrug-resistant *P. falciparum*
- Reduction of gametocytes, which may reduce transmission of parasites resistant to antimalarial drugs
- No parasite resistance documented as yet with the use of artemisinin and its derivatives
- Few reported adverse clinical effects; however pre-clinical toxicology data on artemisinin derivatives are limited.

Due to the very short half-life of Artemisinin derivatives, their use as monotherapy requires a multiple dose regimen of seven days duration. Combination of one of these drugs with a longer half-life “partner” antimalarial drug allows a reduction in the duration of Artemisinin treatment, while at the same time enhancing efficacy and reducing the likelihood of resistance development to the partner drug.

**Background of Fixed Dose - Artesunate + Amodiaquine:**
- Fixed Dose Combination- Artesunate + Amodiaquine Winthrop (ASAQ) are a new fixed dose combination as a result of a partnership which started in the late 2004 between Sanofi-Aventis and DNDI (Drug for Neglected Diseases Initiative).
- ASAQ is available under the name Artesunate + Amodiaquine Winthrop (ASAQ) for public Markets and under the brand name Coarsucum in private markets
- ASAQ is available in 4 presentations for 4 age ranges (infants, small children, Adolescents and adults) and each presentation is easily identified with a specific package color code and pictograms to ensure appropriate usage in the field. These 4 presentations
  - Make possible simple dosing regimen:
    - 1 tablet per day for 3 days for infants, children and adolescents.
    - 2 tablets once a day for 3 days for adults.

**Rationale for Fixed -Dose**
- The rationale for using ACT is based on the concept that the artemisinin will substantially and rapidly reduce even multidrug-resistant *P. falciparum* parasitaemia, leaving the residual parasitaemia to be killed by high concentrations of the partner drug (Amodiaquine). In this way, the probability of the development of de novo resistance is greatly reduced. ACT also reduces gametocyte carriage and infective.
- The WHO considers rapid and effective treatment with an ACT essential in its quest to roll back malaria. Another element considered essential is treatment compliance. There is increasing acceptance that compliance is improved by the use of simplified, fixed-dose combinations presented in easy-to-use packaging

**Indication**
This medication is used in the treatment of uncomplicated malaria with sensitive *P. falciparum*. 
Depending on body weight or Age: Artesunate (4mg/kg) + Amodiaquine base (10mg/kg) once a day for 3 days

<table>
<thead>
<tr>
<th>Weight</th>
<th>Age</th>
<th>Table content</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 4.5 kg &lt; 9kg</td>
<td>2 to 11 months</td>
<td>25mg AS + 67.5mg AQ</td>
<td>1 tablet/day x 3 days</td>
</tr>
<tr>
<td>≥ 9kg &lt; 18kg</td>
<td>1 to 5 years</td>
<td>50mg AS +135mg AQ</td>
<td>1 tablet/day x 3 days</td>
</tr>
<tr>
<td>≥ 18kg &lt; 36kg</td>
<td>6 to 13 years</td>
<td>100mg AS +270mg AQ</td>
<td>1 tablet/day x 3 days</td>
</tr>
<tr>
<td>≥ 36kg</td>
<td>14 years and above</td>
<td>100mg AS +270mg AQ</td>
<td>2 tablet/day x 3 days</td>
</tr>
</tbody>
</table>

Experience has shown that when two or more drugs with different biochemical targets in the malaria parasite are used in combination, the development of resistance to both drugs can be delayed. Drug combinations containing artemisinin derivatives have the highest therapeutic efficacy and the greatest potential to delay the onset of resistance. Because artemisinin-based combination therapies (ACTs) comprise two medicines which work in different ways, it is thought unlikely that the malaria parasite—which has rapidly developed resistance to other, single treatments—would evolve to resist these medicine combinations. Multi-center trials on ACTs have been completed to document clinical efficacy and safety in children and additional safety information is being sought for young infants and pregnant women. (See table 5.1 for treatment combination options)

TREATMENT OF UNCOMPLICATED P. falciparum MALARIA

- In young children, **treat fever with paracetamol** to reduce fever and the risk of vomiting before giving anti-malarial treatment.
- The main therapeutic option is Artemisinin-based combination therapy. Review criteria, precautions, and follow-up for treatment failures.
- The first dose of ACT- Fixed Dose Combination should be administered at the health facility (in front of the health worker)
- Children under 5kg and pregnant women during their 1st Trimester should be treated with oral quinine.

In the Liberian situation, it was decided that Artesunate and Amodiaquine- Fixed Dose be used.

**Why?**
The resistance to SP is suspected to be high, and even without a high resistance, its ‘needs to be preserved for use as Intermittent Preventive Treatment in Pregnancy. The three day treatment regime of Artesunate and Amodiaquine is similar to the Chloroquine regimen, with which people are already familiar. With this combination therapy, Sulphadoxine-Pyrimethamine (Fansidar™) will be reserved for the use of Intermittent Preventive Treatment for pregnant women.
Side effects and contraindications of Artesunate and Amodiaquine-Fixed Dose

Artesunate: Few side effects recorded; occasionally it has been reported to cause drowsiness and weakness.

Amodiaquine: The side effects that have been recorded with amodiaquine are: itching, Gastroenteritis, nausea, vomiting and weakness.

Artesunate + Amodiaquine- Fixed dose are CONTRA INDICATED:
- In the 1st Trimester of pregnancy
- In children weighing less then 4.5kg
- Person known to be allergic to the drug (ACT)

EXAMPLES OF DRUG CALCULATION FOR UNCOMPICLATED MALARIA:

1. Artesunate and Amodiaquine (PO) Fixed dose combination
   A child weights 6.5kg. Which of the four Fixed Dose Combination blisters should be administered to the child?

2. A child weighs 10 kg was diagnosed of uncomplicated malaria. Which of the four Fixed Dose Combination blisters should be administered to the child?

3. A patient weighs 19.5kg. Which of the four Fixed Dose Combination blisters should be given to the child?

Quinine (PO)

4. A pregnant woman weighs 40kg. Calculate the amount of quinine to be given to the patient.
   Quinine Dose: 30mg/kg in 2 or 3 divided doses for 7 days.

5. A Child weighing 4kg. Calculate the amount of quinine to be given to the patient.
Fig: Pink and Purple blister of fixed dose combination.
<table>
<thead>
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TREATMENT FOR UNCOMPLICATED MALARIA WITH AMODIAQUINE + ARTESUNATE (FDC)
(Confirmed by rapid diagnostic test and/or Microscopy)

*Amodiaquine dosage is 10mg/kg/day for 3 days + **Artesunate dosage is 4mg/kg/day for 3 days

**Contraindications:** pregnant women in first trimester & children weighing less than 5 kg.

**Side Effects:** Puritus, nausea, and vomiting. These side effects should be explained to patients with reassurance that they are normal, but that the drugs are still working to get rid of the malaria parasites.

**Standard case definition for uncomplicated malaria:** Malaria is defined as fever (greater than 37.5°C) or history of fever in previous two days Plus at least one or more of the following symptoms and exclusion of other possible causes of disease.

- Chills (feeling cold) and rigors (shaking of the body)
- Headache
- Diarrhea
- Vomiting
- Body Pains
Guide on interpersonal communication:

Interpersonal communication is face-to-face verbal or non-verbal exchange of information and feelings between two or more people.

The service provider/clinician should remember that each time he/she is in contact with a client, communication is taking place.

There are often common characteristics or qualities that service providers possess, or should possess, that contribute to their effectiveness as health care givers. Qualities might include (but not limited to) the following:

- Empathy
- Respect for others
- Good communication skills
- Tolerance for values and beliefs different from one’s own
- Unbiased attitudes towards others
- Patience
- Gentleness
- Friendliness

Effective questioning will help to obtain useful information from the client. Questioning is a way to determine what service the client wants or how he/she is feeling, what the client already may know, or what problem he/she may have. It is also a way to determine whether the client has understood what you have told him/her.

Open-ended questions encourage the client to offer information, concerns and feelings freely.

Closed ended questions are useful for obtaining specific information, especially if there is a limited time such as in an emergency or in taking a medical history. They can be answered in just a few words.

Probing questions encourage the respondent to give further information, and to clarify an earlier point. They require tact in wording and tone used so as to not be judgmental.

Health care workers should be good listeners. Listening is as important as sharing information. As a health care worker, who is used to providing people with information, it may be difficult to remember that it is important to listen. Through listening to clients you can find out information you need to assist them with problems, and help them to make decisions. When listening to clients, listen actively.

Active Listening is characterized by paying attention to what is being said and also observing non-verbal communication of the client. Giving full attention is demonstrated by actions such as having eye contact and nodding.

Reflection is observing the client’s emotions and reflecting them back to him/her. Reflection helps the provider check whether the emotions observed are correct. This helps to show that the provider has empathy and respect for the client and her feelings.

Summarizing and Paraphrasing means repeating back to the client what you heard him/her say in a short form.

Miscommunication can happen very easily when two people discuss something. A client may tell you something that you understand in quite a different way from the way he/she meant it. To prevent miscommunication when listening to a client’s problem or when sharing information with a client, it is useful to summarize or paraphrase what has been said.
Giving information should be based on what the client already knows, to help ensure that the client’s information is complete and accurate. Information should be given clearly and in non-technical language, so that the client understands.

ROLE PLAY

Case Scenario
Hawah presents at Nyehn health center (Montserrado). She arrives at the health center at 7:30 am having walked for two hours to get there. There are many patients at the health center and so she waits one and a half hours to see the PA. Here is the conversation that occurs

PA: What’s wrong?
Hawah: I have had fever for three days and I vomited this morning.
PA: OK, Do you have a health card?
Hawah: Yes, here it is
The PA looks at the card and then takes out a Rapid Diagnostic Test for malaria. He asks Hawah to hold her hand out. Hawah does not know what the PA is doing.
A while after the test the PA sees that the test is positive. He writes something on the health card.
PA: Go to the dispenser
Hawah gives her card to the dispenser and waits to be called.
She is called after one hour.
Dispenser: Here are your tablets – they are Artesunate and amodiaquine. Take these today, take them tomorrow and take those the day after (she points to the sachet). OK? If you’re sick come back.
Hawah: Thank you, how much is that?

Hawah returns home. She is still feeling very ill and takes some of the tablets. She does not remember what the dispenser told her about taking the tablets. She begins to feel tired and her skin itches. She takes some more tablets the next day and feels tired again and ill. She stops taking the tablets. She is meant to take more, but she keeps them instead.

Part 2
After four days, she feels very ill again. She is vomiting and has high fever. She goes back to the health center.

What could be wrong with Hawah when she returns to the health center?

Why could Hawah still have malaria?

What could the PA and dispenser have done to avoid Hawah returning to the health center ill after four days?
SESSION SIX: EMERGENCY TRIAGE

SESSION OBJECTIVES:

By the end of this unit you should be able to:

- Define emergency triage
- Conduct emergency triage
- Recognize danger signs
- Assess and treat danger signs

This session deals mainly with emergency triage (not necessarily malaria), danger signs and practical procedures for danger signs. Facilitators will instruct participants to partake in a role-play and a discussion of the role-play. Afterwards there will be a presentation on danger signs. Finally, you will be asked to brainstorm on a question of emergency triage.

Group Activity

Instructions

1. **Emergency Triage:** This session is facilitated by role-play. The facilitator will ask for volunteers amongst the participants to play the roles of health workers, patients and caretakers.

2. **After the role play,** the facilitator will lead discussion on danger signs with the participants and brainstorm on the following questions:

   **What are the treatment approaches for each danger sign?**

**Questions:** There is a queue of over 200 people outside your health facility. How would you implement emergency triage as quickly and effectively as possible?
EMERGENCY TRIAGE

Many deaths during the acute phase of emergencies can be avoided with prompt identification and effective treatment of all patients who are severely ill (as a result of malaria or any other condition). This, however, is not easy in situations where there is few skilled staff, health facilities are limited, and patient caseloads are excessive. It is therefore essential to adopt an emergency triage procedure that is both effective at identifying high risk patients, and is simple and quick to perform.

The emergency triage procedure described below can identify, in less than 2 minutes, those who need immediate assessment and treatment to be able to save their lives.

Priority Cases in the Health Center

Patients with any of the following features need urgent clinical assessment and treatment:

**Danger Signs:**

**Witnessed convulsions**

Convulsions are particularly common in febrile children. Any convolution that lasts more than five minutes requires prompt treatment with diazepam (see Management of severe malaria). Convulsions may present in a subtle way, and important signs include intermittent Nystamus (rapid, jerky eye movements), salivation, and minor twitching of a single finger, toe, or corner of the mouth

**Prostration**

This is the Inability to sit unsupported (if age 1 year or above) OR Inability to drink or breast-feed (if < 1 year)

Note: Prostration should be actively tested. It is not enough to ask the caregiver

**Coma**

This is the Inability to localize a painful stimulus1 (if age 8 months or above) OR Inability to fix or follow objects with the eyes (if < 8 months)

To assess for coma: Rub firmly on the patient’s sternum with the knuckles of one hand. A patient who is able to localize pain will attempt to remove the examiner’s hand.

