GUIDELINES FOR CASE

3RD EDITION

JULY 2014

GUIDELINES FOR CASE MANAGEMENT OF MALARIA IN GHANA

Ministry of Health

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3RD EDITION

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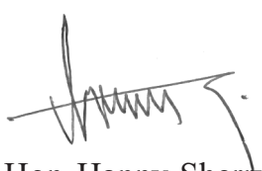
FOREWORD

These guidelines are the outcome of consultative meetings co-sponsored by the Ministry of Health, Ghana Health Service (GHS), Global Fund, the World Health Organization (WHO), Guilin Pharma and Malaria care, PATH.

They are the sole recommendations for the management of malaria in Ghana and all who are engaged in managing malaria in Ghana should abide by these guidelines.

This document replaces the April 2009 Guidelines for Case Management of Malaria in Ghana. The broad objective of this document is to provide a set of recommendations and regulations for the care of patients with malaria, based on the revised Anti-Malaria Drug Policy, January 2014 (3rd Edition).

It is hoped that by following these guidelines, case management of malaria will be standardized and improved throughout the country.



Hon. Hanny-Sherry Ayittey
Minister of Health
Ghana

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ABBREVIATIONS AND ACRONYMS

ACT	Artemisine based CombinationTherapy
AS-AQ	Artesunate-Amodiaquine
ADR	Adverse Drug Reaction
ADRs	Adverse Drug Reactions
AE	Adverse Event
AEs	Adverse Events
AIDS	Acquired Immune Deficiency Syndrome
AL	Artemether-Lumefantrine
ANC	Antenatal Care
AR	Adverse Reactions
ARI	Acute Respiratory Infections
CBA	Community Based Agent
CHO	Community Health Officer
CHPS	Community Health Planning Services
C/S	Culture and Sensitivity
DHIMS	District Health Information Management System
DHMT	District Health Management Team
DHS	Demographic and Health Survey
DOT	Directly Observed Therapy
FANC	Focused Antenatal Care
FDA	Food and Drugs Authority
G-6-PD	Glucose-6-Phosphate Dehydrogenase
GHS	Ghana Health Service
Hb	Haemoglobin
Hct	Haematocrit
HIV	Human Immunodeficiency Virus
HMM	Home Management of Malaria
ICCM	Integrated Community Case Management

ICP	Institutional Contact Person
IM	Intramascular
ITN	Insecticide Treated Net
IPTp	Intermittent Preventive Treatment in pregnancy
IV	Intravenous
LLIN	Long Lasting Insecticide Net
LP	Lumbar Puncture
M & E	Monitoring & Evaluation
MICS	Malaria Indicator Cluster Survey
NMCP	National Malaria Control Programme
ORS	Oral Rehydration Salt
RDT	Rapid Diagnostic Test
RHMT	Regional Health Management Team
SMC	Seasonal Malaria Chemoprevention
SP	Sulphadoxine Pyrimethamine

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1.0 INTRODUCTION

Malaria is a parasitic disease caused by a protozoon of the genus Plasmodium. It is transmitted through the bite of an infective female Anopheles mosquito. The main parasite species causing malaria in Ghana are *Plasmodium falciparum* (80-90%), *P. malariae* (20-36%), and *P. ovale* (0.15%). *P. vivax* has not yet been seen on blood films in Ghana. *P. knowlesi* has been identified in Asia as a malaria parasite in humans. Mixed infections of *P. falciparum* and *P. malariae* are not uncommon. Crude parasite rates range from 10 % to 70%.

Anopheles gambiae s.l. and *Anopheles funestus* have been identified as the major vectors of malaria in all the ecological zones of the Northern Sahel, Middle transitional and in the southern zone. They account for about 95% of all catches. *Anopheles arabiensis* has been found in the Sahel zone but in fewer numbers. *Anopheles melas* also exists but in small proportions in areas with brackish water along the south-western coast, typically, in mangrove swamps.

Malaria is a major cause of illness and death in Ghana, particularly among children and pregnant women. In 2012, malaria accounted for 38.9% of all out-patient illnesses and 38.8% of all admissions. Malaria infection during pregnancy causes maternal anaemia and placental parasitaemia both of which are responsible for miscarriages and low birth weight babies. As much as 16.8% of all admissions of pregnant women in 2012, were attributable to malaria whilst 3.4% of death among pregnant women were due to malaria.

Malaria parasite prevalence among children aged 6-59 months in the MICS 2011 report indicated a regional variation from as low as 4% in the Greater Accra region to as high as 51% in the Upper West region.

Since Ghana adopted the Roll Back Malaria Initiative in 1998/1999, the country has been implementing a combination of preventive and curative interventions as outlined in the Strategic Plan for Malaria Control in Ghana, 2014 – 2020. The country continues to implement strategies that are designed to enhance the attainment of the set objectives. **Additionally, Ghana subscribes to sub-regional and global initiatives such as the T3 (Test, Treat and Track) initiative which seeks to ensure that every suspected malaria case is tested, that every case tested positive is treated with the recommended quality-assured antimalarial medicine, and that the disease is tracked through timely and accurate reporting to guide policy and operational decisions.** These processes if strictly adhered to, will enhance an accurate profiling of the malaria burden and also greatly contribute to appropriately managing other causes of febrile illnesses. It will additionally reduce the unnecessary exposure of patients to anti-malaria medicines, reduce consumption of ACTs and thus eliminate pressure on the medicines.

These revised guidelines demonstrate a shift from the past when fever was invariably equated with malaria to testing of every suspected case of malaria before treatment. Injection Artesunate replaces quinine as the drug of choice for treatment of severe malaria following evidence from clinical trials (Aquamat Studies). This document replaces the January 2009 Guidelines for Case Management of Malaria in Ghana. The aim of this document is to provide a set of recommendations and regulations for the care of patients with malaria based on the revised Anti-Malaria Drug Policy, January 2014 (3rd Edition) and current evidence-based best practices in malaria case management.

1.1 OBJECTIVE

The primary objective of the Malaria Control Programme is to reduce disease and death due to malaria, especially in children under five years and pregnant women. One of the main interventions to achieve this objective is effective case management.

Accurate and prompt malaria case management requires that all who provide health care should be able to:

- Correctly recognise the signs and symptoms of malaria and make correct diagnosis.
- Confirm the diagnosis by use of appropriate test (RDT or microscopy).
- Provide correct and prompt treatment in accordance with the National Guidelines.
- Track all positive and negative cases.
- Recognise the importance of full compliance with treatment schedules.
- Recognise the danger signs of severe/complicated malaria and act promptly.
- Ensure prompt referral of cases when necessary.
- Provide appropriate pre-referral treatment.

1.2 Target Levels of Utilisation

There are four levels of health-care delivery in the country at which malaria will be diagnosed and managed. This classification is based on the level of training and competence as well as the nature of the support services available for health delivery. The levels are:

(a) Community level: households, licensed chemical sellers, community based agents and volunteers.

(b) Primary health facility level: CHPS compounds, health centers, private clinics and pharmacies, polyclinics and similar institutions.

(c) Secondary health facility level: district hospitals.

(d) Tertiary health facility level; regional hospitals and teaching hospitals.

These guidelines cover the management of malaria at all levels. The majority of malaria cases are managed at the lower levels while certain cases will require referral of patients to a higher level of care.

2.0 CLINICAL FEATURES OF MALARIA

2.1 Preamble

History taking forms an important aspect of the malaria case management. Malaria is a disease which presents with signs and symptoms similar to other conditions and differential diagnosis is critical, therefore the need for confirmation of suspected malaria.

Malaria characteristically presents as a fever. The incubation period of the *P. falciparum* parasites is from 10 to 14 days. The first attacks are usually more severe and may persist for weeks if untreated. The onset of falciparum malaria may be insidious and the fever may be remittent or irregular. If the acute attack is treated rapidly, the disease is usually mild and recovery is uneventful.

If left untreated, sequestration of infected red blood cells in the deep tissues can cause serious complications. Malaria due to *P. falciparum* during pregnancy is extremely dangerous to both mother and foetus due to sequestration of parasites in the placenta.

2.2 Classification

Cases of malaria are categorised as either "uncomplicated" or "severe/complicated," based on the clinical severity.

Uncomplicated malaria: the presence of fever or a recent history of fever, with confirmed parasitological investigation in the absence of any signs of severe disease (refer to Section 3.0).

Severe/complicated malaria: presence or history of fever, plus any life threatening condition with confirmed parasitological investigation (refer to Section 4.0).

3.0 UNCOMPLICATED MALARIA

3.1 Case Definition

A person presenting with a history of fever within the preceeding 2-3 days, or found to have fever on examination (axillary temperature ≥ 37.5°C or rectal temperature ≥ 38.5°C), in the absence of any other cause will be considered a suspected case of malaria. In the absence of signs of severe disease, a case of suspected malaria confirmed by parasitological investigation is considered to be "uncomplicated" malaria.

3.2 Signs and Symptoms

The patient suffering from suspected uncomplicated malaria commonly complains of:

- fever or a history of fever within the preceding 2-3 days
- chills (feeling unusually cold)
- rigors (shivering)
- headache

Other clinical features may include:

- generalised body and joint pain
- nausea and/or vomiting
- loss of appetite
- sweating
- abdominal pain (especially in children)
- bitterness in the mouth
- irritability and refusal to feed (in infants)

These features may occur separately or in combination. The presentation of malaria varies and may resemble other locally important disease such as pneumonia, meningitis, enteric fever or septicaemia.

3.3 Diagnosis

The definitive diagnosis of malaria can be made with microscopy or Rapid Diagnostic Test (RDT) to determine the presence of malaria parasites in the blood. Microscopy is the gold standard diagnostic test which should be carried out at all health facilities where available.

In Ghana, diagnosis is progressively being shifted from clinical to parasitological confirmation as the basis for treatment. This is in compliance with global initiatives and recommendations such as the Test, Treat and Track (T3) which is an initiative to scale-up parasite-based diagnosis to all age groups. This means that in patients with suspected malaria, a parasite-based diagnosis with microscopy or RDT is recommended whenever possible before giving anti-malarial treatment. Children under five (5) years of age must now be tested either by microscopy or RDT prior to treatment.

In general, RDTs will be deployed at all levels and used as an alternative where or when microscopy is not feasible. In situations where parasitological diagnosis (microscopy

or RDT) is not possible, treatment could be given on the basis of presumptive diagnosis of malaria.