**Respiratory distress**

This is deep breathing and/or in drawing of the lower chest wall (Rapid RR)

Note: clothing should be removed so the breathing pattern can be observed

**Awareness:** All patients coming with severe malaria should receive Dextrose 50% (children: 1ml/kg / Adult: 20 to 50 ml IV slowly)
### ASSESSMENT AND TREATMENT OF DANGER SIGNS

<table>
<thead>
<tr>
<th>Signs</th>
<th>Check</th>
<th>If…</th>
<th>Treatment$^8$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CONVULSIONS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration</td>
<td>Duration lasts &gt;5 minutes</td>
<td></td>
<td>Diazepam IV or PR</td>
</tr>
<tr>
<td>Blood glucose</td>
<td>Blood glucose &lt; 2.2 mol/l or test not possible</td>
<td></td>
<td>50% dextrose</td>
</tr>
<tr>
<td>Malaria slide or RDT</td>
<td>Malaria slide or RDT Positive or test not possible</td>
<td></td>
<td>Start antimalarial drugs</td>
</tr>
<tr>
<td>Lumbar puncture (LP)$^9$</td>
<td>Lumbar puncture (LP) Positive or test not possible</td>
<td>CSF evidence of meningitis or LP not possible</td>
<td>Start antibiotics for meningitis</td>
</tr>
<tr>
<td><strong>PROSTRATION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Circulation capillary refill</td>
<td>Any sign positive (indicates shock) and no evidence of severe malnutrition</td>
<td></td>
<td>Insert IV and start rapid fluids</td>
</tr>
<tr>
<td></td>
<td>OR weak, past pulse OR Cold hands</td>
<td></td>
<td>Give oxygen</td>
</tr>
<tr>
<td>Hydration status</td>
<td>Any sign positive (indicates shock) and no evidence of severe malnutrition</td>
<td></td>
<td>Insert IV and start rapid fluids</td>
</tr>
<tr>
<td>Sunken eyes</td>
<td></td>
<td></td>
<td>OR insert NG tube and start ORS</td>
</tr>
<tr>
<td>Lax skin turgor$^{11}$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nutrition</td>
<td>Any sign positive (indicates severe malnutrition)</td>
<td></td>
<td>Transfer to therapeutic feeding center</td>
</tr>
<tr>
<td>Visible severe wasting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>and/or flaking skin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>and edema of both feet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood glucose</td>
<td>Blood glucose &lt; 2.2 mol/l or test not possible</td>
<td></td>
<td>Give glucose 50% IV</td>
</tr>
<tr>
<td>Lumbar puncture</td>
<td>Lumbar puncture CSF evidence of meningitis or LP not possible</td>
<td>Positive or test not possible</td>
<td>Start antibiotics for meningitis</td>
</tr>
<tr>
<td>If none of the above signs are present, perform LP</td>
<td></td>
<td></td>
<td>Start antimalarials</td>
</tr>
<tr>
<td>Malaria slide or RDT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>COMA</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood glucose</td>
<td>Blood glucose &lt;2.2 mol/l or test not possible</td>
<td></td>
<td>Give glucose 50% IV</td>
</tr>
<tr>
<td>Perform LP 12</td>
<td>Perform LP CSF evidence of meningitis or LP not possible</td>
<td></td>
<td>Start antibiotics for meningitis</td>
</tr>
<tr>
<td>All comatose patients</td>
<td></td>
<td></td>
<td>Insert NG tube, urinary catheter</td>
</tr>
<tr>
<td><strong>RESPIRATORY DISTRESS</strong></td>
<td>Palmar pallor Check Hb Hb &lt;5g/dl</td>
<td></td>
<td>Insert IV and give immediate blood transfusion</td>
</tr>
</tbody>
</table>

$^8$ For treatment details see section on management of severe malaria

$^9$ Lumbar puncture should be performed by medical doctor if the patient is still unconscious > 30 minutes after the end of convulsion

$^{10}$ Capillary refill: apply pressure for 3 seconds to whiten the fingernail. Determine the capillary refill time from the moment of release to the recovery of the original nail color

$^{11}$ Skin turgor: Pinch the skin of the abdomen halfway between the umbilicus and the side for 1 second, then release and observe. If the skin takes > 2 seconds to return, this indicates dehydration
<table>
<thead>
<tr>
<th>Hydration</th>
<th>Any positive sign and no evidence of severe malnutrition</th>
<th>Insert IV and start rapid IV fluids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lethargy</td>
<td>Sunken eyes</td>
<td>Very slow skin pinch</td>
</tr>
<tr>
<td>Circulation</td>
<td>Capillary refill &gt;3 seconds</td>
<td>Weak, fast pulse Cold hands</td>
</tr>
<tr>
<td>Listen to chest</td>
<td>Chest crackles</td>
<td></td>
</tr>
</tbody>
</table>

Session seven

Assessment and Case Management of complicated malaria
SESSION SEVEN: ASSESSMENT AND CASE MANAGEMENT OF SEVERE / COMPLICATED MALARIA

SESSION OBJECTIVES

At the end of the session the participants will be able to:

- Define complicated malaria
- Recognize the danger signs of complicated malaria
- Recognize early a patient with complicated malaria and respond quickly to the needs of the patient
- Conduct thorough assessment of the patient with complicated malaria
- Outline and carry out the management of a patient with complicated malaria
- Use IV / IM Quinine, IM Artemether and IM/IV Artesunate appropriately

A presentation will be done on severe malaria. This is the theoretical side of complicated malaria after which participants will carry out case scenarios and clinical sessions (if possible).

At the end of the session, the facilitator will show you a video on complicated malaria, and if available, take you for a clinic visit.

Hospital visit objectives (if possible)

At the end of the session participant will be able to:

- Identify a patient with complicated malaria
- Carry out clinical assessment for patients with complicated malaria
- Make a clinical diagnosis of complicated malaria
- Outline the management of a patient with complicated malaria
DEFINITION OF SEVERE / COMPLICATED MALARIA

**Definition:** Complicated/severe malaria is a case of malaria associated one or more of the following danger signs:
- Convulsions (witness or history in present illness)
- Prostration
- Respiratory distress
- Coma
- Circulatory collapse
- Jaundice
- Haemoglobinuria
- Abnormal bleeding
- Severe anemia
- Hypoglycemia

ASSESSMENT OF SEVERE P. falciparum MALARIA:

Severe malaria is a **medical emergency**, and these patients need admission for immediate treatment and quality nursing care. When the cares are not available, these patients need to be referred after stabilization of their situation. The risk of developing severe malaria depends on the age and immunity of the patient.

**High risk group of developing severe malaria in all areas:**
- Pregnant women
- Young children
- Severely malnourished children and adults (< 70% weight for height)
- Visitors of non or hypo endemic regions
- Immuno – compromised patients(TB, HIV/AIDS , etc)

**Emergency triage and resuscitation**

In a situation where patient numbers are high and there are many late presentations, effective triage is essential to identify and treat immediately patients who are highest risk of dying. All patients with signs of severe malaria **must receive immediate treatment.**
**Resuscitation**: during resuscitation the following procedure should be followed; prompt resuscitation of patients with severe malaria saves lives.

- Clear the airway and make sure that the patient is breathing.
- Treat convulsions if present.
- Start an intravenous (IV) line.
- Take blood for laboratory investigations (microscopy or RDT, blood glucose and hemoglobin Hb). Urea and electrolytes, blood gas and blood culture are also important investigations to do.
- Treat hypoglycemia if present (blood glucose <40 mg/d or 2.2mmol/dll)
- Rapidly assess for shock and hydration status and resuscitate if necessary with normal saline (0.9%) or Ringers lactate (see below).
- If Hb < 5g/dl and patient has signs of heart failure (eg. respiratory distress), transfuse blood (see page 54)
- For unconscious patients, insert a nasogastric tube and prevent aspiration by placing the patients in a lateral decubital position.
- Perform a lumbar puncture to exclude meningitis.
- Start appropriate anti malarial treatment (see page 64).
- Start antibiotic therapy if the patient is unconscious, in shock or there is focus of infection (Ref- WHO. Severe/ complicated malaria 2000).

**Laboratory support**

- Confirmatory diagnosis with RDT for the detection of *P. falciparum* malaria is required. **Laboratory diagnostic method is the ‘Gold Standard’ (microscopy)**
  - Measurement of blood glucose
  - Measurement of hemoglobin (Hb) or packed cell volume (PCV)
  - Blood grouping and cross-matching, and the ability to screen blood for HIV, hepatitis, etc. where possible

**Nursing care for severe malaria**

Regular observation of the patient with severe malaria is critical, because the clinical situation changes quickly. The most important observations are pulse, respiratory rate and pattern, blood pressure, temperature, and level of consciousness. If there is any deterioration in consciousness, it is essential to check for hypoglycemia and for a significant fall in hemoglobin, because these are amenable to treatment.

In all patients with severe malaria:

- Check hemoglobin and parasitemia daily for the first 3 days if microscope is available. If the patient is unconscious:
- Check blood glucose every 4 hours.
Check blood glucose and Hb if there is a deterioration in conscious level

MANAGEMENT OF THE COMPLICATIONS OF SEVERE MALARIA

Management of the following complications of severe malaria – hypoglycemia, convulsions, coma, renal failure, severe anemia, pulmonary edema, and spontaneous bleeding are outlined below:

Treatment of hypoglycemia (blood glucose <40 mg/dl or < 2.2 mmol/dl)

- If the patient is able to tolerate oral fluids, give milk or a sugar solution (4 level teaspoons of sugar (20 grams) in a 200ml cup of clean water).

For unconscious patients or those unable to tolerate oral fluids:
- Insert an IV line.
- Children: Dilute 50% glucose 1ml/kg in an equal volume of Normal saline or distilled water and give by slow IV injection over a period of 5 minutes. *(Example: a child weighing 16kg would receive 16 x 1ml = 16ml 50% glucose diluted to 32ml). Then follow with a continuous infusion of 5% or ideally 10% dextrose.
- Adults: Give 20 to 50ml of glucose 50% IV push over 5 to 10 minutes.
- Recheck blood glucose 15 minutes after the end of the infusion.
- If blood glucose is still <40mg/dl, repeat glucose infusion as above.
- If it is not possible to insert an IV line and the patient is unconscious, give 1ml/kg 50% dextrose via NG tube.
- Give oral fluids (milk or sugar solution) and food once the patient regains consciousness.

Note: if hypoglycemia is suspected clinically and it is not possible to check the blood glucose, give a presumptive infusion of 50% glucose as described above.

Treatment of convulsions

- Maintain the airway.
- Turn the patient on his or her side to reduce the risk of aspiration.
- Do not attempt to force anything into the patient’s mouth.
- Control convulsions
- Check blood glucose and treat if <40 mg/dl (see above)
- Monitor vital signs every 15 minutes and record

Treat with:
- **Diazepam** 0.3mg/kg as a slow IV injection over 2 minutes,
  
  OR

- Diazepam 0.5mg/kg per rectum in children: administered by inserting a 1ml syringe (without a needle) into the rectum
  
  OR

- If the patient continues to convulse, repeat dose of diazepam to at most 2 doses in 24 hours. Ref. *(Therapeutic handbook for malaria in Africa, page: 112)*

  If the convulsion persists, administer long acting anticonvulsant (Phenobarbitone 10-15mg/kg)

Maintenance fluid requirements (IV, oral, or via nasogastric tube)
Use IV fluids, such as 4% dextrose, 0.18% saline or 5% dextrose (ideally with added sodium 2mmol/kg/day). Change to 10% dextrose if the patient becomes hypoglycemic.

The following maintenance fluid volumes are recommended:

<table>
<thead>
<tr>
<th>Weight</th>
<th>Fluid requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 5kg</td>
<td>150ml/kg/day</td>
</tr>
<tr>
<td>5-10kg</td>
<td>120ml/kg/day</td>
</tr>
<tr>
<td>11-19kg</td>
<td>80 ml/kg/day</td>
</tr>
<tr>
<td>20-30kg</td>
<td>60ml/kg/day</td>
</tr>
<tr>
<td>Child &gt;30kg and adult</td>
<td>50ml/kg/day</td>
</tr>
</tbody>
</table>

*Note that the fluid requirement is quoted in ml per kg body weight per day.*

The total daily fluid requirement for a 14kg child would therefore be 14 x 80 = 1120ml, while the requirement for an adult weighing 55kg would be 55 x 50 = 2750ml.

In the situation where there are large number of patients, and limited number of nursing staff, close observation of patients is usually impossible. It is therefore safest to give maintenance fluids by nasogastric (NG) tube, in preference to IV infusion. The mother or caregiver can help with the administration of NG feeds under the supervision of a trained health worker, which also makes it possible to provide calories in addition to fluid, an important advantage as many patients are likely to be malnourished. The daily fluid requirement can be given as 4-hourly NG feeds (milk or dilute porridge). Example: the daily fluid requirement for a 14kg child is 80 x 14ml = 1120ml. This can be given in the form of 4 – 6 hourly NG milk feeds of 187ml.

**Rapid administration of IV fluids for resuscitation of patients in shock or with severe dehydration**

- Use normal saline (N/S) (0.9%) or Ringer’s lactate. (*Note: Dextrose solutions, e.g. 5% dextrose, 4% dextrose 0.18% saline, and 10% dextrose, must NOT be used for fluid resuscitation, since this can lead to cerebral edema (brain swelling)).
- Check for malnutrition (wasted muscles with associated edema), since these patients should *not* be given large volumes of intravenous fluids.
- Children: infuse 20ml/kg of normal saline (or Ringer’s lactate) over 15 minutes. (Example: a child of 15kg would receive 15 x 20ml = 300ml)
- Adults: infuse 1000ml (1 liter) of normal saline (or Ringer’s lactate) over 30 minutes.
- Reassess the patient. If there is no improvement in hydration or circulation (pulse becomes slower, capillary refill improves: see Box 5.2), give a second infusion (children: 20ml/kg normal saline; adults: 1000ml normal saline)
- Reassess the patient. If there is no improvement in hydration or circulation, give a third infusion (children: 20ml/kg normal saline; adults: 1000ml normal saline)
- Reassess the patient. If there is still no improvement in circulation or hydration, infuse 20ml/kg of blood over 60 minutes.
- Give presumptive treatment with IV antibiotics (see below) to all patients who are shocked, since shock may be secondary to bacteraemia.

**Blood transfusion for severe anemia**
It is essential to ensure a safe blood supply for transfusion. If your health center doesn’t have the facilities to transfuse the patients, you have to refer them to the nearest hospital where safe transfusion is possible. Blood should be cross-matched and screened for HIV, malaria and hepatitis B. If blood screening can’t be assured, do not transfuse and refer patient to another facility where safe transfusion is possible.

Children
a. Children with Hb <5g/dl (packed cell volume, PCV, <15%) with respiratory distress
   - These patients need blood as an emergency.
   - Give 20ml/kg, as packed red cells or whole blood.
   - Infuse the first 10ml/kg over 30 minutes, and the next 10ml/kg over 2 hours.
   - Reassess the patient at the end of the transfusion. If the patient still has respiratory distress and Hb <5g/dl, repeat the transfusion.

b. Children with Hb <5g/dl (PCV <15%) but without respiratory distress
   - These patients should be transfused but, because their condition is less critical, blood (20ml/kg) can be given over 3 to 4 hours.
   - Diuretics (Frusemide) are unnecessary.

c. Severely malnourished children (severe wasting plus edema)
   - Give blood much more cautiously to these patients.
   - Infuse 10ml/kg blood over 3 hours.
   - Give 1mg/kg IV Frusemide halfway through the transfusion.

Adults
a. Non-pregnant adults
   - Blood transfusion is indicated in patients with Hb <7g/dl plus symptoms (severe lethargy, prostration, breathlessness). Those with Hb <7g/dl who are otherwise asymptomatic and ambulatory should NOT be transfused.
   - Blood (500ml) should be transfused over 3 to 4 hours.

b. Pregnant women
   - Blood transfusion is indicated in the following situations:
     - Women of 36 weeks gestation or more with Hb <7g/dl (even if asymptomatic: women who are severely anemic during labor are at increased risk of dying).
     - Women < 36 weeks gestation with Hb < 7g/dl plus symptoms (severe lethargy, prostration, breathlessness).
     - Transfuse 500ml blood (packed red cells ideally) slowly over 4 to 6 hours. Frusemide 40mg IV should be given halfway through the transfusion.
     - Transfusion should be avoided in the third stage of labor, due to the risk of fluid overload associated with placental separation.
Assessment of level of consciousness

<table>
<thead>
<tr>
<th>Children (Five years old and below)</th>
<th>Blantyre coma scale</th>
<th>Adults (Above five years old)</th>
<th>Glasgow coma scale</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Response</strong></td>
<td><strong>Score</strong></td>
<td><strong>Response</strong></td>
<td><strong>Score</strong></td>
</tr>
<tr>
<td><strong>Motor</strong></td>
<td></td>
<td><strong>Eyes open:</strong></td>
<td></td>
</tr>
<tr>
<td>Localize pain*</td>
<td>2</td>
<td>Spontaneously</td>
<td>4</td>
</tr>
<tr>
<td>Withdraws in response to pain**</td>
<td>1</td>
<td>To speech</td>
<td>3</td>
</tr>
<tr>
<td>No motor response</td>
<td>0</td>
<td>To pain</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No response</td>
<td>1</td>
</tr>
<tr>
<td><strong>Verbal</strong></td>
<td></td>
<td><strong>Best verbal response:</strong></td>
<td></td>
</tr>
<tr>
<td>Appropriate cry</td>
<td>2</td>
<td>Oriented</td>
<td>5</td>
</tr>
<tr>
<td>Inappropriate cry</td>
<td>1</td>
<td>Confused</td>
<td>4</td>
</tr>
<tr>
<td>No cry</td>
<td>0</td>
<td>Inappropriate words</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Incomprehensive</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No response</td>
<td>1</td>
</tr>
<tr>
<td><strong>Eyes</strong></td>
<td></td>
<td><strong>Best motor response</strong></td>
<td></td>
</tr>
<tr>
<td>Gaze oriented</td>
<td>1</td>
<td>Obeys commands</td>
<td>6</td>
</tr>
<tr>
<td>Gaze not oriented</td>
<td>0</td>
<td>Localizes pain</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Withdrawal</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flexion to pain</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Extension to pain</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No response</td>
<td>1</td>
</tr>
<tr>
<td><strong>Maximum score</strong></td>
<td>5 (fully conscious)</td>
<td><strong>Maximum score</strong></td>
<td>15 (fully conscious)</td>
</tr>
<tr>
<td><strong>Minimum score</strong></td>
<td>0 (deep coma)</td>
<td><strong>Minimum score</strong></td>
<td>3 (deep coma)</td>
</tr>
</tbody>
</table>

* Apply sternal pressure (the examiner should press firmly on the child’s sternum using the knuckles of one hand). The child that is able to localize pain makes an attempt to remove the examiner’s hand.


The Blantyre coma scale is a simplified way to rapidly assess and monitor the level of consciousness in children. A score of 5 indicates full consciousness, while a score of 3 or less indicates coma. The assessment should, ideally, be carried out on a 4-hourly basis in all unconscious children.
Management of the unconscious patient

- Ensure that the airway is clear.
- Insert a nasogastric tube and aspirate the stomach contents into a syringe every 4 hours, to reduce the risk of aspiration pneumonia.
- Check that the patient is not hypoglycemic, shocked, dehydrated or severely anemic, and treat any of these conditions urgently (as above).
- Start treatment with quinine, IM artemether, or ACT (see pages 41 and 63)
- Perform a lumbar puncture (LP) on all unconscious patients to exclude bacterial meningitis. If there is evidence of CSF infection (see page 60) or LP is not possible, treat presumptively for bacterial meningitis (see below).
- After successful correction of dehydration and shock, restrict IV fluids to 70% of normal maintenance fluids (maintenance fluid requirements are described on page 51).
- Assess fluid balance daily if possible (daily weight gives a rough indication of overall fluid balance).
- Check blood glucose every 4 hours, and Hb and parasitemia at least daily.
- Treat witnessed convulsions that last for >5 minutes (see above).
- Monitor conscious level of patient every 4 hours with Blantyre (children) or Glasgow (adults) Coma score. If conscious level deteriorates, check blood glucose and Hb.
- Turn unconscious patients every 4 hours to prevent pressure sores.

Acute renal failure

Children

- Established acute renal failure is rare in African children with severe malaria, and poor urine output is often secondary to dehydration.
- Patients MUST be catheterized, so that urine output can be measured accurately.
- Acute renal failure is suggested by a urine output of < 0.5ml/kg/hour (oliguria). (e.g. for a 10kg child, 0.5ml/kg/hour = 10 x 0.5 = 5ml/hour = 5 x 24 ml/day = 120ml/day). Blood concentrations of urea and creatinine are usually raised.
- Check that oliguria is not due to dehydration or shock by giving test infusion(s) of 20ml/kg normal saline (see above).
- If, despite correction of dehydration or shock (improved peripheral perfusion, normal blood pressure), urine output is still <0.5ml/kg/hour, give IV furosemide 3mg/kg.
- If urine output remains <0.5ml/kg/hour, assume that renal failure is established, and restrict fluids to insensible loss (30ml/kg/day: equivalent to 300ml/day for a child weighing 10kg) plus urine output. Consider peritoneal dialysis, if operationally feasible.

Adults

- Patients MUST be catheterized, so that urine output can be measured accurately.
- Acute renal failure is suggested by oliguria (urine output < 400ml in 24 hours).
- Check that oliguria is not due to dehydration or shock by giving test infusion(s) of 1000ml normal saline (see above).
- Once dehydration is corrected, give a single dose of furosemide 40mg. If oliguria persists (<30ml/hour), increase the dose in a stepwise fashion at 60-minute intervals to 100mg, 200mg (one hour infusion), and finally 400mg (two hours infusion).
- If urine output remains < 30ml/hour, assume that renal failure is established, and restrict fluids to insensible loss (approximately 1000ml/day) plus urine output.

**Pulmonary edema**

- Pregnant women are particularly prone to pulmonary edema, especially during labor and immediately after delivery.
- Check for increased respiratory rate, chest signs (crackles on auscultation), and hepatomegaly.
- If pulmonary edema is suspected, position the patient upright, give oxygen, stop IV fluids and give furosemide 1mg/kg.
- If pulmonary edema is associated with blood transfusion, give 1mg/kg furosemide IV and restart transfusion at a slower rate.

1. **Infection:**

   Treatment with IV broad-spectrum antibiotics should be given to patients with severe malaria under the following circumstances:

   - **Severely ill or shocked patients:** A recent study showed that 8% of all children (14% of those <12 months of age) admitted to an African district hospital with severe malaria had concurrent bacteraemia. Mortality was increased three-fold among those with bacteraemia. All patients who are shocked, or who remain severely ill following resuscitation, should therefore receive presumptive treatment with broad spectrum IV antibiotics (e.g. ampicillin 50mg/kg 6 hourly plus gentamicin 7.5mg daily, or according to local patterns of antibiotic resistance).

   - **Unconscious patients:** A recent study from an African district hospital showed that 4% of all children (14% in children < 1 year) with impaired consciousness and malaria parasitaemia had evidence of definite bacterial meningitis. If it is not possible to do a lumbar puncture (LP) in an unconscious patient with malaria, or if the cerebrospinal fluid findings are suggestive of meningitis, start presumptive IV treatment for meningitis (e.g. for children: benzyl penicillin 60mg/kg 6 hourly plus chloramphenicol 25mg/kg 6 hourly and for adults: benzyl penicillin 5 million international units (MIU) (600mg is equivalent to 1 MIU) 6 hourly plus 1 gm (1000mg) chloramphenicol 6 hourly as a standard dose). Treatment should be tailored according to local patterns of antibiotic resistance.

   - All patients with clinical evidence of bacterial infection (e.g. pneumonia, dysentery) should receive antibiotic therapy according to local treatment protocols.

2. **Anti malarial drug treatment for severe malaria:** (See Session 8)

   The two options for drug treatment of severe *P. falciparum* malaria are the artemisinin derivative (Artemether) or quinine dihydrochordine. Both options are effective if administered correctly, and the choice between them depends largely on practical considerations.

   Intravenous quinine, for example, should be administered by means of a rate-controlled infusion over a period of 4 hours. Because of the risk of fatal hypotension, it should NEVER be given as a bolus IV injection. In remote rural areas if IV infusion is not possible, IM artemether not available.
before referring patient, use Quinine IM 20 mg/kg diluted in 8ml of normal saline to a concentration of 10ml to giving in 2 divided doses. The dose is divided equally and administered in the 2 anterior thighs (not in the buttocks).

In complex emergency or peripheral health facilities, it may be more practical to use IM artemether, which is given once daily, has minimal side effects, and which clears malaria parasites rapidly. For emergency treatment of severe malaria, or of patients who cannot tolerate oral medication, artemether can be administered intramuscularly prior to transfer to an inpatient facility. Once the patient is able to tolerate oral medication, treatment must be completed with a full course of an effective oral anti malarial drug, since severe malaria will not be cured with a single dose of artemether.
Session 8:

Treatment of severe malaria
SESSION EIGHT: TREATMENT OF SEVERE MALARIA

SESSION OBJECTIVES

*The primary goal in administering treatment is to be able to:*

- List and describe in detail the antimalarial drugs which are used in Liberia
- Explain the side – effects of anti-malaria therapies to patients
- Clearly describe how to provide quality care to patients in order to enhance compliance of prescribed antimalarial.

A presentation will be made on the treatment of severe malaria by the facilitator. Before this discussion, participants will be required to answer the following questions.

Which drugs have you been using to treat severe malaria?

Brain Storming Questions:

What is your experience of using quinine?

What is your experience of using IM Artemether?

What is your experience of using IV/IM Artesunate injection?
ANTIMALARIAL DRUG TREATMENT OF SEVERE MALARIA

OPTION 1: Quinine dihydrochloride IV

Loading dose: 20mg/kg
- Omit the loading dose of quinine if the patient has had quinine in the previous 2 days.
- The loading dose should be administered as an infusion over 4 hours (see below)

Maintenance dose: 10mg/kg administer 8 hours after the loading dose.
- The maintenance dose should be administered as an infusion over 4 hours (see below)
- If IV therapy is still required after 48 hours, the maintenance dose should be reduced to 7mg/kg, to avoid the risk of quinine accumulation.
- A minimum of 3 doses of IV quinine should be given before changing to oral treatment continue with oral quinine for 6 days or ACT fixed dose for 3 days see chart on page 44

Volume of infusion
- Quinine can be diluted in 5% dextrose, 10% dextrose, 4% dextrose 0.18% saline, or normal saline
- Dilute quinine to a total volume of 10 to 15ml/kg for children (the same volume is used for both loading and maintenance doses) and infuse over 4 hours
- For adults the maximum volume of infusion fluid is about 500ml of D5W
- To avoid overloading the patient with IV fluids, the volume of the quinine infusion MUST be taken into account when calculating the total 24-hour fluid requirement (see Maintenance fluid requirements, page X). Example: the 24 hour fluid requirement for an adult weighing 50kg is 50ml/kg/day, i.e. 50 x 50 = 2500ml. BUT, the patient will receive 3 x 500ml infusions of quinine each day = 1500ml. Therefore, the patient needs an additional 1000ml of maintenance fluid to bring the 24-hour total to 2500ml.
- IV quinine can cause hypoglycemia, and blood glucose should therefore be monitored every 4 hours
- To correct hypoglycemia cause by quinine, glucose 50% should be given prior to starting quinine infusion.

NB. NEVER GIVE QUININE IV BOLUS

Changing to oral treatment after IV quinine protocol
- Once the patient is able to tolerate oral medication, treatment should be completed with oral quinine 10mg salt/kg by mouth every 8 hours or 15mg/kg every 12 hours to complete 7 days of treatment of ACT fixed dose see page 44 for chart
ANTIMALARIAL DRUG TREATMENT OF SEVERE MALARIA

OPTION 2: Artemisinin derivatives IM Artemether

**Loading dose:** 3.2mg/kg
- Give IM Artemether as a single dose on Day 1.

**Maintenance dose:** 1.6mg/kg
- Give once a day starting on Day 2 and continue on Day 3
- Treatment should be completed with ACT fixed dose (for 3 days) to complete 6 days of treatment.
- A minimum of 3 doses of IM Artemether should be given before changing to oral treatment
- Continue until the patient is able to tolerate oral medication. If the patient cannot tolerate oral treatment continue up to maximum of 7 days.

Note: IM Artemether should not be given to:
- patients in shock and coma (absorption is not reliable),
- Children under 5 kg and pregnant women in the 1st trimester.

OPTION 3: Artesunate 60mg/ml IM/IV is also recommended in the second and third trimesters of pregnancy. Artesunate 60mg/ml IM/IV is given at 2.4mg/kg loading dose, then 1.2mg/kg after 12 hours. Follow by 1.2mg/kg every 12 hours until the patient can tolerate oral medication.

Note: IM/IV Artesunate can be given maximum 7 days, if patient does not tolerate oral medication in 3 days. However, if patient tolerates oral medication
**Resuscitation:** Prompt resuscitation of patients with severe malaria saves lives.