All other causes of fever must be excluded. **A negative result from a properly performed test should greatly raise the suspicion of an illness other than malaria, and these patients should be investigated for other causes.** Treatment of malaria should generally be withheld from a patient who has a negative result to laboratory test, and adequate follow up, including repeating the malaria test done. Other causes of fever must be investigated and treatment given appropriately.

3.4 Use and Interpretation of Diagnostic Tests for Malaria

The following guidelines apply to the use and interpretation of diagnostic tests (microscopy or RDT).

3.4.1 Children Under Five (5) Years of Age

Children under 5 years of age are now to be tested either by microscopy or RDT prior to treatment. Fever in this age group may also be caused by other infections including pneumonia, measles, meningitis, otitis media, tonsillitis, viral infections among others. Children should be thoroughly assessed and treated for these conditions especially when microscopy/RDT result is negative for malaria.

3.4.2 Children Aged Five (5) Years or More and Adults

- All febrile patients who are five (5) years and above should be carefully examined for other causes of fever. These conditions should be treated, if present.

- When a malaria diagnostic test is available:
  - Treat if test results are positive and recent malaria infection and treatment excluded .
  - If a correctly performed test is negative and danger signs are absent, clinicians should withhold anti-malarial treatment and follow up the patient, after excluding other causes of fever.
  - In areas where diagnostic testing is not possible, malaria treatment could be initiated based on clinical assessment and diagnosis.

- In all pregnant women with fever or history of fever, a confirmatory diagnostic test for malaria is strongly recommended. However, in cases where parasitological investigations are unavailable, anti-malaria treatment should not be withheld.

Additional information on diagnostic tests is provided in the Annex C, including summarised Standard Operating Procedures and a flow chart to aid in decision making. For a detailed information of the subject, refer to the National Guidelines for Laboratory Diagnosis of Malaria (Ghana Health Service, 2014).

3.5 Treatment of Uncomplicated Malaria

The primary goals of treatment of a case of uncomplicated malaria are to :

- *Promptly confirm diagnosis and effectively treat to avoid progression to severe disease.*
- *Limit the duration of disease.*
- *Minimise the risk of developing and spreading drug resistant parasites.*

3.5.1 Artemisinin-Based Combination Therapy

Since 2004, it has been a national policy to use Artemisinin-based Combination Therapy (ACTs) for the treatment of uncomplicated malaria. This change was necessary because the malaria parasite became resistant to Chloroquine and other monotherapies. Artemisinin and its derivatives are the most rapidly acting and effective anti-malarials available. They are administered in combination with a second, long-acting anti-malarial in order to enhance treatment and protect against the development of drug resistance.

As per the revised treatment policy (2014), three Artemisinin-based Combination Therapy (ACT) products have been selected for use nationally:

- Artesunate-Amodiaquine (AS-AQ)
- Artemether-Lumefantrine (A-L)
- Dihydroartemisinin-Piperaquine (DHAP)

All three drugs are safe for use in children (except the use of A-L in children below 6months). In the 1st trimester, it is recommended that quinine is used. Either Artesunate-Amodiaquine or Artemether-Lumefantrine combination can be used in 2nd or 3rd trimesters of pregnancy.

3.5.1.1 General Guidelines for Treatment Using ACTs

(a) Drug Administration

The first oral dose of the ACT should preferably be given under supervision of a health worker, especially for children. It is preferable to administer these medicines after meals.

(b) Management of Vomiting

If vomiting occurs within 30 minutes, the dosage of the ACT should be repeated. If vomiting stops, you can give the patient the subsequent doses to take home if you are sure that your instructions will be followed. Ask the patient to return to the clinic if vomiting persists. **Persistent vomiting may suggest severe/complicated malaria and should be managed appropriately .**

In children, apply tepid sponging, and continue to feed or breast feed. You must ensure adequate fluid intake. In children, repeated vomiting sometimes results from high fever and can be reduced by tepid sponging and administration of paracetamol.

(c) Other Supportive Treatment:

i. If a patient has an axillary temperature of ⩾37.5° C or feels very hot to touch on examination, give an antipyretic, preferably paracetamol. Treatment of fever is especially important for children. In adults (not in children) aspirin may be given as an alternative to paracetamol. (See Tables 6 and 7).

ii. Children with high fever should be tepid- sponged.

iii. Advise mothers/caregivers to give extra fluids, such as breast milk, drinking water, fresh fruit juices, coconut water, Oral Rehydration Salt solution (ORS), etc.

iv. Feed the child during illness.

v. In case of itching, give an antihistamine. Explain that itching is a possible adverse drug reaction. If itching is mild, patients should continue taking the drug.

(d) Patient Counselling

Advise the patient to return for medical attention immediately (within the same day) if symptoms get worse, and especially if signs of severe disease develop. The patient should also return for medical attention if fever has not resolved by the last day of treatment. Inform the patient of the importance of full compliance to treatment schedule.

- ACTs are the recommended anti-malarials for uncomplicated malaria.
- The Artemisinin derivative components of the combination must be given for at least three days for an optimum effect.
- The following oral ACTs are recommended for treatment of uncomplicated malaria
  - Artesunate-Amodiaquine;
  - Artemether-Lumefantrine;
  - Dihydroartemisinin-Piperaquine.
- Fixed-dose combinations are highly preferable to the loose individual medicines co-blistered or co-dispensed.

3.5.1.2 Dosing Guidelines for Artesunate-Amodiaquine

This is currently available as a fixed-dose formulation with tablets containing 25/67.5 mg, 50/135 mg or 100/270 mg of Artesunate and Amodiaquine. Co-blister packs of separate scored tablets containing 50 mg of Artesunate and 153 mg base of amodiaquine respectively, are also available.

Therapeutic dose: A dose of 4 mg/kg/day Artesunate and 10 mg/kg/day amodiaquine is given once or twice a day for 3 days, with a therapeutic dose range between 2–10 mg/kg/day Artesunate and 7.5–15 mg/kg/dose Amodiaquine. It is given orally. The dosing should be done according to body weight. Health facilities therefore need to have weighing scales.

Artesunate-Amodiaquine Co-Blistered Formulation*:*
In the co-blistered formulation, tablets of each drug come packaged together. The Artesunate and Amodiaquine should always be given together. They may be administered either as a single dose each day (refer to Table 1) or as daily divided doses (Table 2). In the case of divided doses, half the total daily dose is given 12 hourly.

Table 1: Artesunate + Amodiaquine Co-Blistered Formulation.
Regimen for ONCE DAILY DOSING

Weight (kg)	**Age (yr)**	**Artesunate 50 mg tablets**			**Amodiaquine 150 mg base tablets**		
		Day 1	*Day 2*	*Day 3*	*Day 1*	*Day 2*	*Day 3*
5-10 kg	Under 1	½ tab	½ tab	½ tab	½ tab	½ tab	½ tab
10-24 kg	1-6	1 tab	1 tab	1 tab	1 tab	1 tab	1 tab
24-50 kg	7-13	2 tabs	2 tabs	2 tabs	2 tabs	2 tabs	2 tabs
50-70 kg	14-18	3 tabs	3 tabs	3 tabs	3 tabs	3 tabs	3 tabs
≥70 kg	≥18	4 tabs	4 tabs	4 tabs	4 tabs	4 tabs	4 tabs

Note: *The dose in mg/kg body weight is: Amodiaquine 10mg/kg body weight + Artesunate 4mg/kg body weight, taken as a SINGLE DOSE daily for three (3) days, after meals.*

Table 2: Artesunate + Amodiaquine Co-Blistered Formulation.
Regimen for TWICE DAILY DOSING

Wt. (kg)	Age (yr)	Artesunate 50 mg tablets						Amodiaquine 153 mg base tablets					
		Day 1		*Day 2*		*Day 3*		*Day 1*		*Day 2*		*Day 3*	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
5-10	Under 1	¼ tab	¼ tab	¼ tab	¼ tab	¼ tab	¼ tab	¼ tab	¼ tab	¼ tab	¼ tab	¼ tab	¼ tab
10-24	1-6	½ tab	½ tab	½ tab	½ tab	½ tab	½ tab	½ tab	½ tab	½ tab	½ tab	½ tab	½ tab
24-50	7-13	1 tab	1 tab	1 tab	1 tab	1 tab	1 tab	1 tab	1 tab	1 tab	1 tab	1 tab	1 tab
50-70	14-18	1½ tabs	1½ tabs	1½ tabs	1½ tabs	1½ tabs	1½ tabs	1½ tabs	1½ tabs	1½ tabs	1½ tabs	1½ tabs	1½ tabs
≥ 70	≥18	2 tabs	2 tabs	2 tabs	2 tabs	2 tabs	2 tabs	2 tabs	2 tabs	2 tabs	2 tabs	2 tabs	2 tabs

Note: *The dose in mg/kg body weight Amodiaquine 10mg/kg body weight + Artesunate 4mg/ kg body weight, taken as TWO DIVIDED DOSES after meals daily for three (3) days.*

Artesunate-Amodiaquine Fixed Dose Combination Therapy:

Since 2007, a fixed dose combination formulation has been prequalified by WHO and adopted for use in Ghana. The tablets are water dispersible. The product is available in four presentations for four age ranges (2-11 months, 1-6 years, 7-13 years and 14 years and above) and each presentation is easily identified with a specific color code and pictograms to ensure appropriate usage. These four presentations make possible a simple dosing regimen. (Refer to Table 3).

Table 3: Artesunate + Amodiaquine Fixed Dose Combination Standard Regimen, using the four available dosing strengths given 12hourly

Weight (kg)	Age (yr)	Tablet Dosing Strength	Day 1		Day 2		Day 3	
≤8 kg	2-11 months. "Infants"	**AS: 25mg AQ: 67.5mg**	½ tab	½ tab	½ tab	½ tab	½ tab	½ tab
9-17 kg	1-6 years "Young Children"	**AS: 50mg AQ: 135mg**	½ tab	½ tab	½ tab	½ tab	½ tab	½ tab
18-35 kg	7-13 years "Children"	**AS: 100 mg AQ: 270mg**	½ tab	½ tab	½ tab	½ tab	½ tab	½ tab
≥36 kg	>13 years "Adolescents & Adults"	**AS: 100mg AQ: 270mg**	1tab	1tab	1tab	1tab	1tab	1tab

* *Each tablet contains both Artesunate (AS) and Amodiaquine (AQ), at the dosages indicated. The product packaging clearly indicates which dosing strength applies to which age group.*

Use of the fixed dose combination product improves adherence and ease of administration.