- Clear the airway and check that the patient is breathing.
- Establish intravenous (IV) access.
- Treat convulsions lasting 5 minutes or more.
- Take blood for: malaria parasites (microscopy or RDT), blood glucose and hemoglobin (Hb). Urea and electrolytes, blood gas and blood culture are also extremely useful, but are unlikely to be feasible in most complex emergency situations.
- Treat hypoglycemia (blood glucose <40 mg/dl)
- Rapidly assess circulation, hydration and nutritional status, and resuscitate as necessary with normal saline (0.9%) or Ringers lactate (see below).
- If Hb < 5g/dl and patient has respiratory distress, transfuse blood (see below)
- For unconscious patients, insert a nasogastric tube and aspirate stomach contents to prevent aspiration pneumonia, place the patient in the recovery position, and perform a lumbar puncture to exclude meningitis.
- Start anti malarial drug treatment (see below).
- Start antibiotic therapy

*(Ref: WHO. Severe and complicated malaria, 2000)*

For more information, refer to session 6 (Assessment of severe malaria)

**Drug calculation for Complicated/ Severe malaria**

**QUININE IV**

If a child weights 12.5kg has severe malaria, Calculate the quinine treatment for the child.

1. **Loading Dose:** 20mg/kg
2. **Maintenance Dose x2:** 10mg/kg

**Loading Dose**

\[
\text{20mg/kg x 12.5kg = 250mg} \\
\text{DO/DH= 250mg/ 600mg x2ml} \\
\text{500mg/ 600mg = 0.8ml 1}^{\text{st}} \text{ drip}
\]

**Maintenance Dose:**

\[
\text{12.5kg x 10mg/kg = 125mg} \\
\text{DO/ DH = 125mg/ 600mg x 2 =250mg} \\
\text{250mg/ 600mg =0.4ml 2}^{\text{nd}} \text{ drip and 3}^{\text{rd}} \text{ drip} \\
\text{OR:} \\
\text{0.8ml/2 =0.4ml (to find the maintenance dose)}
\]

**RX:** Loading dose: 0.8ml 1\textsuperscript{st} drip

Maintenance dose: 0.4ml 2\textsuperscript{nd} drip and 3\textsuperscript{rd} drip
FLUID REQUIREMENT

Dose: 10ml/kg _15ml/kg for children
Adult: 500ml D5W
A child weighs 12.5kg
12.5kg x 15ml/kg = 187.5ml = 200ml (round up to 200ml)

Calculate the fluid drop / minute:

**Formula: Drop/ Time x Volume**
20gtt/ 60min. x volume (1/3 x V/ T)
20gtt/ 240min (4x 60) X 200ml = 16.6 = 17 gtt/ min.

**OR**

**Drop per minute = drop factor (20gtt/ml) x volume**

- Time in minutes
  - 20gtt/ml x 200ml
  - 4hrx60 minutes
  - 4000gtt
  - 240 minutes
  - 16.67 gtt/minute = 17gtt/minutes

RX: D5W 200ml with 0.8ml quinine added = 1st dose
D5W 200ml with 0.4ml quinine added = 2nd dose
D5W 200ml with 0.4ml quinine added = 3rd dose

Then continue with quinine PO.

12.5mg /kg x 30mg /kg x 7 days = 2,625 mg **Total dose.**

The amount of quinine IV given is then subtracted from the total dose.

Example:

1st dose: 250 mg
2nd dose: 125 mg
3rd dose: 125 mg

Total doses = 2,625mg – 500mg
DO/DH = 2,125mg/ 300mg x 1 tablet = 7 tablets
= 7/6 =1.16 =1 tablet/ day
RX: Quinine (300mg) ½ tablet PO bid x 6 days or ACT fixed dose refer to treatment chart on page 42 & 46

IM/IV Artesunate injection 60mg/ml
Loading dose = 2.4mg/kg, then 1.2mg/kg after 12 hours day one;
Maintenance dose = 1.2mg/kg after every 12 hours x 2 days.
Example: Hawah weighs 12.5kg and has severe malaria. Calculate the require IV/IM Artesunate she needs.

12.5kg x 2.4mg/kg = 30mg/60mg/ml
= 0.5 ml
Note: if administration is through IM, dilute 0.5 ml in 2.5 ml distilled water and if IV, dilute 0.5 ml in 5 ml distilled water. Continue with maintenance dose of 1.2mg/kg every 12 hours for two days
before changing to oral medication (FDC). If patient is unable to tolerate oral treatment, continue for a maximum of 7 days.

**IM ARTEMETHER**

Loading Dose: **3.2mg/kg**  
Maintenance Dose: **1.6mg/kg**

Calculate Artemether IM for a patient who weighs 16kg.

**Loading dose:** 16kg x 3.2mg/kg = 51.2mg  
DO/DH = 51.2mg / 20mg x 1ml = 2.5ml

**Maintenance dose:** 1.6mg/kg x 16mg = 25.6mg  
DO/DH = 25.6mg / 20mg x 1ml = 1.3ml  
OR 2.5ml / 2 = 1.28 or 1.3ml

RX: Artemether IM 2.5ml (20mg/ml)  
1st day  
Artemether IM 1.3ml (20mg/ml) 2nd day  
Artemether IM 1.3ml (20mg/ml) 3rd day

Continue with ACT fixed dose refer to chart on page 42 & 46

**DIAZEPAM (IV)**

Dose: IV = 0.3mg/kg  
Rectal = 0.5mg/kg

Calculate diazepam IV and Rectal for a child weighing 3.5kg.  
3.5kg x 0.3mg/kg = 1.05mg  
DO/DH = 1.05mg / 10mg x 2ml = 0.21ml = 0.2ml

**Diazepam Rectal**

3.5kg x 0.5mg/kg = 1.75mg  
DO/DH = 1.75mg / 10mg x 2ml = 0.35ml = 0.4ml rectally

Note: **Dose of Diazepam should be limited to maximum of 2 doses in 24 hours, except where there is a good sex up for monitoring and managing respiratory collapse.**

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**Anti malarial Treatment dosages:**
**ACT fixed dose combination:** 3 days
- **ARTESUNATE:** 4 mg/kg (tabs of 25, 50 or 100 mg)
- **AMODIAQUINE:** 10 mg/kg (tabs of 67.5, 135 or 270 mg)

**QUININE PO:** 30 mg/kg divided in 2 or 3 divided doses (tabs of 200 to 300 mg) for 7 days

**QUININE IV:**
- Loading dose\(^{12}\): 20 mg/kg for 4 hr
- Maintenance dose: 10 mg/kg over 4 hrs given every 8 hrs or 15 mg/kg over 4 hrs every 12 hrs.

**ARTEMETHER IM:** 3 days
- Loading dose: 3.2 mg/kg – Day 1
- Maintenance dose: 1.6 mg/kg – Day 2&3

**IM/IV Artesunate injection 60mg/ml**
Loading dose = 2.4 mg/kg, then 1.2 mg/kg after 12 hours day one; Maintenance dose = 1.2 mg/kg after every 12 hours x 2 days.

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**Session 9:**

**Malaria during Pregnancy**

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\(^{12}\) For non immune people, and for people without quinine taken history
SESSION NINE: MALARIA DURING PREGNANCY

SESSION OBJECTIVES

At the end of the session the participants should be able to:

- Identify danger signs of malaria in pregnancy and take appropriate actions
- Explain treatment for malaria in pregnancy
- Explain prevention of malaria during pregnancy
- Identify and explain contraindications for certain treatments in pregnancy
- Explain the national malaria policy for Intermittent Preventive Treatment (IPT) of malaria in pregnancy

In this session the treatment of malaria in pregnancy is dealt with through a presentation by the facilitator. As pregnant women are at high risk of suffering severely from malaria, this session is an important one. A presentation will be given on the policy of providing Intermittent Preventive Treatment (IPT) to pregnant women. Throughout the presentation participants will be asked some of the following questions, which will be discussed in group forum.

*Why are pregnant women especially at high risk if they get P. falciparum malaria?*

*How should pregnant women be diagnosed with malaria?*

*What are the most common complications of severe malaria in pregnancy?*

*What is Intermittent Preventive Treatment (IPT)?*

*Is Sulfadoxine Pyrimethamine (SP) or Fansidar safe to give as IPT to pregnant women?*

*When should IPT be given to pregnant women?*

*How can you incorporate and monitor the policy into the Antenatal Clinics (ANC) or normal clinic activities?*
INTRODUCTION:

Malaria during pregnancy is a major public health problem in tropical and sub tropical regions throughout the world. In most endemic areas in Africa, like Liberia, pregnant women are the main adult risk group for malaria. The main burden of malaria infection during pregnancy results from *Plasmodium falciparum* infection.

The symptoms and complications of malaria during pregnancy differ with the intensity of malaria transmission thus, with the level of immunity acquired by the pregnant woman.

WHO RECOMMENDATIONS: Recommended interventions for malaria prevention and control during pregnancy can be found in the box below. Policies for malaria prevention and control during pregnancy in areas of stable (high) malaria transmission should emphasize a package of Intermittent Preventive Treatment (IPT) and use of Insecticide Treated Nets (ITNs) and ensure effective case management of illness and anemia.

### Intermittent preventive treatment (IPT):

All pregnant women in areas of stable (high) malaria transmission areas should receive at least 2 doses of IPT after quickening (beginning of 2nd trimester), with the first movement of the fetus (WHO, 2004). WHO recommends a schedule of 4 antenatal clinic visits, with three visits after quickening will ensure that a high proportion of women receive at least 2 doses. Doses should be given at least 4 weeks apart.

Currently, the recommended drug for IPT is Sulfadoxine-Pyrimethamine, because it is safe for use during pregnancy, effective in women of reproductive age and can be delivered as a single dose under observation by a health worker.

**Current scientific evidence suggests:**

- **At least 2 doses are required to achieve optimal benefit in most women.**
- **One study of IPT in HIV-infected pregnant women showed that monthly dosing (most women received 3-4 doses) was necessary to achieve optimal benefits.**
- **In settings with HIV prevalence among pregnant women greater than 10%, it is more cost effective to treat all women with a 3-dose regimen rather than to screen for HIV and provide the regimen only to HIV-infected women.**

There is no evidence that a 3rd dose carries any additional benefits, that more than 3 doses during pregnancy offers additional benefit or that receiving 3 or more doses of SP increases the risk for adverse drug reactions. Research to assess the safety, efficacy and programme feasibility of other antimalarials in IPT is under way.

### Insecticide-treated nets (ITNs):

Insecticide-treated nets should be provided as early in pregnancy as possible to all pregnant women living in malaria endemic areas, including epidemic and disaster situations, according to the perceived need in the locality. Their use should be encouraged for women throughout pregnancy and post partum. Nets can be provided in the antenatal clinic or through other sources in the private and public sectors.

### Effective case management of malaria illness and anemia:

Effective case management of illness for all pregnant women in malaria endemic areas must
be ensured. Iron supplementation for the prevention and treatment of anemia should be given to pregnant women as part of routine antenatal care. Pregnant women should also be screened for anemia, and those with anemia should be managed according to national reproductive health guidelines.
NATIONAL STRATEGY:

The general Objective of the strategy is to contribute to the reduction of malaria related maternal and perinatal morbidity and mortality.

The specific Objective are:

- To reduce malaria episodes among pregnant women attending ANC services
- To contribute to the reduction of maternal anemia amongst pregnant women attending ANC services
- To contribute to the reduction of low birth weight amongst pregnant women attending ANC

The components of the strategy are:

- To integrate IPT with the following package of interventions within the Safe Motherhood program
  - Iron and folic acid supplementation
  - De-worming
  - Effective Case Management
  - ITN distribution
- To increase awareness at all levels about integrated strategies for control and prevention of malaria during pregnancy
- To ensure that all health facilities/staff in the country are fully equipped to provide IPT with SP according to national guidelines.
- To assess regularly the efficacy of the drugs used for IPT.
- To assess regularly the effectiveness of IPT including monitoring side effects.

- To promote the other ways of malaria prevention:
  - Screen doors and windows with wire or nylon mesh/nets to prevent mosquitoes from entering the house.
  - Avoid going outside after dark or when out in the evening:
    - Wear protective clothing that covers the arms and legs.
    - Apply chemical mosquito repellent cream on exposed skin surfaces.
  - Use mosquito coils that release smoke (particularly when sitting outdoors) the smoke keeps mosquito away or kills them when they fly through it (might not be too effective).
  - Spray rooms with insecticide before going to bed every evening. Because the sprays are only effective for a few hours, this method should be used in combination with other measures such as screening doors and windows.
  - Manage the environment by ensuring that breeding sites of the anopheles mosquito are eliminated or reduced.

CONSEQUENCES OF MALARIA DURING PREGNANCY:

Millions of pregnancies occur among women living in malaria endemic regions of Africa, yet only a fraction of these women have access to effective interventions. In Africa, anemia caused by malaria is estimated to cause up to 10,000 maternal deaths per year.

Semi-immune pregnant women
Most of the pregnant women in Liberia have some form of immunity to malaria parasites as the country has high malaria endemicity, with malaria transmission taking place all year round. However, Pregnancy reduces the degree of partial immunity to *P. falciparum* that most women from moderate to high transmission settings will have acquired through childhood and adult life, and those in their first and second pregnancies are at increased risk of malaria infection.

Malaria in semi-immune pregnant women is **frequently asymptomatic** (with the exception of anemia), with no fever and few or no parasites in the peripheral blood. In many such cases, however, the placenta may be heavily infected, despite the absence of fever.

**Effect of malaria on the mother:**

The main maternal effect of malaria infection during pregnancy is **anemia**, which is often severe and may be life threatening when not recognized and treated effectively.

To minimize the dangerous effects of malaria in pregnancy, intervention should focus on the prevention of malaria infection, early case detection, and the administration of prompt, effective and safe treatment for all pregnant women with clinically suspected malaria, or with a positive RDT.

When the parasites get into the placenta, they can interfere with the transfer of oxygen and nutrients from the mother to the unborn baby. When this happens to the mother, it increases her risk of:

- Maternal anemia
- Spontaneous abortion/ pre-term birth
- Complicated/ severe malaria
- Placental infection
- Hypoglycemia

Pregnant women are at a higher risk of malaria infection if they are:

- In their first or second pregnancy
- Adolescents
- Immigrants/ visitors from areas of low malaria transmission
- Infected with HIV/AIDS
- Sickle cell clients

**Effect of malaria on the fetus**

Malaria parasites affect the placenta leading to:

- Fetal anemia
- Prematurity
- Low birth weight
- Still birth, Intra uterine fetal death
- Congenital malaria (rare)
Studies have shown that HIV/AIDS infection during pregnancy:

- Reduces a woman’s resistance to malaria
- Decreases the effects of anti malaria treatment.
- Increases risk of malaria-related problems during pregnancy
- Increases risk of intrauterine growth retardation, leading to low birth weight
- Increases the risk of maternal anemia

An HIV infected woman can transmit the virus to the baby during pregnancy, childbirth, or through breastfeeding. Malaria infection can increase the risk of transmission of HIV from the mother to the baby. Newborns infected with HIV have a lower resistance to malaria.

**ANTENATAL CARE**

**Goals**

The major goal of focused antenatal care is to help women maintain normal pregnancies through:

- Identification of pre-existing health conditions
- Early detection of complications arising during the pregnancy
- Health promotion and disease prevention
- Appropriate planning for delivery

**Methods:**

- **Emphasizes quality of visits over quantity of visits** and recognizes that frequent visits do not necessarily improve pregnancy outcomes
- **Realizes that the previous concept of dividing pregnancies into “high risk” and “low risk” does not hold** because every pregnant woman is at risk of complications and should, therefore, receive the basic care—including monitoring of complications.
- **Relies on evidence—based, goal—directed** interventions that are appropriate to the gestational age of the pregnancy, and specifically address the most prevalent health issues affecting women and newborns. In areas with a high prevalence of malaria, such interventions include the detection, prevention, and treatment of malaria and its complications.
- **Emphasis that care is given by skilled healthcare providers:** midwives, doctors or other qualified health care providers who have the knowledge, skills, and attitudes required to work effectively towards accomplishing the goals of ANC, as described below.

**INTERMITTENT PREVENTIVE TREATMENT:**
IPT is important because many pregnant women are asymptomatic. Sulfadoxine-Pyrimethamine (SP) is the drug of choice in Liberia because of its:

a) **Effectiveness:** SP is the single-dose antimalarial with the best overall effectiveness for prevention of malaria in pregnancy in some areas of Africa with stable transmission of *P. falciparum* malaria as in Liberia

b) **Safety:** No significant side effects reported when appropriately used

c) **Acceptance:** Demonstrated a high level of acceptance by pregnant women

d) **Program feasibility:** Good program feasibility can be delivered as a single dose treatment under observation by the health worker thereby minimizing complications

e) **Low resistance:** To date there is limited data on the resistance to SP in Liberia. One study in the South East of the country has shown some resistance.

**Dosage:**

<table>
<thead>
<tr>
<th>3 tablets of Sulfadoxine 500mg+pyrimethamine 25 mg (Fansidar®) once in second trimester</th>
<th>Swallowed in front of the health worker</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AND</strong></td>
<td></td>
</tr>
<tr>
<td>3 tablets of sulfadoxine 500mg+pyrimethamine 25 mg (Fansidar®) once in third trimester</td>
<td>Swallowed in front of the health worker</td>
</tr>
</tbody>
</table>

**Caution:**

- **Do not** give SP to women who have a history of allergy to sulpha drugs; if an allergic reaction is suspected after the first IPT dose, no further doses should be given.

- **Do not** give SP if the woman has had a dose of SP in the previous 4 weeks.

- SP should only be given to pregnant women who swallow the drug in the presence of the health worker

- Women should be given clear instructions when to return for the next dose of SP for IPT.

- Women should be instructed that they may still get clinical malaria and that if they develop a fever, anaemia or fatigue they should immediately return to the clinic for follow up.

**TREATMENT OF MALARIA DURING PREGNANCY**

**Treatment of uncomplicated *P. falciparum* malaria:**

All pregnant women with symptomatic malaria should receive urgent treatment with effective antimalarial drugs. **Oral quinine** is recommended in the national malaria policy as first line treatment of uncomplicated malaria in pregnancy. Artesunate and Amodiaquine fixed dose are safe in the second and third trimesters of pregnancy if there is no quinine available.

**Treatment of severe malaria in pregnant women**
Pregnant women with severe malaria should receive the highest level of inpatient medical care possible because of the high risk of maternal and perinatal mortality. Hypoglycemia, acute pulmonary edema, hyperpyrexia, post-partum hemorrhage, premature delivery, and perinatal death are particular risks.

Severe malaria in pregnant women should be treated with IV quinine. IV quinine is safe in all three trimesters of pregnancy but may induce hypoglycemia (it should be administered with caution).

**Presentation and treatment of complications**

1. **Hypoglycemia:**

   Hypoglycemia is a significant risk for all pregnant women with malaria. It may occur during the clinical course of uncomplicated malaria, may be asymptomatic, or may present with sweating, confusion, agitated behavior, drowsiness, convulsions, or loss of consciousness. Women in the second and third trimester of pregnancy who are undergoing treatment with IV quinine are at particularly high risk, and this risk persists for several days post-partum.

   Some suggestions to reduce or treat hypoglycemia are:
   - Recommend that the woman eats before taking medications (PO)
   - Let the woman know the signs and symptoms of hypoglycemia
   - Encourage patient to take in sugar water or eat sugar cane.
   - When giving IV Quinine, give dextrose 50% (dose: 1ml/kg IV) in children or 20 to 50ml for adults

2. **Severe anemia:**

   Severe anemia is also a significant risk for all pregnant women with malaria. Severe anemia is the main maternal effect of malaria infection during pregnancy and may be life threatening when not recognized and treated effectively.

   Some suggestions to reduce or treat incidences of severe anemia among pregnant women in malaria endemic regions are:
   - Intermittent Preventive treatment
   - Iron supplementation
   - Use of ITNs
   - Transfuse packed cells when Hb is less than 5 g/dl
## Anti malaria treatment during pregnancy

<table>
<thead>
<tr>
<th></th>
<th>1&lt;sup&gt;st&lt;/sup&gt; Trimester</th>
<th>2&lt;sup&gt;nd&lt;/sup&gt; Trimester</th>
<th>3&lt;sup&gt;rd&lt;/sup&gt; Trimester</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intermittent Preventive Treatment (IPT)</strong></td>
<td>NO</td>
<td>3 tabs of SP- Fansidar (Sulfadoxine 500 mg + Pyrimethamine 25mg= Fansidar) Swallowed in front of the health worker</td>
<td>3 tabs of SP- Fansidar (Sulfadoxine 500 mg + Pyrimethamine 25mg= Fansidar) Swallowed in front of the health worker</td>
</tr>
<tr>
<td><strong>Uncomplicated malaria Treatment</strong></td>
<td>Quinine PO tabs of 300mg 30mg/kg/day for 7 days (BID)</td>
<td>Quinine PO tabs of 300mg 30mg/kg/day for 7 days (BID/TID)</td>
<td>Or if there is NO quinine PO: ACT fixed dose for 3 days Artesunate 4mg/kg Amodiaquine 10mg/kg</td>
</tr>
<tr>
<td><strong>Severe malaria Treatment</strong></td>
<td>Quinine IV for 24h • Loading dose: 20mg/kg for day 1 • Maintenance dose: 10mg/kg for days 2 and 3 THEN • Quinine PO tabs of 300mg 30mg/kg/day for 6 days or ACT fixed dose see chart on page 44</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>IM Artemether/Artesunate</strong></td>
<td>Contraindicated In the first trimester of pregnancy</td>
<td>Safe in Second and third trimesters of pregnancy</td>
<td></td>
</tr>
</tbody>
</table>
CONTRAINDICATIONS OF ANTIMALARIAL DRUGS DURING PREGNANCY

<table>
<thead>
<tr>
<th>Drug</th>
<th>Contraindication</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP</td>
<td>(Sulfadoxine Pyrimethamine) is contraindicated during the 1st trimester of pregnancy</td>
</tr>
<tr>
<td>Concomitant administration of Folic-Acid/Fefa and SP is contraindicated in pregnancy</td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>is contraindicated during the 1st trimester of pregnancy</td>
</tr>
<tr>
<td>IM Artemether</td>
<td>is contraindicated during the first trimester of pregnancy</td>
</tr>
<tr>
<td>Artesunate injection (IV/IM)</td>
<td>is contraindicated during the first trimester of pregnancy</td>
</tr>
</tbody>
</table>

Group activities:
- Divide participants into two or more groups
- Give them 20 to 30 minutes to answer the following questions
- When participants have completed, each group will make a five minutes presentation followed by discussion.

IPT CASE SCENARIOS

**Case Scenario one**
Ms. Famatta, a 32yrs. old Liberian housewife, married with 3 children is five months pregnant. She lives in Medina Town, Grand cape Mount County, in the Republic of Liberia. A few days ago
her mother and other relatives observed that since she got pregnant she has not attended antenatal clinic, so they began urging her to attend the clinic. On Wednesday, she reluctantly attended the antenatal clinic where she met the midwife (Ma Jebbeh). At the clinic, she complains of no sign or symptom of malaria but alleged slight lower abdominal pain and vaginal discharge. What should Ma Jebbeh do for Famatta?

**Case Scenario Two**

Two months ago Mondamai, a 22 years old Bassa, Liberian girl missed her period. She came to the clinic with complaints of headache, body pain and fever x 2 days. RDT was quickly performed by the P.A., Mr. Tamba and the result was positive. Clinical assessment revealed that she was ten weeks pregnant. Mr. Tamba was troubled with making a decision on the services and treatment to be provided. What advice would you give him?

**Case Scenario three**

Mrs. Patricia Benson, a 42 yrs. old female came to the antenatal clinic for routine health check-up. Assessment revealed that her expected time of delivery was one week away. Her MCH record shows that she received her first IPT dose 2 months ago. What services would you suggest to be offered to Mrs. Benson?
Session 10:

Pharmacovigilance
SESSION TEN: PHARMICOVIGILANCE (ADVERSE EFFECTS)

SESSION OBJECTIVES

At the end of the session the participants will be able to:

- Define a basic pharmacovigilance system
- Understand the importance of Pharmacovigilance system
- Understand the objectives of a basic pharmacovigilance system
- Fill in a Suspected Adverse Event Form

INTRODUCTION

The artemisinin derivatives have been shown to be highly effective in the treatment of uncomplicated and severe malarial disease in countries of South East Asia, and under trial conditions in other malaria endemic countries of the world. Monitoring systems in these countries have identified very few suspected adverse events (SAE) associated with the use of these drugs. Because of their higher therapeutic efficacy and potential to reduce the development of antimalarial drug resistance, the artemisinin derivatives have now been recommended for use in combination with other effective antimalarial drugs, in a broader range of epidemiological settings, including countries of Sub-Saharan Africa.

The choice of drug combinations is a national drug policy decision, and a number of different combinations may be chosen. Amongst these are artemether/lumefantrine (Coartem), Artesunate plus Amodiaquine (AS+AQ) and Artesunate-plus Sulfadoxine-Pyrimethamine (AS+SP). The therapeutic profile of Artemisinin-based Combination Therapies (ACT) appears to be good under well-conducted clinical studies in both South East Asia and some countries in Africa.

The introduction of the artemisinin derivatives as combination therapy (ACT-Fixed Dose) thus, offers a number of challenges to health services in resource-poor countries. Healthcare personnel will be required to ensure correct prescription through training, effective distribution channels and the fostering of compliance by patients. Systems to promote this are in place, but may require strengthening. Appropriate pharmacovigilance system to monitor the potential occurrence of unexpected adverse reactions are not in situ in many countries using these drugs as 1st line or 2nd line antimalarial treatment.

Through the Roll Back Malaria Program, supported by the World Health Organization (WHO) and partners, the following protocol has been designed and adapted by the National Malaria Control Program to assist public and private health services in resource-poor countries to support countries in establishing a pharmacovigilance (PV) system. While the basis for instigating a pharmacovigilance system relates to the introduction of new antimalarial drug combinations, it is recognized that safety monitoring of all drugs is a necessity for public health. Thus, the proposed generic system aims to capture suspected adverse events associated with all drugs and it is not specific to antimalarial drugs. Coordination with various disease control programs at national level will be required for the establishment of the Expert Safety Review Panel to interpret safety issues associated with drugs.
OBJECTIVES

The objectives of the pharmacovigilance system are to:

- Detect and report suspected adverse drug reactions following the introduction of new drug(s)

- Assess suspected adverse reaction so as to evaluate causality, clinical relevance, frequency and distribution in particular population groups.

- Communicate and recommend relevant actions to authorities and the public regarding such adverse effects

- Provide health education and training to health care providers about suspected adverse effects in order to improve patient’s compliance and to respond appropriately to any adverse effects.

DEFINITION: Pharmacovigilance is a system of monitoring and evaluating suspected adverse effect(s) of a particular pharmaceutical product.

THE PHARMACOVIGILANCE SYSTEM

[Diagram showing the flow of communication between the Pharmaceutical Board, National Experts Safety Review Panel, Ministry of Health / Social Welfare, Central level, County Investigation Team, and County level.]
OBJECTIVE 1:

- To detect and report suspected adverse drug reactions following the introduction of new drug(s)

The working definition of a SAE, is any reaction leading to death, or which is life threatening, results in a congenital abnormality, requires or prolongs patient hospitalization or permanent disability or damage, following administration of a drug. A reportable suspected adverse event requires, according to WHO criteria for reporting, at a minimum, four items of information:

- An identifiable source of information or reporter
- An identifiable patient
- Suspected product(s)
- Suspected reaction(s)

Detection and reporting of a SAE will occur through the health facilities. Health facility staff at dispensaries, health centers and outpatient departments of clinics will detect and report SAE. SAE detection and reporting will also occur both at tertiary care facilities and antenatal and delivery clinics (where congenital abnormalities associated with the use of antimalarial drugs will be documented). Thus, any report of a patient experiencing a SAE will be eligible if the reporting health professional can verify that the patient took a drug, the drug can be identified, the SAE occurred only after administration of the drug, and if she or he believes that the SAE was associated with the treatment received. A standard report form will be completed for each suspected adverse drug reaction, called SAE Report Form. The County Investigation Team (CIT) will ensure the supply and distribution of SAE Report Forms, through the Essential Drug Program’s (EDP) regular drug supply. The CIT will also review and complete the SAE Report Form, and complete a CIT Report. A checklist has been drafted to assist the CIT in conducting their investigation to ensure completeness of the investigation, to validate the SAE, and to determine drug causality. This report would be forwarded to the national pharmacovigilance coordinator.

OBJECTIVE 2:

To assess suspected adverse reaction so as to evaluate causality, clinical relevance, frequency and distribution in particular population groups.