3.5.1.3 Dosing Guidelines for Artemether-Lumefantrine

This is currently available as a fixed-dose formulation with dispersible or standard tablets containing 20 mg of artemether and 120 mg of lumefantrine.

Therapeutic dose: The recommended treatment is a 6-dose regimen over a 3-day period. The dosing is based on the number of tablets per dose according to pre-defined weight bands (5–14 kg=1 tablet; 15–24 kg=2 tablets; 25–34 kg = 3 tablets; and > 34 kg= 4 tablets) for 3 days. This extrapolates to 1.7/12 mg/kg body weight of Artemether and lumefantrine, respectively, per dose with a therapeutic dose range of 1.4–4 mg/kg of Artemether and 10–16 mg/kg of Lumefantrine. Lumefantrine absorption is enhanced by co-administration with fat containing meal. It is essential that patients or caregivers are informed of the need to take this ACT immediately after a meal or a drink containing at least 1.2 g of fat particularly on the second and third days of treatment. A flavoured dispersible tablet paediatric formulation of Artemether plus Lumefantrine is now available, enhancing its use in young children. Dosing regimen: time 0, 8hours, then 12hourly for a total of 3 days.

Note:	*Arthemether- Lumefantrine is not recommended for infants under 5 kg or under 6 months of age. (Refer to Table 4 below)*

Table 4: Artemether + Lumefantrine Recommended Dosing Regimen

Artemether + Lumefantrine*							
Weight	**Age**	**Day 1**		**Day 2**		**Day 3**	
		First Dose	*After 8hrs*	*Morning*	*Night*	*Morning*	*Night*
Under 5 kg	< 6 months	**Not recommended for patients under 5 kg**					
5-15 kg	6 months – 3 years	1 tab	1 tab	1 tab	1 tab	1 tab	1 tab
15-25 kg	3-8 years	2 tabs	2 tabs	2 tabs	2 tabs	2 tabs	2 tabs
25-35 kg	8-12 years	3 tabs	3 tabs	3 tabs	3 tabs	3 tabs	3 tabs
35 kg and Above	>12 years	4 tabs	4 tabs	4 tabs	4 tabs	4 tabs	4 tabs

Note:	*Each tablet contains Artemether 20mg + Lumefantrine 120 mg.*

3.5.1.4 Dosing Guidelines for Dihydroartemisinin Piperaquine

This is currently available as a fixed-dose combination with tablets containing 40 mg of dihydroartemisinin and 320 mg of piperaquine.

Therapeutic dose: A dose of 4 mg/kg/day dihydroartemisinin and 18 mg/kg/day piperaquine once a day for 3 days, with a therapeutic dose range between 2–10 mg/kg/day dihydroartemisinin and 16–26 mg/kg/day piperaquine.

Refer to Table 5 below

Table 5: Dihydroartemisinin Piperaquine (DHAP) Dosing Regimen for the 40mg/320mg formulation

Weight (Kg)	**Age (Years)**	**Dihydroartemisinin(DHA)/Piperaquine (P) 40 mg/320 mg base tablets**		
5-10	Under 1	**Day 1**	**Day 2**	**Day 3**
		½ tab	½ tab	½ tab
11-24	1-6	1 tab	1 tab	1 tab
24-50	7– 13	1½ tab	1½ tab	1½ tab
50-70	14-18	2 tabs	2 tabs	2 tabs
≥70	≥18	3 tabs	3 tabs	3tabs

NB: *Parental anti-malarials given as initial start doses must be avoided in treatment of uncomplicated malaria.*

3.5.1.5 Dosing Guidelines for Paracetamol

Treatment of fever with paracetamol is a recommended part of supportive care for malaria, especially in children. Paracetamol in tablet, syrup or suppository forms may be given every 4-6 hours until the temperature is normal. *(Refer to Tables 6 and 7)*.

For children above 14 years and for adults, Aspirin (acetyl salicylic acid) may be given instead of Paracetamol. The dose of Aspirin is 325 to 650 mg every 4-6 hours as needed.

NB: *Aspirin should not be given to children below 14years, due to the risk of Reye's syndrome. Aspirin should not be given to pregnant women, nor to breastfeeding mothers.*

Table 6: Dosing Regimen for Paracetamol Tablets (500mg per tablet)

Paracetamol Tablets (500 mg)		
Age (years)	**Dose**	**Number of tablets**
< 1	125 mg	¼ tab
1-5	250 mg	½ tab
6-9	500 mg	1 tab
10-14	750 mg	1½ tabs
≥50	1000 mg	2 tabs

Table 7: Dosing Regimen for Paracetamol Syrup (120mg per 5ml syrup)

Paracetamol Syrup (120mg per 5ml)		
Age	**Dose**	**Volume of Syrup**
0-6 months	60 mg	2.5 ml
7-24 months	120 mg	5 ml
2-4 years	180 mg	7.5 ml

Note: *Paracetamol is given at a dose of approximately 10mg/kg every 4-6 hours until temperature is normal*

3.6 Assessment and Management of Treatment Failures

True treatment failure (also called therapeutic failure) occurs when a patient with confirmed uncomplicated malaria, has completed the correct dosage and followed the regimen of the nationally recommended anti-malarial treatment, and presents with asexual parasitaemia on a blood smear within 28 days of the start of treatment.

Patients who have been diagnosed with malaria and treated may fail to improve for various reasons including:

- The presenting symptoms, such as fever, were due to a cause other than malaria.
- The treatment was inadequate (the patient was not prescribed the full recommended dose; or did not take the medication as directed).
- The patient may have vomited the medication.
- The drug administered may have been of poor quality.
- The malaria parasite may be resistant to the medication administered.

In the event of suspected treatment failure, the following should be established:

a. Whether patient complied with the treatment regimen.

b. Absence of other differential diagnosis of common febrile illness such as upper respiratory tract infections and urinary tract infection.

c. Presence of malaria parasites in blood film as established through microscopy.

NB: *Recurrence of parasitaemia after 28 days is considered as a new infection and should be treated with the first ACT used.*

For the management of treatment failures the following options are recommended:

- An alternative ACT; Artesunate-Amodiaquine, Artemether-Lumefantrine or Dihydroartemisinin-Piperaquine which has not been administered as initial treatment.

- If for any reason ACT cannot be administered then oral quinine could be used.

- Oral quinine 10mg/kg body weight 8 hourly plus tetracycline 250mg 6 hourly or doxycycline100mg twice daily or clindamycin 5mg/kg body weight (maximum 300mg) 8hourly must all be given for a total of 7 days).

Treatment Failure should be distinguished from Inadequate Treatment.
Inadequate treatment can be defined as failure to complete the initial course of treatment for whatever reason (e.g. vomiting, non-compliance, etc.) In case of inadequate treatment a full course of the initial drug used should be repeated.

3.7 Referral

3.7.1 Criteria for Referral

These essentially include two elements, namely; severe disease and failure to respond to recommended therapy. One or more of the following criteria listed below is an indication for referral of a malaria patient to a hospital:

- Altered consciousness (confusion, change in behaviour, delirium, coma persisting for over 30 minutes after convulsion).
- Repeated convulsions (fits) – 2 or more within 24 hours.
- Inability to drink or breast feed.
- Repeated vomiting and inability to retain oral medication, food and fluids.
- Severe dehydration.
- Hypothermia (axillary temperature of 35.7ºC or below).
- Persistent hyperpyrexia in children (axillary temperature≥38.5°C)
- Severe anaemia (pallor).

- Circulatory collapse or shock, (feeble, weak, rapid pulse and cold extremities).
- Acute renal failure (little or no urine)
- Obvious jaundice (yellowish coloration of the sclera of the eyes).
- Pregnant women with persistent high-grade fever (axillary temperature of ≥38.5 C) not responding to treatment. (refer after start of therapy)
- Failure to respond to initial treatment within two to three days.
- Severe reactions to anti-malarial drugs.
- Other conditions that cannot be managed locally.

If the patient is already being managed in a hospital, the presence or persistence of the above conditions may prompt referral to a higher level of care. The decision to refer from a lower level hospital to a higher level (e.g. district to regional) will depend on the capacity of the referring health facility, the patient's clinical course, and the feasibility of referral options.

3.7.2 Steps to Take During a Referral

When sending the patient on referral, remember to:

i. Start initial treatment before referral. The following are options for pre-referral treatment.

Administer a start dose of:

a. Rectal Artesunate (10mg/kg body weight;) OR
b. IV/IM Artesunate (2.4mg/kg body weight)

If *a* or *b* not available give *c* or *d*

c. IM Quinine (10mg/kg body weight) OR
d. IM Artemether (3.2mg/kg as a loading dose)

Refer to Section 4.0 for further guidance, including dosage regimen.

ii. If referral is not possible immediately, continue treatment until referral is possible.
iii. Have the patient lie down on his/her side during the journey to avoid aspiration in case of vomiting.
iv. Continue feeding if possible.
v. Send a staff with the patient if possible.
vi. Send a clear letter or referral form about the clinical picture, the type of treatment given, dosages, times and route of administration for any medications given.

Refer to the Annexe B for a Sample Referral Form.

3.8 Treatment of Uncomplicated Malaria in Pregnant Women

Pregnancy places a woman at risk of increased frequency of malaria episodes, and increased severity of malaria illness.

3.8.1 Diagnosis

In all pregnant women with fever or history of fever, a confirmatory diagnostic test for malaria is recommended (microscopy or rapid diagnostic test). Due to the risk of adverse drug effects in the first trimester of pregnancy, it is especially preferable to confirm the presence of malaria parasites before treatment is initiated. However, unavailability of laboratory testing should not be a reason for withholding anti-malaria treatment in pregnant women.

Other conditions including urinary tract infection; pneumonia; enteric fever; intra-uterine infections (chorioamnionitis) may present with fever during pregnancy. To rule out other non-malarious causes of fever, it is therefore essential to take a comprehensive history and conduct a thorough examination, followed by a request for other relevant laboratory investigations (such as urine analysis).

3.8.2 Treatment in the First Trimester

The drug of choice for uncomplicated malaria for pregnant women in the first trimester is oral Quinine. Two options are available:

- Oral Quinine at 10mg/kg body weight (max 600 mg) three times per day for seven days. OR
- Oral Quinine (10mg/kg body weight) in combination with Clindamycin (5 mg/kg body weight) 3 times daily for 3 days may be used. Clindamycin should be administered with food and copious amounts of water.

ACTs are not recommended for use in the first trimester. However, their use shall not be withheld in cases where they are considered to be life saving, or where other anti-malarials are considered to be unsuitable, including the possibility of non-compliance with a 7 day treatment with quinine.

3.8.3 Treatment in the Second and Third Trimesters

In the second and third trimesters, ACTs are recommended for the treatment of uncomplicated malaria. The options are:

- Artesunate-Amodiaquine for 3 days (adult dosage as in Tables 1, 2,3) OR
- Artemether-Lumefantrine for 3 days (adult dosage as in Table 4).

3.8.4 Management of Treatment Failure in Pregnancy

Treatment failure is said to occur if fever and parasitaemia fail to resolve or recur within 28 days of receiving the above listed treatments. True treatment failure, however, is very rare. The following should be established before a diagnosis of treatment failure is made:

a. The pregnant woman still presents with signs and symptoms of malaria.
b. That she completed the full treatment course and did not vomit after taking medications.
c. That the symptoms are not due to other common infections such as ear, nose, throat, urinary tract infection, chorioamnionitis, enteric fever (typhoid), etc.
d. That the presence of malaria parasites is confirmed through microscopy.

In the event of treatment failure, the alternative drug to be used depends on which medicine was given first. The options are shown in the Table 8. Note that ACTs are not recommended for use in the first trimester; however, their use shall not be withheld in cases where they are considered to be life-saving or where other anti-malarials are deemed to be unsuitable. In the second or third trimester, an ACT can be used (either Artesunate-Amodiaquine or Artemether-Lumefantrine).

Table 8: Drug selection for treatment failure in pregnancy

Drug Used Initially		Alternatives for Treatment Failure
1st Trimester	Quinine	Artesunate + Amodiaquine or Artemether+Lumefantrine
	Quinine + Clindamycin (for 7 days)	Artesunate + Amodiaquine or Artemether+Lumefantrine
2nd or 3rd Trimester	Artesunate + Amodiaquine	Quinine + Clindamycin or Artemether + Lumefantrine
2nd or 3rd Trimester	Artemether + Lumefantrine	Quinine + Clindamycin or Artesunate + Amodiaquine

- Combination of Quinine and Clindamycin should be given for 7 days for treatment failure

4.0 SEVERE/COMPLICATED MALARIA

SEVERE/COMPLICATED MALARIA IS A MEDICAL EMERGENCY
The objective of management is to prevent deaths from the direct effect of the disease or its complications through the use of appropriate emergency supportive measures, diagnostics and the recommended anti-malaria medications.

4.1 Introduction

Delay in diagnosis and inappropriate treatment of uncomplicated malaria especially in infants and children can lead to the rapid development of severe/complicated malaria. It mostly occurs in children under five (5) years of age, pregnant women and non-immune individuals. The principles of diagnosis and treatment for adults are the same as in children. The most common complications of severe/complicated malaria responsible for most deaths particularly in children under 5 years of age are:

- Cerebral malaria – Prolonged coma not attributed to any other cause in a patient with falciparum malaria.
- Respiratory distress (acidosis)
- Severe anaemia
- Hypoglycaemia
- Severe dehydration

All cases diagnosed as severe/complicated malaria should be referred promptly for hospitalisation.

4.2 Diagnosis of Severe/Complicated Malaria

As with uncomplicated malaria, the diagnosis of severe/complicated malaria is based on a comprehensive history taking, examination and confirmation with laboratory testing. The patient is likely to have experienced some of the typical symptoms of malaria. These may have included: chills, rigors, headache, body aches, sweating, nausea/vomiting, loss of appetite, and/or abdominal pain.

In <u>all patients</u>, clinical diagnosis of severe/complicated malaria should be made in a patient with:

- fever (history of fever or axillary temperature≥ 38.5°C) PLUS
- any "sign of severe/complicated malaria" from the list below.

In <u>young children</u>, a clinical diagnosis of severe/complicated malaria can also be made if there is;

- fever (history of fever or axillary temperature ≥ 38.5°C) PLUS
- any "general danger sign in young children" from the list "Signs of Severe/complicated malaria".

Severe/complicated malaria is caused by Plasmodium falciparum infection, and is confirmed by the presence of the asexual parasite forms in the blood. While laboratory tests should not delay the initiation of treatment, **it is mandatory to test for *Plasmodium falciparum*. Parasitological confirmation should be established by microscopy (preferred) or RDT.**

Note: *High parasitaemia is not always present in severe disease, and the initial blood slide examination may be negative. Where there is high clinical suspicion of malaria, the test should be repeated at 6 hourly intervals.*

4.2.1 Signs of Severe/Complicated Malaria

Malaria is considered as severe if a patient has any one or combination of the following clinical manifestations and laboratory findings:
Clinical Findings:

- Altered consciousness (change of behaviour, confusion, delirium, coma persisting for over 30 minutes after convulsion).
- Repeated generalised convulsions (fits) – 2 or more within 24 hours.
- Difficulty in breathing or pulmonary oedema.
- Spontaneous unexplained heavy bleeding (Disseminated Intravascular Coagulation).
- Marked jaundice (yellowish colouration of the eyes).
- Prostration i.e. generalised weakness, such that the patient cannot walk or sit without assistance.
- Hyperpyrexia (axillary temperature ≥ 38.5°C).
- Inability to take fluids or anything orally.
- Repeated profuse vomiting.
- Circulatory collapse or shock (cold limbs, weak rapid pulse) (systolic BP of less than 80mmHg in adults and less than 50mmHg in children.

Laboratory Findings:

- Severe normocytic anaemia (severe anaemia; haematocrit <15% or Hb <5g/dl).
- Signs of hypoglycemia (sweating, pupillary dilation, abnormal breathing, coldness, blood sugar- <40mg/dl. or 2.2mmol/L).
- Renal Impairement -Signs of renal failure (passing very little urine)-Serum creatinine >265umol/l.
- Signs of haemoglobinuria (dark or cola-colored urine).
- Hyperparasitaemia (250,000 parasites/microlitre).

4.2.2 General Danger Signs in Young Children

The term "general danger sign" represents an important concept in Integrated Management of Neonatal and Childhood Illnesses (IMNCI) (Refer Annex E for details). These are non-specific clinical findings that suggest the presence of serious underlying illness. When assessing a young child for malaria or any other acute condition, look for these general danger signs:

- The child is unable to drink or breast feed.
- The child is vomiting everything he/she drinks or eats.
- The child has history of convulsions during the current illness.
- The child is lethargic, unconscious, or convulsing during the examination.

A child with fever and any general danger sign should be diagnosed and treated for severe/complicated malaria. Laboratory confirmation with microscopy or RDT should be done concurrently. The child should also be examined and investigated for other causes of fever e.g. acute respiratory infection, pneumonia, septicemia, otitis media, meningitis, etc. and appropriately managed in addition to the specific treatment for malaria.

4.3 Management of Severe/Complicated Malaria before Referral

The condition of the patient with severe/complicated malaria can deteriorate very rapidly.

The goals of management of severe/complicated malaria are to provide:

- Urgent treatment of life threatening problems.
- Anti-malarial treatment which is specific for severe/complicated malaria.
- Appropriate supportive care throughout the period of illness.

When severe/complicated malaria is identified in the outpatient setting, parenteral treatment (IV/IM medication) should begin promptly. This section provides guidance on management of severe/complicated malaria in the outpatient setting, prior to referral.

Blood samples should be taken for microscopy or RDTs but patients' referral should not be delayed in the quest of waiting for test results.

Start initial IV anti-malaria treatment and supportive care immediately while waiting for the patient to be transferred. In situations where the IV route is not feasible, start:

- Rectal Artesunate (10mg/kg BW) (Tables 9 and 10) OR
- Intramuscular Artesunate (2.4mg/kg body weight) OR
- Intramuscular Quinine (10mg/kg body weight), OR
- Intramuscular Artemether (3.2mg/kg body weight as a loading dose).

If referral is not feasible immediately, continue treatment until the referral becomes possible. For dosage regimens, see the sections below on IM Artesunate, (Section 4.3.2) IM Quinine (Section 4.3.3), Rectal Artesunate (Section 4.3.1), and IM Artemether (Section 4.3.3.3).

4.3.1 Administration of Rectal Artesunate

Rectal Artesunate is to be used in the pre-referral setting. It is especially appropriate for the home/community setting, where there are no trained health workers who can administer injections. Give a single dose at the time the decision to refer is made.

The dosage is 10 mg/kg body weight to be administered as a single dose rectally (Table 9 and 10).

In the event that an artesunate suppository is expelled from the rectum within 30 minutes of insertion, a second suppository should be used especially in young children. The buttocks should be held together for 10 min to ensure retention of the rectal dose of artesunate.

Table 9: Rectal Artesunate (Pre-Referral Treatment in Children)

Weight (kg)	Age	Artesunate Dose (mg)	Regimen
5 – 8	0 – 12 months	50	One 50mg suppository
9 – 19	13 – 42 months	100	Two 50mg suppositories
20 – 29	43 – 60 months	200	One 200mg suppository
30 – 39	6 – 13 years	300	Two suppositories of the 50mg and one of the 200mg suppository
>40	> 14 years	400	Two of the 200mg suppositories

Table 10: Rectal Artesunate (Pre-Referral Treatment in Adults)

Weight (kg)	Artesunate Dose (mg)	Regimen
40 – 50	400	Two of the 200mg suppositories
60 – 80	800	Four of the 200mg suppositories
>80	1200	Six of the 200mg suppositories

4.3.2 Administration of Intramuscular Artesunate Before Referral

Dosage for IM Artesunate

For adults and children, Artesunate 2.4 mg/kg body weight must be given at time 0 hour, then at 12 hours and 24 hours, then once daily. In situations where the patient is still within the facility following referral, parenteral treatment should be continued while waiting until patient leaves.