All SAE Report Forms validated by the CIT and forwarded by the National Coordinator will be reviewed by the NESRP. The NESRP then conducts causality assessments. The National Expert Safety Review Panel (NESRP) plays a critical role in confirming the causality assessments made by the CIT, and in determining causality when not established with confidence by the CIT. The investigation needs to include an assessment on the cause of the suspected adverse drug reaction. Any additional investigations required by the panel or decisions made are then communicated to the CIT by the National Coordinator.
OBJECTIVE 3:

To communicate and recommend relevant actions to authorities and the public regarding such adverse effects

Once the investigation, assessments and decisions are made, the NESRP through the NMCP must ensure that the public is well informed. The communication should include preparation on how to deal with public concern on drug safety, to minimize the potential harm and to maintain public trust in the medicines being used.

When communicating with the media, the following information should be available:

- A complete account of the event framed in their appropriate context, (i.e. that it is an isolated occurrence) to prevent concern that it is widespread
- Whether the event is ongoing or not (it is unlikely that there will be new cases linked to drug therapy)
- An outline of actions taken or planned
- The cause of the event
- The corrective action that has been or will be taken
- Guidance to the public on how to respond to such concerns
- Follow-up of communication events
- Assessment of effect or impact

OBJECTIVE 4:

To provide health education and training to health care providers about suspected adverse effects in order to improve patient’s compliance and to respond appropriately to any adverse effects.

International support will be required from a number of organizations such as Uppsala Monitoring Centre of the WHO, which collects international Adverse Drug Reaction (ADR) reports, provides methodological support, analyses rates and risk-benefit profiles. Also, the WHO Essential Drugs and Medicines & Malaria Control Department, supports international expert panels to review periodically the safety profile of antimalarial drugs and provide technical guidance and possibly training support to national essential drug program and malaria control programs.

Adapted from “Pharmacovigilance of Artemisinin-based Combination Therapies”, World Health Organization
### Patient Information

- **Name**: ___________________________
- **Age**: ______
- **Date of Birth**: (M/D/Y) ___/___/___
- **Sex**: M/F
- **Address**: ____________________________________________
- **Patient Record Number**: ___________________
- **Is the patient Pregnant?**: Yes No Not sure
  - If Yes: **Date of Last Menstrual Period**: (M/D/Y) ___/___/___
- **Weight**: ______ kg
- **Height**: ______ m

### Comments
(E.G. include relevant medical history, drug allergies, previous exposure to similar drugs, other lab data, etc.)

### Adverse Events

<table>
<thead>
<tr>
<th>Death</th>
<th>Life threatening</th>
<th>Hospitalization</th>
<th>Permanent Disability</th>
<th>Congenital Anomaly</th>
<th>Other: (Specify)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATE OF ONSET (M/D/Y): <em><strong>/</strong></em>/___</td>
<td>DATE REPORTED AT FACILITY (M/D/Y): <em><strong>/</strong></em>/___</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Describe the adverse event in detail** (Include all relevant laboratory results), attach additional information if necessary.

**Describe how the reaction was treated**: (Attach additional information if necessary)
**Outcome of reaction** (Cross those that apply): ❌️ Date of Recovery
(M/D/Y): …/…/….

- Recovered completely ❌️ Not yet recovered
- Recovered with long term consequences ❌️ Other (specify):

**MEDICINES** (List the medicine suspected of causing the reaction as well as all concomitant medicine)

<table>
<thead>
<tr>
<th>Brand name</th>
<th>Batch No.</th>
<th>Daily Dosage</th>
<th>Route</th>
<th>Date Started (m/d/y)</th>
<th>Date Stopped (m/d/y)</th>
<th>Reason for use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

**REPORTING DOCTOR/PHARMACIST/REPORTING HEALTH WORKER**

NAME: ____________________________________________

"""""""" QUALIFICATIONS: ____________________________

ADDRESS: ____________________________________________ TEL: ____________________________

__________________________________________ Date: ________________

SIGNATURE: ____________________________

Health Facility Reporting/County: ____________________________

**QUESTIONS ON PHARMACOVIGILANCE:**

1. **What is Pharmacovigilance?**

   **Answer:**
   Pharmacovigilance is a system of monitoring and evaluating suspected adverse effect(s) of a particular pharmaceutical product.

2. **Give 2 objectives of a basic pharmacovigilance system.**

   **Answers:**
   - Detect and report suspected adverse drug reactions following the introduction of new drug(s)
   - Assess suspected adverse reaction so as to evaluate causality, clinical relevance, frequency and distribution in particular population groups.

3. **What is a suspected adverse drug event/effect?**

   **Answers:**
The working definition of a SAE, is any reaction leading to death, or which is life threatening, results in a congenital abnormality, requires or prolongs patient hospitalization or permanent disability or damage, following administration of a drug.

Session 11:

Case Scenarios
SESSION ELEVEN: CASE SCENARIOS

Objectives of case scenarios - To allow participants to:

- Demonstrate knowledge on the clinical assessment of malaria
- Assess and identify differential diagnosis for febrile illnesses
- Outline and explain the disadvantages of using the clinical diagnosis alone.
- Identify tools to conduct a clinical assessment in a systematic way
- Understand and practice the treatment protocol for uncomplicated malaria.

Group activities:

- Divide participants into two or more groups
- Give them 20 to 30 minutes to answer the following questions
- When participants have completed, each group will make a five minutes presentation followed by discussion.

Case Scenario 1: Situation background

You are in Nimba County where people are returning from other parts of the country to be relocated in the nearby district headquarter. Twenty thousand people, in search for shelters have to live under plastic sheeting in the area because most of their houses were damaged.

It is the end of the rainy season. In certain areas you can hardly walk between shelters. People have started to dig drainage trenches to evacuate stagnant water around their shelter, but these efforts are not very effective. Sanitation is poor within the camp, with very few available latrines – most of which are not used because of poor maintenance, and the population prefers to go to the bush.

There is a temporary health post which is run by the county to care for the affected population. The daily number of consultations is high, at around 150 to 200 per day. You have very limited capacity for laboratory diagnosis.

Data from previous years show that malaria transmission increases one month after the rainy season. *P. falciparum* is predominant, accounting for 95% of the total malaria cases screened during consultation. *P. falciparum* is chloroquine-resistant in the area, and the therapeutic efficacy of SP for *P. falciparum* is between 60% and 75%.

Part 1
Saye is a five-month old boy. His mother brought him to the clinic because he feels hot and has had a cough for three days. There has been no difficulty in breast-feeding. He has not vomited or had convulsions, nor has he been unconscious or lethargic.

1. What would you ask Saye’s mother in your clinical assessment? Explain why?

2. What kind of physical examination would you do?
3. According to the symptoms and your clinical assessment, what would be your diagnosis?

4. According to your previous diagnosis for Saye, what would be your treatment and why?
Give dosage and course of the treatment (refer to the simplified antimalarial dosage charts provided in the Participants manual).
(Saye weighs 7.2 kg and *falciparum* malaria diagnosis has been confirmed by RDT.)

**Case scenario 2:**
A 2-year-old girl from Kapee village (outside Bong Mines) develops fever and soon has brief convulsion. Kapee village is a remote community away from the city. Initially the mother gave a teaspoonful of herbal liquid. Later, on the evening of the same day, the child’s speech became less comprehensible and shortly afterwards, was no longer responding to any call. It took the mother 4 hours to come to hospital and the child remains unconscious when they got there. In addition to the loss of consciousness, she was found on examination to be severely pale with a temperature of 38.5°C.

1. What key information is provided in this history?

2. What signs of severe disease can you identify?

3. How should this child’s illness be classified?

4. Mention the most appropriate diagnostic tools you would use to confirm your diagnosis?

**Case scenario 3:**
A mother brings her daughter Fatu (18 months, 11kg) to your clinic. Fatu fell ill a week ago, with fever, loss of appetite and has a cough. Her mother bought some chloroquine at the market 3 days ago and has given Fatu a whole tablet each day. Yet Fatu still has a fever and is now very sleepy. When her mother makes her eat, Fatu cries weakly. For the last few days, her mother has been afraid to feed her because she is so sleepy and seems to have trouble swallowing. Fatu stopped feeding from the breast 4 months ago when her mother became pregnant. Her mother explained to you that they have been in the village since 3 months sleeping in a temporary shelter while she builds her house.

1. How would you identify the danger signs in order to provide immediate treatment?
Your assessment shows the following:
Fatu is very lethargic, waking only for a few seconds before falling asleep again she is able to localize a painful stimulus but she is not able to sit unsupported. She is not convulsing. She has fast breathing and indrawing of the lower chest wall.

1. What are your next steps in the assessment of the patient?

What is your Differential Diagnosis?

Scenario 4:
You are working in a 20-bed health center in Bong County that provides both outpatient and inpatient services. Your health workers are not well trained and competent. You have no laboratory facility to perform blood tests. However, you have rapid diagnostic test kits in your health center. You do not have equipment to do lumber puncture.

Hawa, a 26-year-old woman, (weight: 55kg) is brought to your health center in her husband’s arms. The man traveled with his wife for a day before reaching your clinic. He is very concerned because his wife is unwell. She has had a very hot body for three days and yesterday she was too weak to walk. Her temperature is now 41.0 °C and you are unable to wake her. Her husband claims that earlier today, she had some spasms all over her body, especially in her arms and legs. At this moment, Hawa starts convulsing.

1. What would be your first priority in the management of Hawa?

2. How would you identify other danger signs in order to provide immediate treatment for Hawa?

3. Hawa has danger signs and requires immediate treatment. What would be your immediate treatment for Hawa?

Alternative Problem-Solving Exercises
Case Management

Instructions:
This session contains alternative case scenarios that can be substituted for those used in the problem-solving exercise in the Case Management Sessions.
Rolling Back Malaria in Complex Emergencies Participants Training Manual- July 2007

Case Scenario A
You are a health worker working in the Voinjama Health center in Lofa County, where there is an influx of returnees from neighbouring Guinea. Some of these people settled down in villages, living in makeshift shelters.
The health center is grossly overstretched with diagnostic facilities and equipment available.
Previous data show that P.falciparum is a problem in Lofa county.

Case A, Part 1
It takes the villagers 4 hours to reach your health center. Your first patient is Kolubah, a 15-year old boy who is an orphan. He tells you that he started to cough four days ago. He cannot walk easily because of infected wounds under both of his feet. His body is very itchy and for the past two days, he has had a hot body, chills at night and mild headache.


2. List the steps in your physical examination.

Case A, Part 2
You have completed your clinical assessment and have the following data: Kolubah has not lost consciousness nor had convulsions. He does not have a stiff neck. His axillary temperature is 39°C. He began to cough two days ago, but has not coughed up any blood. His chest is clear at auscultation. He has no fast or deep breathing and no lower chest wall indrawing. He has a runny nose, a greenish nasal discharge and when you touched his face it was painful. His tonsils are not swollen.
He has no diarrhea, no vomiting, and no pain when passing urine. He is not dehydrated. His spleen is not enlarged at palpation. The wounds under his feet are badly infected. He has two large wounds covered with some cloth. You notice a purulent discharge on the cloth and a strong smell from the wounds.

3. According to the signs and symptoms, what would be your diagnosis for Kolubah?
Case scenario B:

You are in Lofa County, Liberia, an area located at the border with Sierra Leone. The civil war is over in Liberia and mass population that went to Sierra Leone to seek refuge are returning home. At this time, thousands of returnees are brought in Vahun District for resettlement.

You are part of the medical Staff assigned in the Vahun District Clinic to give health care to the returnees. You have an outpatient facility with small number of well trained Staff to assist you.

Vahun District, remote and regular access is difficult by road so medical supplies are limited.

It has been noticed that rats have infested the area and the village has become a breeding ground for rodents.

The rainy season is just about to start or begin. The area is known to be endemic for malaria and the transmission is perennial stable. In the neighboring District of Sierra Leone, the population has over 60% parasite rates and very similar disease epidemiology is expected in Liberia. P. falciparum normally accounts for more than 90% of all infections. Lassa fever and filariasis are also endemic in the region.

Part 1:
Mamadou, a 16 year-old boy, comes to your clinic. He says, he was one of the first to return to the village fourteen days ago. He has not felt well for the past 5 days and complains of a headache, hot body and chills during the night as well as a sore throat that began this morning

1. What questions would you ask Mamadou in your clinical assessment?

2. What kind of physical examination would you undertake?

Part 2:
You have completed your clinical assessment and have the following information:

He feels hot constantly and complains of chills. He has had these symptoms for two days. Mamadou has not lost consciousness nor had convulsion. He has no cough and no diarrhea. He has had one episode of vomiting and complains of loss of appetite and stomach discomfort. He complains of severe headache. He has no photophobia. He has had two episodes of epistaxis, but for a very short time. He had one episode of bleeding in the left eye. He has not sought medical care elsewhere, nor has he received any medication. There is another sick person in his family with similar symptoms. His axillary temperature is 39.5° C. His pulse rate is 62 beats per minute. He dose not have a stiff neck upon examination. His throat has small white patches, but no pus. No cervical lymph nodes are noted on palpitation. His spleen is not enlarged. He has no rash.
4. According to the signs and symptoms, what would be your differential clinical diagnosis for Mamadou?

Case scenario C
Nowai is an 18 year old woman who comes to the clinic for a consultation. She is three months pregnant. Since yesterday, she has had a severe headache and a hot body. For the past 3 days, she has also experienced burning on urination.

You have completed your clinical assessment and have collected the following information:

Nowai has no danger signs, no vomiting, and no blood in her stool or urine. She is not dehydrated. She has pale conjunctivae. She has no cough and no fast or deep breathing. Her temperature is 37.4°C. It is her first pregnancy. She has not taken any treatment or medicines lately.

5. What would be your clinical diagnoses for Nowai?

6. Based on your clinical diagnosis, what would be your treatment for Nowai? Give the dosage and course of the treatment (If you diagnosed malaria, refer to the simplified antimalarial dosage charts provided in the Participants manual).

6. You have RDT kits available and decide to test Nowai. The result is negative. Does this change your initial diagnosis and treatment? Give your reasons.

7. Will you administer Intermittent Preventive Treatment (IPT) TO Nowai during this visit? If YES or No
**Case Scenario D**

You’re a health worker working in Palala Health Center. The area you are working in is known to have a perennial (all year long) transmission of malaria with seasonal peaks from May to October. Previous data show that *P. falciparum* is responsible for >90% of the cerebral malaria as compared to only 3% for *P. ovale/P. malariae*. Access to health care is also very difficult. People have to walk for days before they can reach health facilities that often suffer from shortages of medicines and medical equipment.