Table 11: How to reconstitute Artesunate injection for IM use

30mg vial	60mg vial	120mg vial
Step 1 1 Add **0.5ml** of the **SODIUM BICARBONATE** SOLUTION to the vial containing the powder.	**Step 1** 1. Add 1ml of the **SODIUM BICARBONATE** to the vial containing the powder.	**Step 1** 1. Add 2ml of **SODIUM BICARBONATE** to the vial containing the powder.
Step 2 2 Gently Shake for 2-3 minutes to ensure dissolution into a clear solution.	**Step 2** 2. Shake for 2-3 minutes to ensure dissolution into a clear solution.	**Step 2** 2. Shake for 2-3 minutes to ensure dissolution into a clear solution.
Step 3 3 Add approximately 1ml of **NORMAL SALINE** to the clear solution obtained in step 2 to obtain a solution of **20mg** Artesunate per ml (total vol. 1.5ml).	**Step 3** 3 Add approximately 2ml of **NORMAL SALINE** to the clear solution obtained in step 2 to obtain a solution of **20mg** Artesunate per ml (total volume 3ml).	**Step 3** 3 Add approximately 4ml of **NORMAL SALINE** to the clear solution obtained in step 2 to obtain a solution of **20mg** Artesunate per ml (total volume 6ml).
Step 4 4 Withdraw the required amount of solution and inject at the chosen site.	**Step 4** 4 Withdraw the required amount of solution and inject at the chosen site.	**Step 4** 4 Withdraw the required amount of solution and inject at the chosen site.

4.3.3 Administration of Intramuscular Quinine

4.3.3.1. Intramuscular Quinine in Young Children.

The dosage is 10 mg (0.2ml) per kg body weight every 8 hours. Calculate the volume to be given, based on body weight (Table 12).

- Weigh the child.
- Prepare a Quinine dilution of 50mg/ml: use a 10ml sterile syringe and needle to draw up 5mls of sterile water for injection or saline (not dextrose). Then into the same syringe draw up 300mg (1ml) from an ampoule of Quinine. The syringe now contains 50mg Quinine per ml.
- Administer by intramuscular injection to the thigh. If the calculated volume exceeds 3ml, inject half the dose into each thigh.

Table 12: Dosing Regimen for Quinine IM Injection in Young Children

Body Weight (kg)	Volume of Quinine Dihydrochloride Inj. (50 mg/ml dilution)
< 5 kg	1.0ml
5.1 – 7.5 kg	1.5ml
7.6 – 10.0 kg	2.0ml
10.1 – 12.5 kg	2.5ml
12.6 – 15.0 kg	3.0ml
15.1 – 17.5 kg	3.5ml – half to each thigh
17.6 – 20.0 kg	4.0ml – half to each thigh
20.1 – 22.5 kg	4.5ml – half to each thigh
22.6 – 25.0 kg	5.0ml – half to each thigh
25.1 – 27.5 kg	5.5ml – half to each thigh
27.6 – 30.0 kg	6.0ml half to each thigh

Note:	*The dosage for IM Quinine is 10 mg (0.2ml) per kg of body weight every 8 hours.*

4.3.3.2 Intramuscular Quinine In Adults.

The dosage is 10 mg/Kg body weight of Quinine given 8 hourly by deep IM injection, to a maximum dose of 600 mg.

- Use a Quinine dilution of 100 mg/ml. To prepare this, draw 2mls of Quinine 600mg and add 4mls of sterile water or saline (not dextrose).
- Small adults (weighing less than 60 kg) should be given the correct calculated dose for weight. Larger adults will simply receive the maximum dose (600mg).
- If the required volume is more than 5ml, divide it into two and inject at separate sites.

4.3.3.3 Administration of Intramuscular Artemether

The dose of IM Artemether is 3.2mg per kg body weight as a loading dose, then 1.6mg/kg body weight daily till the patient can tolerate oral therapy or up to a maximum of five days.

NB:	*Artemether injection should only be used in children if none of the alternatives are available as its absorption may be erractic.*

4.3.4. Supportive Treatment for Severe/Complicated Malaria in the Outpatient Setting

Use of Antipyretics

In young children, high temperatures are associated with vomiting, often regurgitating their medication, and seizures. Treatment is with antipyretics and, if necessary, fanning and tepid sponging. Antipyretics should be used if axillary temperatures are ≥ 38°C) and the patient can tolerate oral medication. Paracetamol (acetaminophen) 15 mg/kg every 4 hours is widely used; it is safe and well tolerated, given orally or as a suppository (Refer Tables 6 and 7 for dosing).

Management of Convulsions

Generalised seizures are common in children with *P. falciparum* malaria. In case of convulsions the following should be done:

- Clear and maintain airway
- Treat with diazepam:
  - A slow intravenous injection of diazepam [0.15mg/kg body weight, (maximum 10mg)] for adult will usually control convulsions.
  - Diazepam can also be given rectally (0.5 – 1.0mg/kg body weight) if injection is not possible.
- If convulsions reoccur, repeat the treatment, if they persist, give phenobarbitone 10mg/kg body weight IM injection. This may be repeated once; maximum total dose is 20mg/kg/24 hours. The adult dose is 200mg and may be repeated after 6 hours.

Nursing Care

- Provide good nursing care: For example, keep an unconscious patient on his or her side and monitor vital signs.
- Prevent or correct dehydration by encouraging to drink or breastfeed, and by giving ORS. Unconscious patients should receive ORS by nasogastric tube.
- Prevent and/or manage hypoglycaemia:
- Continue feeding the patient if possible.
- If a child is able to breastfeed, encourage the mother to breastfeed the child.
- If a child is not able to breastfeed but is able to swallow, give expressed breast milk, or if not available, give "sugar water." A young child should be given 30 - 50 ml of milk or sugar water before departure.

- If child is not able to swallow, give 50ml of milk (expressed breast milk) or sugar solution by nasogastric tube, if trained to do so.
- To make "sugar water", dissolve 4 level teaspoons of sugar or 2 cubes (20 grams) in a 200 ml cup of clean water.

4.4 Management of Severe/Complicated Malaria in Hospital

4.4.1 Initial Patient Evaluation

(a) Assess Airway, Breathing and Circulation.

(b) Assess the patient by looking for:

- Dehydration
- Repeated Convulsions
- Signs of shock and collapse
- Anaemia
- Pulmonary Oedema
- Level of Consciousness (use Glasgow or Blantyre Coma scales)
- Hyperpyrexia
- Urine Output

(c) Do the following laboratory tests immediately:

- Microscopy for malaria parasites-thick and thin blood films. (If microscopy is not available, an RDT should be used.)
- Haemoglobin (Hb) and/or Haematocrit (Hct).
  If Hb<5gm/dl and Hct<15 - 20%, do grouping and cross-matching for possible transfusion.
- Lumbar Puncture (LP) for cerebrospinal fluid following convulsions or comatose patient in order to exclude other causes of convulsions and coma (funduscopy must be done to rule out raised Intracranial Pressure before LP is conducted).
- Urea /creatinine, and electrolytes, if available.
- Blood glucose, hypoglycaemia-present if glucose is <2.2mmol/L or <40mg/dl).
- Additional tests if available: Full blood cell count, platelet count, clotting studies, blood culture, plasma bicarbonate, plasma lactate.

(d) Start treatment whilst waiting for results of laboratory investigations:

- Secure the airway in an unconscious patient. Consider intubation.
- Insert an IV cannula.
- Weigh the patient, or estimate the body weight (for calculation of medication and fluid regimens).
- Administer parenteral anti-malarial medications (as below).
- Provide additional supportive therapy (as below).

4.4.2 Anti-malarial Medication for Severe Malaria

Following rapid clinical assessment and parasitological confirmation of the diagnosis, full parenteral doses of an appropriate anti-malarial should be started without delay. Parenteral treatment provides adequate blood-serum concentrations as quickly as possible initially. The available options in order of preference are: IV/IM Artesunate, IM Artemether, IV/IM Quinine.

Parenteral treatment should continue until patient is well enough to swallow, and for at least 24 hours even if the patient is well enough to swallow before 24hours. Treatment should then be completed by giving a full 3-day course of an oral ACT (Artesunate-Amodiaquine, Artemether-Lumefantrine, Dihydroartemisinin-Piperaquine).

4.4.2.1 Dosage for IV Artesunate

- Parenteral Artemisinins in the treatment of severe/complicated malaria should be given for a minimum of 24 hours, once started (irrespective of the patient's ability to tolerate oral medication earlier).

- For adults and children, Artesunate 2.4 mg/kg body weight given IV on admission (time =0), then at 12 hours and 24 hours then every 24 hours must be given. The total duration must be a maximum of seven days.

Reconstituting Parenteral Artesunate

Artesunate is dispensed as a powder of artesunic acid in vials of 30mg, 60mg or 120mg and usually in packs containing sodium bicarbonate solution and normal saline.

Check the brand available at your facility and follow the general instructions provided below.

Table 13: Reconstitution of Parenteral Artesunate for IV use

30mg vial	60mg vial	120mg vial
Step 1 Add 0.5ml of the **SODIUM BICARBONATE** solution to the vial containing the powder.	**Step 1** Add 1ml of the **SODIUM BICARBONATE** to the vial containing the powder.	**Step 1** Add 2ml of **SODIUM BICARBONATE** to the vial containing the powder.
Step 2 Gently Shake for 2–3 minutes to ensure dissolution into a clear solution.	**Step 2** Gently Shake for 2–3 minutes to ensure dissolution into a clear solution.	**Step 2** Gently Shake for 2–3 minutes to ensure dissolution into a clear solution.
Step 3 For IV use, ADD approximately 2.5ml of normal saline to the clear solution to produce 3ml of solution with concentration 10mg Artesunate /ml.	**Step 3** For IV use, ADD approximately 5ml of normal saline to the clear solution to produce 6ml of solution with concentration 10mg Artesunate /ml.	**Step 3** For IV use, ADD approximately 10ml of normal saline to clear solution to produce 12ml of solution with concentration 10mg Artesunate /ml.
Step 4 4. Withdraw the required amount of the solution and inject slowly at a rate of 3-4ml per minute.	**Step 4** 4. Withdraw the required amount of the solution and inject slowly at a rate of 3-4ml per minute.	**Step 4** 4. Withdraw the required amount of the solution and inject slowly at a rate of 3-4ml per minute.