You are working in a 20-bed health center that provides both outpatient and inpatient services. Your health workers are well trained and competent. The center has a small laboratory with one microscope and one well-trained laboratory technician to perform blood tests. You do not have equipment to perform a lumbar puncture.

Theresa, a 26-year-old woman, (weight: 42kg) is brought to your Health facility by her husband. The man traveled with his wife for two days before reaching your Health Center. He is very concerned because his wife is unwell. She has had a very hot body for three days and the fourth day she was too weak to walk. Her temperature is now 38.9°C and you are unable to wake her. Her husband claims that earlier today, she had some spasms all over her body, especially in her arms and legs. At this moment, Theresa starts convulsing.

1. **What would be your first priority in the management of Theresa?**

2. **How would you identify the other danger signs in order to provide immediate treatment for Theresa?**

**Case Scenario D, Part 1**

Your assessment shows the following:

You were not able to wake Theresa at her arrival and before she had her convulsion. The convulsion lasted for 10 minutes and diazepam has been effective. She is now unable to localise a painful stimulus or to sit unsupported. She does not have respiratory distress.

1. **Theresa has danger signs and requires immediate treatment. What would be your immediate assessment of the patient?**

**Case Scenario D, Part 2**

Your assessment shows the following:

Theresa is in coma (as indicated by the Glasgow coma scale). She has an axillary temperature of 41°C. She has a slow skin pinch (slightly dehydrated). Her blood tests results are as follows:

- Hemoglobin level: 12g/dl
- Blood glucose: 40 mg/dl
Malaria slide: Positive for *P. falciparum*

3. What would be your immediate treatment for Theresa? Give the full treatment, dosage and course you would prescribe. Explain your choice of treatment.

**Case Scenario E**

You are in North East of Liberia in November and it is the end of the rainy season. The area you are working is highly malaria endemic. The transmission is perennial with seasonal peaks from May to October and *P. falciparum* is predominant. According to reports people moving towards your area of assignment are coming from areas where malaria is known to be highly endemic. Apart from your clinic, there is another agency working in your area and providing primary health care (outpatient and inpatient services) to the local population, 50 km from your location. The other agency has a small laboratory with one trained laboratory technician and a microscope. You do not have a laboratory, but you recently received a small quantity of RDT.

A few days later, about 1000 returnees start to arrive in your location. Your consultation rate has increased dramatically and your health workers cannot cope with the influx.

Tommy, a 35-year-old man, (weight: 60kg) comes to your clinic for consultation. His family says that he has had diarrhea and fever for the last four days. They arrived in the village only two weeks ago. They became anxious yesterday because Tommy started to act like “a crazy person”. They took him to the witchdoctor where he was given a special drink to remove the evil eye. He did not receive any other medicines. He started to vomit this morning and they brought him to the clinic because he is unable to walk alone and refused to drink. The family is very concerned about his condition.

1. **Do you think this man could have severe malaria? Why or why not?**

2. **How would you identify the danger signs in order to provide immediate treatment to Tommy?**

**Case Scenario E, Part 1**

Your clinical assessment of danger signs shows the following:

Tommy is able to localize a painful stimulus, but he cannot sit unsupported. He does not have convulsions and according to his family, he has not had convulsions previously. He does not have deep breathing nor indrawing of the lower chest wall.

You notice that he has problems swallowing and vomits any liquid he takes. He can answer when you talk to him but he is very confused and weak.
3. Tommy has danger signs and requires immediate treatment. What would be your immediate management?

**Case Scenario E, Part 2**
Your assessment revealed the following:

Tommy has a temperature of 38°C. He has a slow skin pinch and sunken eyes. The malaria RDT is positive for *P. falciparum*.

Session 12:

Supervision and Surveillance

SESSION TWELVE: SUPERVISION AND SURVEILLANCE

SESSION OBJECTIVES

At the end of the session participants should be able to:

- Understand and define surveillance and its importance in the follow-up of the administration of antimalarial drugs
- Understand the importance of supervision, specifically for malaria
- Identify problems that may occur with malaria treatment and problems that occur with reporting malaria data in health facilities.

In this session, the essential features of surveillance systems will be discussed. Participants will be expected to partake in discussions regarding types of surveillance systems and reasons for surveillance systems.

There are some problem-solving exercises that will follow discussions. Lastly, plans of actions regarding the whole course including supervision and surveillance will be discussed to ensure that full monitoring and evaluation of the antimalarial drugs currently being used.

Questions regarding Surveillance systems:

1. What is a surveillance system?

2. What are the different kinds of surveillance systems?

4. Why do we need a surveillance system, especially with regard to malaria prevention and control?
ESSENTIAL ELEMENTS AND INDICATORS OF SURVEILLANCE SYSTEMS

What data do you collect as part of your surveillance system?

- **Demographic data**: including size and structure of the targeted population, births and deaths, and special groups: pregnant women, under five years old.
- **Morbidity data**: those who suffer from the disease.
- **Mortality data**: those who die from the disease

**Demographic data**

- Demographic data are needed to calculate:
  - The size of the targeted population
  - The size of the high-risk groups in the population (e.g., under five year olds)
  - The denominator for mortality and morbidity rates
  - The resource needed for interventions

**Morbidity data**

- A case definition should be developed for every disease and standardized across all partners. Remember that a surveillance system is only as good as the ability of partners to use standardized case definitions.
- Must look at disease incidence across a standardized age group.
- Must include pregnant women in the system.

**Mortality data**

The overall objective is to reduce mortality.
- Is important in order to assess the outcome and/or impact of an intervention
- Must be assessed across a standardized age group.
- Must be assessed among pregnant women.

**Note: It is important to determine:**

- What data should be collected?
- Who will collect the data?
- Who will analyze the data and how often?
- How the results will be disseminated?

**Types of Surveillance:**

- **Active Surveillance**: The process of collecting data during a specific time frame and in a specific location in order to detect disease.
- **Passive Surveillance**: The process of collecting routine data and comparing trends over time in order to detect or monitor disease.
- **Sentinel Surveillance**: The process of collecting data at designated sites that are representative of the general population or epidemiological area in order to detect or monitor disease.
DEFINITIONS:

1. STANDARD CASE DEFINITIONS

Case definitions are a set of diagnostic criteria that must be fulfilled for an individual to be regarded as a case of a particular disease for surveillance and outbreak investigation purposes. Case definitions can be based on clinical criteria, laboratory criteria or a combination of the two with the elements of time, place and person.  

Standard case definitions are used to diagnose and record common health problems affecting the population. This helps health workers to accurately monitor disease trends and make better estimates of required resources. If standard case definitions are used at several locations or by different relief agencies, disease trends among different populations can be compared.

Malaria standard case definitions:  

Uncomplicated malaria is:

A person with fever or a history of fever associated with symptoms such as nausea, vomiting and diarrhoea, headache, back pain, chills, myalgia, where other infectious diseases have been excluded.

Severe malaria is:

A person with fever and symptoms as for uncomplicated malaria, but with associated signs such as disorientation, loss of consciousness, convulsions, severe anaemia, jaundice, haemoglobinuria, spontaneous bleeding, pulmonary oedema or shock.

2. CONFIRMATION OF THE CASES

There are two things you need to do during the period when you are trying to confirm cases:

- Identify confirmatory diagnostic facilities and tools available.
- Demonstrate malaria parasites in blood films by examining thick or thin smears or by rapid diagnostic kit for P. falciparum.

The essential elements of an effective surveillance system are:

- Standardized case definitions
- Confirmation of cases
- Defined and clear study protocol (i.e., plans and procedures, system representative)
- A good plan for data analysis
- Timely reporting
- Feedback of information to the people who have to take decisions in a timely manner
- Trained staff

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3. INCIDENCE:

**Def:** The number of new cases of a disease over a defined period of time and in a specified population.

**Calculation:** \( \frac{\text{Number of New Cases}}{\text{Population}} \times 100 \)

4. PREVALENCE:

**Def:** The number of new and old cases of a disease over a defined period of time and in a specified population.

**Calculation:** \( \frac{\text{Number of new cases} + \text{Number old cases}}{\text{Population}} \times 100 \)

**Practice with surveillance systems**

**Group activities:**
- Divide participants into two or more groups
- Give them 20 to 30 minutes to answer the following questions
- When participants have completed, each group will make a five minutes presentation followed by discussion.

**Case scenario A:**

You are working in the eastern part of Liberia (Ganta) where the population density is high.

You have recently been appointed as Medical coordinator with the task of providing support to health services at the district and local levels. The district is composed of the main town with 1 referral District Hospital and 30 villages with 2 functional health centers and 4 health posts. The Traditional Healers are numerous in each village and provide most of the health care to many isolated villages that lack other health facilities. Although the health facilities have confirmatory diagnostic tools, the majority of the health workers prefer to use clinical assessment alone because of the patient case load. Based on consultation records, it appears that there is an average of 150 consultations per day.

The district health representative has set up a surveillance system, collecting morbidity and mortality data from the health services. The information is currently collected and analyzed on a monthly basis, but communication and transport breakdown in many areas delay the information; many health facilities do not send any report at all. The health facilities are experiencing a shortage of data collection forms and using blank sheets of paper for reporting.

You visited one clinic that has managed to submit their data collection on a timely basis, but now, two months later, they have not received any feedback. The health workers express their frustration and question the usefulness and relevance of this time consuming task. The ministry of health has provided health workers with case definitions, but you notice during your visit, that these are not used during consultations.
Question 1. Is the surveillance system in place representative of the health problems of the population living in this area? Give your reasons.

Case Scenario B Part 1

You are still working in Lofa County in Kolahun District at Kolahun Health Center when MSF-France pulled out. It is the rainy season and the District has been completely cut off from the rest of the county for one month. Access to Voinjama is impossible due to bad road conditions.

It is estimated that 20,000 people living in Kolahun District with an additional 5000 returnees from Sierra Leone and Guinea who got in at the onset of the rainy season. The County Health Team (CHT), including the District Health Team of Kolahun District, is trying to meet the health needs of the people.

Your District Health Team is barely meeting the health needs of an estimated population of 25,000 people, a mixture of returnees and resident population. You send a team of health workers to conduct an initial assessment of the health infrastructure. The assessment shows that curative services have broken down because of shortage of drugs and other supplies, incentives are being cut off and the facilities were last supplied four months ago and some of the health workers have left.

The health workers that remain are not regular on the job for lack of incentives, drugs and other supplies.

Question 1. What are some of the obstacles you may face trying to set up a surveillance system?

Question 2. The implementation of a surveillance system through the existing health facilities is part of your planned interventions. How would you go about it?
Session 13:

Data collection & Reporting
SESSION THIRTEEN: DATA COLLECTION & REPORTING

SESSION OBJECTIVES

At the end of the session participants should be able to:

- Understand all the formats used for malaria information collection
- Fill properly the data collection form(s)
- Fill properly the reporting form(s)

In this session, the data collection & reporting formats will be presented. Participants will be expected to share their experiences on their utilization of these formats. There are some exercises that will follow discussions.

Information on data collection:

- Data should be easily collected
- Data should be quickly summarized and analyzed and feedback given to the persons at the health facilities that collected the data.
- Data should be locally useful.
- The creation of new or parallel systems of data collection should be avoided.

Document to fill in each month at the health center level:

1. Malaria reporting form
2. Anti malarial drug requisition form
3. EPI reporting form

Drug requisition and monthly reporting

Objectives: at the end of this session, participants will be able to:

- Take a correct inventory of stock and properly fill in the drugs supply and consumption form;
- Place an order for drugs and supplies by properly filling in the requisition form;
- Correlate positive RDTs and Microscopy results to the quantity of antimalarial drugs used in the management of malaria cases;
- Follow the designated reporting channel in order to facilitate proper and prompt reporting
- Send in reports on time (on or before the 5th of the following month).

BRAIN STORMING QUESTIONS

Inventory:

What is inventory?
When do we take inventory?
How do we take inventory?

**Ordering for drugs and supplies**

*When do you order for drugs and supplies?*
Drugs and supplies are ordered when they are in short supply in the store room /warehouse. There should always be a buffer supply of drugs and supplies to ensure that there are no “Stock outs.”

*How do you order for drugs and supplies?*
Drugs and supplies are ordered by filling in the drug requisition form and this is done by public or private health facilities. Forms should be delivered in a timely (before Stock Outs occur) manner through the designated channel.
# Malaria Treatment Form

Health Facility: ____________________________________________

<table>
<thead>
<tr>
<th>Age Group By Years</th>
<th>Total Consultations</th>
<th>Suspected Cases of Malaria</th>
<th>RDT Test Results</th>
<th>MICROSCOPE Test Results</th>
<th>OUT-PATIENTS TREATED</th>
<th>IN-PATIENTS TREATED</th>
<th>Total (A+B)</th>
<th>Death</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>+ve  -ve Total</td>
<td>+ve -ve Total</td>
<td>ACT Quinine Tablets</td>
<td>Quinine IV</td>
<td>Artemether IM</td>
<td></td>
</tr>
<tr>
<td>&lt; 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 – 15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 15 (excluding Pregnant women)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pregnant Women</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

County: __________________________ District: __________________________ Month: _____________ Year: _________
<table>
<thead>
<tr>
<th>Pregnancy status</th>
<th>Total Women attending ANC</th>
<th>First dose</th>
<th>Second dose</th>
<th>More than 2 doses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Trimester</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd Trimester</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3rd Trimester</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This monthly report should be submitted to CHT along with the stock report by 5th of the following month by the health facility.
**ANNEX 1**

Treatment recommended for uncomplicated *falciparum* malaria

<table>
<thead>
<tr>
<th>Therapies</th>
<th>Formulation</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
</table>

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*Annexes:*
| Fixed combinations | Artemether Plus Lumefantrine (CO-ARTEM) | Can be used in complex emergencies anywhere  
Can be used when there is absence of local drug efficacy data (CQ, SP, AQ)  
Highly efficacious treatment with high bio-availability | Not recommended for pregnant women & Children <10kg  
Drug absorption is dependant on food intake  
Drug should be taken with meal rich in fat, glass of Milk or palm butter |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tablets contain: 20 mg artemether 120 mg lumefantrine</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Non-fixed Combinations | Artesunate Plus Mefloquine (AS+SP) | Combination can be used where there is multi-drug resistance malaria(CQ, SP, AQ)  
Can be an effective option to Coartem when efficacy data are not available for SP & AQ  
Artesunate reduces gametocyte carriage rates  
Absorption of Mefloquine improve when taken with plenty water or following food | Mefloquine to be used only minimize the risk of developing drug resistance  
Risk of vomiting first dose is increased (<5yrs and older patients) Need to split the dose over 2 days (on day 2 +3)  
Artesunate & Mefloquine are not recommended in the first trimester of pregnancy |
|                   | Artesunate tablets contain: 50 mg sodium artesunate or 200 mg sodium artesunate  
Mefloquine tablets contain: 250 mg mefloquine base |                                                                              |                                                                 |
|                   | Artesunate plus Sulphadoxine - Pyrimethamine (AS+SP) | Good option where there is good parasite sensitivity to SP  
Practical operation advantages: the full dose of SP is delivered on day 1 as a unique dose  
SP less likely than MQ to cause vomiting in young children  
SP safe in all trimester of pregnancy but artesunate only during the second and third trimester. | Folic acid should be delayed one week after start of SP as it may antagonize the action of Sulphadoxine to sulpha component  
There may be a risk of increased drug toxicity amongst communities with high HIV rates  
SP should not be used for prophylaxis  
Should not be given to children < 2 months old |
|                   | Artesunate tablets contain: same as above  
SP tablets contain: 500mg Sulphadoxine 25 mg pyrimethamine |                                                                              |                                                                 |
Artesunate plus Amodiaquine (AS+AQ.) Fixed dose combination

| ARTESUNATE: 4 mg/kg (tabs of 25, 50 or 100 mg) | AMODIAQUINE: 10 mg/kg (tabs of 67.5, 135 or 270 mg) | Does not need to be delivered with food |

- The therapeutic efficacy of AQ in areas of Chloroquine resistance may be compromised
- Drug efficacy data on AQ should be obtained prior choosing this option
- Not to be used as chemoprophylaxis
- AQ not recommended in the first trimester of pregnancy.