NB: *5% Dextrose can be used in the absence of normal saline in step 3. AVOID the use of water for injection.*

4.4.2.2 Quinine Administration

Quinine should be given either by IV in dextrose infusion or IM until patient can swallow, then treatment shall be continued with oral Quinine. It should always be given by slow rate-controlled infusion, never by bolus intravenous injection. For safety, the dosage of quinine must strictly be adhered to.

a) Intravenous (IV) Administration of Quinine

- Give Quinine as a slow rate controlled IV infusion. The dose is Quinine Hydrochloride salt at 10mg per kg body weight (maximum dose 600mg) 8 hourly in 5-10ml/kg of dextrose saline or in 5% dextrose over 4-8 hours. The infusion rate should not exceed 5 mg salt per kg body weight per hour.

NB:	*Quinine should never be given by IV bolus injection, due to the risk of severe hypotension.*

b) Intramuscular (IM) Administration of Quinine

- Give Quinine by deep IM injection at 10 mg/kg body weight (maximum dose 600 mg) 8 hourly. For IM injection, remember to use sterile water or saline, not dextrose solution. Use the appropriate Quinine dilution for adults or children, as described above in Section 4.3.3 and Table 12.

c) Oral Administration of Quinine to be Included

- The dose of oral Quinine is 10mg per kg body weight (maximum dose 600 mg) every 8 hours to complete 7 days of treatment.
- Oral Quinine should be given concurrently with Clindamycin.

Common ADR of Quinine include cinchonism (ringing sounds in the ears – tinnitus), hearing loss, nausea, uneasiness/restlessness, tremors and blurring of vision. Cinchonism is mild when Quinine is used in the recommended doses and subsides spontaneously when administration of the drug ends. The most serious frequent adverse drug reaction for injectable Quinine is hypoglycaemia, particularly in the 2nd and 3rd trimesters of pregnancy. Serious cardio-vascular and neurological toxicity are rare.

4.4.2.3. Intramuscular Artemether

The dose of IM Artemether is 3.2mg per kg body weight as a loading dose, subsequently 1.6mg/kg body weight once daily up to five days. However, administer a complete course of an ACT once the patient is able to tolerate oral medication or after at least 24 hours of intramuscular injection.

(a) Artemether should not be given in the first trimester unless there are no suitable alternatives. In most other respects, however, the treatment of severe/complicated malaria in pregnancy shall be the same as the treatment of severe/complicated malaria for the general population.

4.4.3 Supportive Therapy for Severe/Complicated Malaria in Hospital

Timely provision of supportive care is often crucial for the survival of patients with severe/complicated malaria. Supportive care may include the following:

- Blood Transfusion for severe anaemia.
- Ensure fluid and electrolyte balance.
- Anti-convulsants for convulsions.
- Anti-pyretics for hyperpyrexia.

General guidelines for supportive care in the hospital setting are as follows:

a. ***Convulsions:*** Clear and maintain the airway. Treat promptly with IV or rectal diazepam. A slow intravenous injection of diazepam [0.15mg/kg body weight, (maximum 10mg)] for adult will usually control convulsions. Diazepam can also be given rectally (0.5 – 1.0mg/kg body weight) if injection is not possible. If convulsions reoccur, repeat the treatment. If convulsion persist, give Phenobarbitone 10mg/kg body weight IM injection. This may be repeated once; maximum total dose is 20mg/kg/24 hours. The adult dose is 200mg and may be repeated after 6 hours.

b. ***Coma:*** Clear and maintain the airway. Intubate if necessary. Place the patient on his or her side. Exclude other treatable causes of coma (such as hyperglycaemia, and bacterial meningitis).

c. ***Treatment of Hypoglycemia:*** Check blood glucose (hypoglycaemic if <2.2 mmol/l or <40 mg/100ml). Give 50mls of 50% glucose by IV bolus injection (for children give 25% glucose, use 1ml/kg body wt.). Follow with IV infusion of 10% glucose. If injectable glucose is not available, give glucose solutions through nasogastric tube (glucose powder or sugar water).

d. ***Prevention of Hypoglycaemia:*** Continue feeding the patient if possible. Encourage a mother to breast feed a child. If the child is not able to breastfeed but is able to swallow: Give expressed breast milk, or if not available, consider giving sugar water. If the child is not able to swallow, give 50ml of expressed breast milk or sugar solution must be given by nasogastric tube. (To make "sugar water" in a limited resource setting, one may dissolve 4 level teaspoons of sugar or 2 cubes (20 grams) in a 200 ml cup of clean water.)

e. ***Hyperpyrexia:*** Provide tepid sponging and fanning. Give Paracetamol at 5mg/kg body weight. See Tables 6 and 7 for dosing.

f. ***Severe Dehydration:*** Provide isotonic fluid (0.9% saline) by IV infusion. Watch out for over-hydration when administering IV fluids. Prevent and/or correct dehydration by encouraging to drink or breastfeed, and by giving ORS.

Unconscious patients should receive ORS by naso-gastric tube. Severe dehydration with metabolic acidosis may manifest as respiratory distress.

Note:	*The routine administration of bolus fluid infusion for resuscitation is contraindicated. Fluid replacement should be tailored to the exact need of the patient.. (caution must be taken in malnourished patients)*

g. ***Pulmonary Oedema:*** Check for over-hydration and stop all intravenous fluids. Prop patient at 45°, give oxygen, give diuretic (Frusemide: 1-2mg /kg of body weight up to a maximum of 40mg by intravenous injection). For life-threatening hypoxaemia, consider intubation with mechanical ventilation.

h. ***Severe Anaemia:*** Diagnosed in patients with Hb <5g/dl, or packed cell volume <15%; and/or in anaemic patient with signs of heart failure (dyspnoea, enlarged liver, gallop rhythm). Transfuse with 10ml per kg body weight packed cells or 20ml per kg of whole blood as appropriate. (Frusemide is given first in cases of heart failure).

i. ***Acute Renal Failure:*** Exclude dehydration, maintain strict fluid balance, monitor fluid input and urine output (urine output: 25-30ml/hour). Carry out peritoneal dialysis or haemodialysis if available.

j. ***Circulatory Collapse or Shock:*** Suspect gram-negative septicaemia. Correct hypovolaemia. Take blood cultures. Give parenteral anti-microbials.

CAUTION:

a. Avoid drugs that increase the risk of gastro-intestinal bleeding:
   - Corticosteroids.
   - Other anti-inflammatory agents, NSAIDs (e.g. Diclofenac, Aspirin).
   - Heparin.

b. Avoid other agents given for cerebral oedema (Urea, Mannitol).

4.5 Monitoring of Severe/Complicated Malaria

a) Monitor the following on routine basis:

i. Level of consciousness (see Blantyre and Glasgow coma scale in the Annexe A).
ii. Vital Signs: blood pressure, body temperature, pulse, respiratory rate four (4) hourly.
iii. Fluid intake/output, including the rate of infusion of fluids.
iv. Urine volume (hourly), colour and specific gravity. If necessary insert urethral catheter to monitor urine output closely.
v. Blood glucose: check 4-hourly while patient is unconscious.
vi. Parasitaemia: obtain on admission (mandatory). While patient is hospitalised, it is recommended to repeat at least six (6) hourly.

vii. Haemoglobin (Hb): obtain if anaemia is suspected to be worsening. At a minimum, check every day while hospitalised.
viii. Occurrence of convulsions.
ix. Uterine contractions and fetal heart rate in pregnant women.

b) Assessment of Recovery

i. Check for neurological sequelae (deficit):
Assess patient for possible neurological sequelae (deficit) of the disease or the treatment. This is important in children, since it is likely that 10% of them may develop neurological sequelae after they recover from cerebral malaria.

- Assess vision and hearing. If deficits found, refer for further evaluation and management.
- Assess neuro-motor functioning. If deficits found, refer for appropriate management.

ii. Perform follow-up laboratory tests on the 7th and 14th days:

- Thick and thin blood films
- Haematocrit
- Haemoglobin

c) For Adults and Children Recovering from Severe Anaemia:

- Give iron and folic acid for two months with regular follow-up
- If child has sickle cell disease, give folic acid only, unless laboratory findings indicate the need for iron supplementation.
- Give anthelmintics as appropriate.

5.0 MALARIA CASE MANAGEMENT AT HOME

Home management of malaria (HMM) is one of the components of Home-Based Care (HBC) or Integrated Community Case Management of childhood illnesses (ICCM) recommended by the Ministry of Health to improve access to prompt and effective treatment of malaria episodes. It is delivered through trained community members living as close as possible to where the children under-five years live. Home Management of malaria allows for coverage of the health services for malaria to extend beyond the reach of health facilities. The inclusion of pre-referral testing with RDTs and treatment with rectal Artesunate is recommended, where feasible.

A brief summary of ICCM guidelines is provided here. For a more complete presentation, refer to the Home Management of Malaria, ARI and Diarrhoea in Ghana: Implementation Guidelines (Ghana Health Service).

5.1 Personnel to Implement Home Management of Malaria

In the Home Management of Malaria intervention, malaria is diagnosed and treated by community health workers and community-based agents. community based agents include appropriately trained members of groups such as: community drug distributors, Licensed chemical sellers, health extension workers, traditional birth attendants, community-based surveillance volunteers, members of village health committees, etc.

5.2 Diagnosis

At the community level, fever or a history of fever should be considered as suspected malaria. Where available, diagnosis should be confirmed with RDT before treatment. However, treatment should not be unduly withheld because of a delay in testing.

In accordance with IMNCI guidelines, every child should be assessed for the general danger signs, and assessment should also be carried out for acute respiratory illness (ARI) and diarrhoea. Refer (Annexe F)

5.3 Treatment

The child may be treated at the community level for uncomplicated malaria if:

- fever is present for 6 days or less
- danger signs are absent
- child is aged 6 to 59 months

The recommended drug for this purpose is Artesunate-Amodiaquine. Supportive care should also be provided, including tepid sponging and administration of paracetamol. The following treatment guidelines apply:

- For dosing regimens of Artesunate-Amodiaquine and Paracetamol, refer to Sections 3.5.1.2 and 3.5.1.5, respectively.
- For dosing regimens of Rectal Artesunate, refer to Section 4.3.1.

ARI, diarrhoea and/or other infections should also be identified and treated, as indicated, in accordance with IMNCI guidelines. The patient must be re-evaluated after 24 hours. If improvement is not seen, referral to a health facility is indicated.

5.4 Criteria for Referral

Safe and effective home management of malaria will require community based Agents (CBA) to adhere carefully to referral criteria. The following categories of patients should not be managed at home, but referred urgently to the nearest community health officer or health center for further evaluation and treatment.