Annex 2: DIAGNOSIS OF MALARIA – CLINICAL ASSESSMENT AND CONFIRMATORY DIAGNOSIS
Practical Procedures

**Practical procedures**

**How to manage the airway in a choking child (foreign body aspiration with increasing respiratory distress)**

**Infants**
- lay the infant on your arm or thigh in a head down position
- give 5 blows to the infant's back with heel of hand
- If obstruction persists, turn infant over and give 5 chest thrusts with 2 fingers, one finger breadth below nipple level in midline (see diagram)

- If obstruction persists, check infant's mouth for any obstruction which can be removed
- If necessary, repeat sequence with back slaps again

**Children**
- Give 5 blows to the child's back with heel of hand with child sitting, kneeling or lying

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- If the obstruction persists, go behind the child and pass your arms around the child's body; form a fist with one hand immediately below the child's sternum; place the other hand over the fist and pull upwards into the abdomen (see diagram); repeat this Heimlich maneuver 5 times
- If the obstruction persists, check the child's mouth for any obstruction which can be removed
- If necessary, repeat this sequence with backslaps again

**How to manage the airway in a child with obstructed breathing (or who has just stopped breathing)**

**No neck trauma suspected**

**Child conscious**
1. Inspect mouth and remove foreign body, if present
2. Clear secretions from throat
3. Let child assume position of maximal comfort

**Child unconscious**
1. Tilt the head as shown

2. Inspect mouth and remove foreign body, if present
3. Clear secretions from throat
4. Check the airway by looking for chest movements, listening for breath sounds and feeling for breath

**Neck trauma suspected (possible cervical spine injury)**
1. Stabilize the neck
2. Inspect mouth and remove foreign body, if present
3. Clear secretions from throat
4. Check the airway by looking for chest movements, listening for breathing sounds, and feeling for breath

If the child is still not breathing after carrying out the above, ventilate with bag and mask

**How to give oxygen**

*Give oxygen through nasal prongs or a nasal catheter:*

**Nasal Prongs**
Place the prongs just inside the nostrils and secure with tape.

**Nasal Catheter**
- Use an 8 F size tube
- Measure the distance from the side of the nostril to the inner eyebrow margin with the catheter
- Insert the catheter to this depth
- Secure with tape

*Start oxygen flow at 1-2 litres/minute*

**How to position the unconscious child**

**If neck trauma is not suspected:**
- Turn the child on the side to reduce risk of aspiration.
- Keep the neck slightly extended and stabilize by placing cheek on one hand
- Bend one leg to stabilize the body position

**If neck trauma is suspected:**
- Stabilize the child's neck and keep the child lying on the back:
- Tape the child's forehead to the sides of a firm board to secure this position
- Prevent the neck from moving by supporting the child's head (e.g. using litre bags of IV fluid on each side)
- If vomiting, turn on the side, keeping the head in line with the body.

**Inserting a nasogastric tube. The distant is measured from the nose to the ear and then to the epigastrium, and then the tube is inserted to the measured distant.**

**Insertion of a nasogastric tube**

A nasogastric tube (size 8 French for children) for fluids or food may have to be passed into the child's stomach, e.g. to feed a severely malnourished child who is anorexic, or to give fluids to an unconscious child.
- Holding the tip of the tube against the child's nose, measure the distance from the nose to the ear lobe, then to the xiphisternum (epigastrium). Mark the tube at this point.
- Hold the child firmly. Lubricate the tip of the catheter with water and pass it directly into one nostril, pushing it slowly in. It should pass easily down into the stomach without resistance. When the measured distance is reached, fix the tube with tape at the nose.
- Aspirate a small amount of stomach contents with a syringe to confirm that the tube is in place (check that it turns blue litmus paper pink). If no aspirate is obtained, confirm position by taking an abdominal X-ray or inject air down the tube - and listen over the abdomen with a
If the tube is not in the stomach, any aspirate obtained will not turn litmus paper pink and the sound of injected air will not be heard over the abdomen. If there is any doubt about the location of the tube, withdraw it and start again. The major complication is when the tube inadvertently passes into the trachea. This leads to distress in the child, an abnormal cry in infants, or cyanosis. If this happens, remove the tube immediately and try again to pass it into the stomach after the child has recovered.

- When the tube is in place, fix a 20-ml syringe (without the plunger) to the end of the tube, and pour food or fluid into the syringe, allowing it to flow by gravity.

The nasogastric tube can be left in position for several days. If there is doubt about the position of the tube, check that it is correctly in place before giving the feed.

Obstruction of nasal breathing can cause distress in some young infants. If oxygen therapy is to be given by nasopharyngeal catheter at the same time, pass both tubes down the same nostril and try to keep the other nostril patent by wiping away crusts and secretions.

### Lumbar puncture

A lumbar puncture is usually performed to detect meningitis in a sick child.

The following signs are contraindications:

- Signs of raised intracranial pressure (unequal pupils, rigid posture or paralysis in any of the limbs or trunk, irregular breathing)
- Skin infection in the area through which the needle will have to pass.

If contraindications are present, the potential value of the information gained from a lumbar puncture should be carefully weighed against the risk of the procedure. If in doubt, it might be better to start treating for suspected meningitis, and delay performing a lumbar puncture.

### Position the child

This is very important for success of the procedure. An experienced assistant holding the child correctly makes the procedure much easier to perform.

There are 2 possible positions:

- The child lying down on the left side (particularly for young infants), or
- In the sitting position (particularly for older children)
Holding a lying child for lumbar puncture.

Note: the spine is curved to open up the spaces between the vertebrae.

Lumbar puncture when the child is lying on the side
- A hard surface should be used. Place the child on the side so that the vertebral column is parallel to this surface and the transverse axis of the back is vertical (see dotted lines in the above Figure).
- The assistant should flex the neck of the child with the chin touching the chest, pull up the knees towards the chest, and hold the child at the buttocks so that the back is bent. Hold the child firmly in this position. Make sure that the child can breathe normally.
- Check anatomical landmarks
- Locate the space between the third and fourth or between the fourth and fifth lumbar vertebrae. (The third lumbar vertebra is at the junction of the line between the iliac crests and the vertebral column).
- Prepare the site
- Use aseptic technique. Scrub the hands and wear sterile gloves.
- Prepare the skin around the site with an antiseptic solution.
- Sterile towels may be used.
- In older children who are alert, give a local anaesthetic (1% lignocaine) infiltrated in the skin over the site.
- Perform the lumbar puncture
- Use an LP needle with stylet (22 gage for a young infant, 20 gage for an older infant and child. If these are not available, hypodermic needles might be used). Insert the needle into the middle of the intervertebral space and aim the needle towards the umbilicus.
- Advance the needle slowly. The needle will pass easily, until it encounters the ligament between the processes of the vertebrae. Slightly more pressure is needed to penetrate the ligament, after which a decrease in resistance is felt as the dura is penetrated.
- Withdraw the stylet, and cerebrospinal fluid will drop out of the needle. If no cerebrospinal fluid is obtained, the stylet can be reinserted and the needle advanced slightly.
- Obtain a sample of 0.5-1 ml CSF and place in a sterile container.
- Withdraw the needle completely and put pressure over the site for a few seconds. Put a sterile dressing over the needle puncture site.
If the needle is introduced too far a lumbar vein may be punctured. This will result in a "traumatic tap" and the spinal fluid will be bloody. The needle should be withdrawn and the procedure repeated in another intervertebral space.

Restraining an older child in sitting position in order to carry out a lumbar puncture.
ANNEX 3
Table of Normal Reference Values

All values are expressed as means with the ranges in parentheses

<table>
<thead>
<tr>
<th>Laboratory Investigations</th>
<th>Normal Reference Values</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Child</td>
</tr>
<tr>
<td>Blood glucose (fasting)</td>
<td>3.3 – 5.5 mmol/l</td>
</tr>
<tr>
<td>Haemoglobin</td>
<td>6 mths – 6 yrs: 12g /dl (10.5 – 14)</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Sodium</td>
<td>135 – 145 mmol/l</td>
</tr>
<tr>
<td>Potassium</td>
<td>3.5 – 5.6 mmol/l</td>
</tr>
<tr>
<td>Urea</td>
<td>2.5 – 6.6 mmol/l</td>
</tr>
<tr>
<td>Creatinine</td>
<td>20 – 80 µmol/l</td>
</tr>
<tr>
<td>Cerebrospinal fluid (CSF)</td>
<td>2.8 – 4.4 mmol/l</td>
</tr>
<tr>
<td>Blood glucose</td>
<td>0.15 – 0.40 g/l</td>
</tr>
<tr>
<td>Protein</td>
<td>≤ 10 x 10⁶/l</td>
</tr>
<tr>
<td>White blood cells</td>
<td>≤ 5 x 10⁶/l</td>
</tr>
</tbody>
</table>

Table 2: Measurement of Blood Pressure *

<table>
<thead>
<tr>
<th>Age group</th>
<th>Average blood pressure (mmHg) (Systolic/diastolic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st year (Infancy)</td>
<td>80 / 55</td>
</tr>
<tr>
<td>2 to 4 years (Preschool child)</td>
<td>85 / 60</td>
</tr>
<tr>
<td>5 to 15 years (School child)</td>
<td>90 / 60</td>
</tr>
<tr>
<td>Adults</td>
<td>100-140 / 60-90</td>
</tr>
</tbody>
</table>

* It is essential to have the appropriate cuff size to take the blood pressure in a child.

Table 3: Respiratory rates (upper limits) *

<table>
<thead>
<tr>
<th>Age group</th>
<th>Respiratory rates per minute</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 2 year</td>
<td>40</td>
</tr>
<tr>
<td>2 – &lt; 6 year</td>
<td>30</td>
</tr>
<tr>
<td>6 – 10 year</td>
<td>25</td>
</tr>
<tr>
<td>Over 10 year</td>
<td>20</td>
</tr>
</tbody>
</table>

* Measure respiratory rate when infant at peace, not crying, struggling or feeding.

Table 4: Heart rate (ranges)

<table>
<thead>
<tr>
<th>Age group</th>
<th>Heart rate ranges per minute</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st year (infant)</td>
<td>80 – 160</td>
</tr>
<tr>
<td>2 to 4 year (Preschool child)</td>
<td>75 – 120</td>
</tr>
<tr>
<td>5 to 15 years (School child)</td>
<td>70 – 110</td>
</tr>
<tr>
<td>Adults</td>
<td>60 – 90</td>
</tr>
</tbody>
</table>

Requirements of Pharmacovigilance

Success of the pharmacovigilance system requires a number of critical factors to be available.

a. Adequate training and capacity building of health professionals
   Because the system depends on written records using standard “suspected adverse event report form”, informal health care providers (such as traditional healers, community health workers etc) are not included in the reporting system but would play an important role in referring patients to health facilities if serious adverse events occur. The reporting system extends only to the hospital, clinic and dispensary level of the health care system. Training in the pharmacovigilance system for these professionals will be incorporated in the national case management training in the use of ACT. After each training, participants will be given the standard “suspected adverse event report form” to record any suspected adverse event.

b. Fostering of public awareness of new drug
   The public needs to be informed through media campaigns and other means about the new antimalarial drugs at the time of the launch. The MCD has the responsibility to ensure that the public is well informed about this new therapy and associated side effects.

c. An investigation team at the county hospital
   The County Investigation Team (CIT) will be critical for the validation of case reports in the whole county and to communicate their findings to the Expert Safety Review Panel at national level. The team will comprise of clinicians as well as the head nurse or matron of the facility and a malaria control staff member. They will be responsible for following-up all SAE signals reported from all health facilities within their County.

d. Quality control of laboratory facilities at referral hospitals
   Although the system does not require intense laboratory investigations, some basic tests will be needed to corroborate the assessment based on clinical signs and symptoms. Quality control of laboratory facilities, especially in referral hospitals may be required.

e. Expert Safety Review Panel
   This National Expert Safety Review Panel (NESRP) would consist of the national coordinator, a clinical pharmacologist, a physician, an obstetrician, a paediatrician and a pharmacist. The panel will review all SAE Report Forms, and conduct causality assessments. Any additional investigations required by the panel or decisions made will be communicated to the CIT by the National Coordinator.

f. National co-ordinator
   The Coordinator is the national focal point for the pharmacovigilance system. This full-time position takes responsibility for the collection and storage of all SAE reports. He/She is responsible for coordinating, communicating, training and supervision of the CIT and is part of the secretariat for the NESRP. The Coordinator may be based within an appropriate department within the MOH.