In summary, the following guidelines apply:

(a) Patients requiring immediate referral must not be managed at hom

- Children below 3 months of age.
- Any patient who has had a fever for 7 or more days.
- The child is unable to drink or breastfeed.
- The child is vomiting everything he/she drinks or eats.
- The child has history of convulsions during the current illness.
- The child is lethargic, unconscious, or convulsing during the examination.

(b) Patients not responding to home management after 24 hours

- It is a national policy that all children who do not respond to treatment within 24 hours should be referred immediately to the nearest health facility.
- Such children should be given an initial dose of Artemisinin-based suppository (if available) prior to referral to the nearest health facility. They should also be tepid sponged, and given paracetamol, if available and encouraged to take in increased fluids such as breast milk or ORS.

5.5 Seasonal Malaria Chemoprevention

Seasonal Malaria Chemoprevention (SMC) is the intermittent administration of full treatment courses using the recommended anti-malarial medicine during malaria season to prevent malaria illness with the objective of maintaining therapeutic anti-malarial drug concentrations in the blood throughout the period of greatest malaria risk.

- A complete treatment course of amodiaquine plus sulfadoxine-pyrimethamine (AQ+SP) should be given to children aged between 3 and 59 months at monthly intervals, beginning at the start of the transmission season, to a maximum of four doses during the malaria transmission season (provided both drugs retain sufficient antimalarial efficacy).

Target areas for implementation is the Sahel sub-region where:

- malaria transmission is highly seasonal and the majority of clinical malaria cases occur during a short period of about four months
- the clinical attack rate of malaria is greater than 0.1 attack per transmission season in the target age group
- pharmacovigilance following administration of anti-malarial for SMC is conducted

Note:	*Any child 3–59 months who develops malaria within the period of SMC implementation and has received SMC medications must have parasi-thologcal diagnosis. Treatment with an ACT not containing any component of drugs used for SMC should be given as appropriate.*

6.0 MALARIA IN PREGNANCY

Malaria infection during pregnancy poses substantial risk to the mother, her foetus, and the neonate because pregnant women are less capable of coping with and clearing malaria infections. Women are four times as likely to get sick from malaria if they are pregnant, and twice as likely to die from the disease. In 2012 annual Malaria Report, malaria contributed to about 3.4% of maternal deaths.

Malaria in pregnancy is associated with the following serious complications:

- Maternal Anemia,
- Spontaneous Abortion,
- Pre-term Birth,
- Severe/Complicated Malaria,
- Pre-maturity,
- Low Birth Weight.

This makes it essential not only to treat malaria promptly, but to make special efforts to prevent malaria in pregnancy. As recommended by WHO, Ghana's national strategy for control of malaria in pregnancy has three main components:

- Prompt and effective case management.
- Sleeping under an insecticide-treated net (ITNs).
- Taking medication for intermittent preventive treatment in pregnancy (IPTp) at monthly intervals after 16 weeks. IPTp is important because many pregnant women will harbour malaria parasites without having symptoms.

6.1 Case Management of Malaria in Pregnancy

Case management of malaria in pregnancy is summarised as follows: (details may be found in "Guidelines for Malaria in Pregnancy").

Management of uncomplicated malaria in pregnancy:

- ***First Trimester:***
  - A combination of oral Quinine with Clindamycin, OR
  - Oral Quinine .
  - The Artesunate-Amodiaquine or Artemether Lumefantrine can be used when Quinine is not available, or if compliance to quinine cannot be guaranteed.

- ***Second and Third Trimester:***
  - Artesunate-Amodiaquine
  - Artemether-Lumefantrine

6.2 Management of Severe/Complicated Malaria in Pregnancy

First Trimester

In the first trimester, the risk of hypoglycaemia is lower and the uncertainties over the safety of the Artemisinin derivatives are greater. However, weighing these risks against the evidence that Artesunate reduces the risk of death from severe/complicated malaria, both Artesunate and quinine may be considered as options until more evidence becomes available. Treatment must not be delayed; so if only one of the drugs Artesunate, Artemether or quinine is available, then it should be started immediately.

Second and Third Trimesters

Parenteral Artesunate is preferred over quinine in the second and third trimesters, because Quinine is associated with recurrent hypoglycaemia.

Treatment Regimen:-

- Artesunate 2.4 mg/kg body weight given IV on admission (time =0), then at 12 hours and 24 hours then every 24hours. The total duration must be a maximum of seven days.

Rectal Artesunate can be used for pre-referral treatment.

TREATMENT REGIMEN FOR SEVERE/COMPLICATED MALARIA

IV/IM Artesunate should be given for at least 24 hours. Change to oral medication with a full course of an ACT (Artesunate-Amodiaquine or Artemether-Lumefantrine or Quinine plus Clindamycin) when patient has recovered and can take oral medication

Table14: Treatment Regimen For Severe/complicated Malaria in Pregnancy

Trimester	Drug	Route of Administration	Dosage	Comments
First	Quinine*	Slow IV Infusion OR IM injection **NOTE:** DO NOT GIVE AS IV BOLUS INJECTION.	10mg/kg body wt (max 600mg) 8 hourly (max. 7 days) or until the patient can take oral preparations	Change to Oral Medications when patient can tolerate oral medication. (Combination of oral Quinine with Clindamycin should be given to complete the 7 day course. Quinine: 10mg/kg body weight 8 hourly Clindamycin: 5mg/kg body weight 8 hourly).
Second and Third	Artesunate	I.V./I.M.	2.4 mg/kg body weight per dose to be given at 0, 12 and 24 hours then daily.	IV/IM Artesunate should be given for at least 24 hours. Change to oral Medication with a full course of an ACT (Artesunate-Amodiaquine or Artemether-Lumefantrine) when patient has recovered and can tolerate oral medication.

NB: For IV administration of injection Artesunate, the diluents may be 5% Dextrose or Dextrose/Saline solution. The calculated dose should be administered at a rate not exceeding 5 mg/kg body weight per hour.

For IM administration, Quinine should be diluted in sterile water or saline (not dextrose) to 100mg/ml; Draw 2mls of Quinine 600mg and add 4mls of sterile water or saline and administer by deep IM injection (anterior thigh). If the diluted volume to be administered is more than 5ml, divide into two and inject in separate sites.

In facilities where parenteral Clindamycin is available, it should be administered IV/IM concurrently with Quinine. For IV administration dilute 300mg Clindamycin with 50ml normal saline and infuse over at least 10 minutes

Table 15: Alternative Drug Treatments for Severe/Complicated Malaria

Alternative Treatments for Severe Malaria in Pregnancy				
Trimester	Drug	Route of Administration	Dosage	Comments
All trimesters of pregnancy	Artemether OR	I/M ONLY	Starting dose: 3.2mg/kg body weight them 1.6mg/kg wt per day (maximum of 5 days).	IM Artemether should be given for at least 24 hours. Change to oral medication with a full 3 days course of an ACT(Artesunate-Amodiaquine or Artemether-Lumefantrine) when patient can tolerate oral medication.
	Quinine	IV OR IM	The dose is Quinine Hydrochloride salt at 10mg per kg body weight (maximum dose 600mg) 8 hourly in 5-10ml/kg of dextrose saline or in 5% dextrose over 4-8 hours. The infusion rate should not exceed 5 mg salt per kg body.	Oral Quinine 10mg per kg body weight (maximum dose 600 mg) is given every 8 hours to complete 7 days of treatment. Oral Quinine should be given concurrently with oral Clindamycin.
Second and Third Trimesters and puerperium	Artemether	IM ONLY	Starting dose: 3.2mg/kg body weight, then 1.6 mg/kg body wt per day (maximum of 5 days).	IM Artemether should be given for at least 24 hours. Change to Oral Medication with a full 3 days course of an ACT (Artesunate-Amodiaquine or Artemether-Lumefantrine) as soon as patient can tolerate oral medication.

6.3 Intermittent Preventive Treatment in Pregnancy (IPTp)

In Ghana, Intermittent Preventive Treatment in Pregnancy (IPTp) consists of anti-malarial medication (Suphadoxine–Pyrimethamine) given in treatment doses at predefined intervals.

- The first dose of Suphadoxine–Pyrimethamine (SP) is given at 16 weeks of gestation or quickening.
- Subsequent doses are given at monthly intervals till delivery.
- A minimum of 3 doses must be given during pregnancy.

IPTp is given as part of a comprehensive antenatal package with other services and products e.g.:

- folic acid tablet 0.4 mg or 400 micrograms,
- iron preparations,
- anthelmintics e.g. albendozole.

6.3.1 Dosing of IPTp

- The dose of 3 tablets of SP which contains Sulphadoxine 500mg plus Pyrimethamine 25mg must be given.
- SP is to be administered to pregnant women during routine antenatal visits as directly observed therapy (DOT).
- SP can be given monthly until delivery.
- SP can be given either on an empty stomach or with food.

6.3.2 Exemptions from IPTp

Pregnant women with the following conditions shall be exempted from using SP:

- First trimester of pregnancy (<13 weeks gestation).
- G6PD enzyme full defect or status controversy.
- Severe anaemia.
- Blood dyscracias e.g. neutrophilia, thrombocytopaenia.
- History of epileptic or seizure disorders.
- Severe liver disease or unexplained recurrent jaundice.
- Known allergy to any sulphur containing drugs or allergy to Pyrimethamine.
- History of previous severe adverse reaction to SP.
- Recent treatment with a sulphur containing drug such as Co-trimoxazole (within 4 weeks).
- Breastfeeding.
- Acute case of malaria (should receive appropriate treatment for uncomplicated or severe/complicated malaria).

Folic acid should be given at a dose of 0.4 mg or 400 micrograms daily . This dose can be safely used concurrently with SP dosing.

The 5mg tablet should not be given concurrently with SP administration.

For additional information on IPTp and malaria in pregnancy, refer to the current "Guidelines for Malaria In Pregnancy".

7.0 MALARIA PROPHYLAXIS FOR VISITORS TO GHANA

7.1 Introduction

Prophylactic medication for malaria is recommended for non-immune visitors, because of the risk for severe disease. It is not 100% protective. Those on prophylaxis who develop signs and symptoms suggestive of malaria should seek prompt medical attention to confirm or rule out malaria.

In Ghana, all non-immune travelers exposed to mosquito bites, especially between dusk and dawn, are at risk of malaria.

Residents of Ghana or other endemic areas who have stayed for 6 months or more in non-endemic areas are considered non-immune.

Malaria prophylaxis is not necessary in persons who have been resident in malaria-endemic areas for many years.

7.2 Precautionary Measures for Visitors

Travelers from non-endemic areas should see their health care provider 4 to 6 weeks prior to departure. As recommended by WHO, travelers and their advisers should note the four principles (the ABCD) of malaria protection:

- Be aware of the risk, the incubation period, the possibility of delayed onset, and the main symptoms.
- Avoid being bitten by mosquitoes, especially between dusk and dawn.
- Take anti-malarial drugs (Chemoprophylaxis) when appropriate, to prevent infection from developing into clinical disease.
- Immediately seek diagnosis and treatment if a fever develops one week or more after entering an area where there is a malaria risk and up to 3 months (or, rarely, later) after departure from a risk area.

7.2.1 Protection Against Mosquito Bites

All travelers should be advised that individual protection from mosquito bites between dusk and dawn is their first line of defense against malaria. Practical measures for protection include sleeping under an insecticide treated mosquito net every night, staying in rooms with screened windows and/or air conditioning where possible; reducing time spent outdoors after dark; and use of mosquito repellants and coils.

7.2.2 Chemoprophylaxis

No anti-malarial prophylactic regimen gives complete protection, but good chemoprophylaxis (adherence to the recommended drug regimen) does reduce the risk of fatal disease. The following should also be taken into account:

- Dosing schedules for children should be based on body weight.
- Anti-malarials should be started the 2-14 days before arriving in the malaria-risk area, and continued for 1-4 weeks after leaving the area, depending on the drug selected.
- Pregnant women, people travelling with young children, and people with chronic illnesses should seek individual medical advice.

(a) Mefloquine

- The adult dosage is 250 mg (one tablet) once per week.
- Children's dosing is by weight (split tablets), at 5mg/kg once per week, to maximum of 250 mg.
- It is preferable to start 2–3 weeks before arrival in the malaria-risk area to achieve higher pre-travel blood levels and to allow side-effects to be detected before travel so that possible alternatives can be considered.
- Continue the drug for 4 weeks after leaving malaria-risk area.
- *Advantages:* Effective, once per week dosing, long half-life.
- *Minor side effects (fairly common):* Headache, nausea, dizziness, sleep disturbance, anxiety, vivid dreams, visual disturbance. Do not usually require stopping the drug.
- *Rare side effects:* Seizures, depression, psychosis (1 in 10,000-17,000). Stop the drug if serious ADR occur.
- *Contraindications:* Epilepsy or other seizure disorder. Active depression or history of psychosis.

(b) Doxycycline

- The adult dosage is 100 mg once daily. Should be taken at same time each day.
- It should be taken with or after meals and do not lie down for 1 hour after taking, to reduce gastric/esophageal irritation.
- Begin 1 or 2 days before arrival in the malaria-risk area. Continue for 4 weeks after leaving malaria-risk area.
- *Advantages:* Effective. Low cost. Familiar drug to many people.
- *Minor side effects (fairly common):* Sun sensitivity, vaginal yeast infection, nausea, gastro-esophageal reflux. etc.
- *Contraindications:* Do not give to children under 8 years or pregnant women. (Teeth may become permanently stained in unborn and young children)

(c) Other drugs

- Atovaquone/Proguanil (Malarone) is a once daily medication. Adult preparation is 250 mg/100mg. Pediatric preparation is 62.5mg/25 mg. This drug may be convenient for short visits because it is taken for 1-2 days prior and just 1 week after the visit to the malaria-risk area. It is generally well tolerated, with rare side effects. However, the high cost may make it less suitable for longer use for many people.
- Proguanil. Recommended for children and pregnant women. Dose is 3mg per kg body weight daily, up to adult dose of 200 mg per day.

Malaria prophylaxis should not be considered 100% effective. Patients on prophylaxis may still develop malaria, even when taking the medication as directed. If signs and symptoms consistent with malaria occur while taking prophylaxis, the patient should seek prompt medical attention. Malaria chemoprophylaxis should be suspended during treatment of malaria and resumed immediately after treatment as recommended.

8.0 COMMUNITY EDUCATION IN MALARIA PREVENTION & CONTROL

Health care workers should take every opportunity to educate their patients and the general public regarding malaria prevention and control. Both urban and rural population should be educated to accept that malaria is both preventable and curable.

In order to control malaria in Ghana, communities and individuals must be educated to:

- protect themselves against the bites of malaria-transmitting mosquitoes.
- treat malaria promptly with effective medications.
- take the recommended steps to prevent malaria during pregnancy.

8.1 Protection Against Malaria-Transmitting Mosquitoes

Individuals are to be educated on the benefits of sleeping under insecticide-treated nets (ITNs) every night. This simple but effective protective measure is especially important for pregnant women and children. However, malaria control will be greatly enhanced if all community members use LLIN. The national malaria control strategy is to move toward universal coverage of LLIN. Households should also be encouraged to fix window and door screens in their houses and use mosquito repellents and coils.

8.2 Prompt Treatment/Malaria in Pregnancy

The following simple messages should be reinforced to patients and caregivers:

- Seek prompt treatment for all cases of fever, especially in pregnancy and in children under five (5) years.
- Use medications recommended by the Ministry of Health .
- Comply fully with treatment as prescribed by your health provider.
- Attend antenatal clinics early in pregnancy.
- Attend antenatal clinic every month or as scheduled. .

9.0 MONITORING AND EVALUATION

9.1 Introduction

Monitoring and Evaluation (M&E) is central to the Malaria Control Programme at national, district and facility levels to track and guide as well as assess the degree to which a plan is implemented and how successfully it has achieved its intended results. Routine data on malaria in Ghana is made accessible mainly through the electronic District Health Information Management System (DHIMS). Indicators being tracked by the programme are shown below.

9.2 Indicators and their definitions

1. Percentage of all suspected malaria cases that were tested (microscopy or RDT) Rationale:

The replacement of conventional anti-malarial drugs with more expensive artemisinin-based alternatives and decreasing prevalence of malaria among fever cases has created an increased need for accurate malaria diagnosis, that is parasite-based diagnosis. Accurate malaria diagnosis avoids unnecessary treatment with the expensive drug combinations and ensures appropriate treatment for febrile patients. Diagnosis allows for more reliable tracking of malaria burden and the impact of control interventions. Accurate diagnosis allows a more rational use of drugs that might effectively reduce drug pressure, thereby delaying the onset of drug resistance. This indicator captures the baseline levels and subsequent scaling up of diagnostic programmes .

Numerator:	Number of all suspected malaria cases that received a parasitological test
Denominator:	Number of all suspected malaria cases
Data sources:	Health information system, routine surveillance system
Frequency:	Monthly

2. Percentage of confirmed out-patient malaria cases that received appropriate anti-malarial treatment according to national policy

Rationale

Prompt treatment with an effective anti-malarial drug regimen is a key component of the technical strategy for controlling and preventing malaria. The drug regimens that are effective differ between countries and change over time depending on local drug resistance patterns. Effective anti-malarial regimens should therefore be defined in the local context, which most countries do in national treatment guidelines. Currently, WHO recommends ACT for uncomplicated malaria treatment.

Numerator:	Number of confirmed (positive) out-patient malaria cases who received first line antimalarial treatment according to national policy
Denominator:	Number of confirmed (positive) out-patient malaria cases

Outpatient cases include those seen at the outpatient department of health facilities as well as those seen by community health workers.

Data Sources:	Health information system, routine surveillance system, (this indicator can also be measured through health facility surveys every 3 to 5 years).
Frequency:	Monthly.

3. Percentage of health facilities reporting no stock-out of key commodities during the reporting period.

Rationale

Ensuring adequate and continued supply of the recommended anti-malarial commodities is key to the success in preventing and controlling malaria through the delivery of effective treatment and preventive services at health facilities.

Numerator:	Number of health facilities reporting no stock-out of key. commodities at any time during the previous reporting period.
Denominator:	Number of health facilities.
Data Sources:	Health information system.
Frequency:	Monthly.

4. All cause Under-Five Mortality Rate

Definition of the indicator: The probability of children dying between birth and their fifth birthday for every 1,000 children born alive.

Definition of key terms:

Numerator:	Number of deaths of children under five years during a specified period x 1,000.
Denominator:	Number of children under-five years in the same period
Data Sources:	Data is usually obtained from registration of vital events, population census demographic and health survey. The commonly used source in Ghana is the DHS with 1998 representing the most current.
Use:	This indicator is a measure of the general health status of the population and the performance of the child health programmes.

5. Malaria test positivity rate (slide positivity rate)

Rationale

The test positivity rate assesses the proportion of tests (microscopy and/or RDT) that are positive for malaria among the fever patients tested. The test positivity rate is usually computed for a specified period of case detection activities. In areas with unstable malaria, an increasing test positivity rate among fever patients is one of the warning signs of a possible epidemic.

Numerator:	Number of laboratory-confirmed malaria cases (tested positive)
Denominator:	Number of suspected malaria cases tested (microscopy. and/or RDT).
Data Sources:	Health information system, routine surveillance system.
Frequency:	Monthly.

6. Inpatient malaria deaths per 1,000 persons

Rationale

Mortality is a major component of the burden caused by malaria, and the overall goal of the Roll Back Malaria Partnership is to reduce malaria deaths to near zero by 2015.

Numerator:	Number of inpatient malaria deaths per year x 1,000.
Denominator:	Number of people in the population.
Data sources:	Health information system, routine surveillance system.
Frequency:	Monthly.

7. Parasitemia prevalence: percentage of children aged 6–59 months with malaria infection (by microscopy and RDT)

Rationale

The prevalence of parasitemia is a useful indicator of the burden of malaria. With intervention coverage data and repeated estimation, understanding of the epidemiology of malaria can be improved and progress of control efforts can be tracked more effectively if estimates of parasitemia prevalence are available.

Numerator:	Number of children aged 6-59 months with malaria. infection detected by microscopy and/or RDT.
Denominator:	Number of children aged 6-59 months tested for malaria parasites by microscopy and/or RDT.
Data sources:	Population-based surveys with diagnostics (such as MIS).
Frequency:	Every 3–5 years (linked to transmission season).

8. Under 5 Malaria Case Fatality Rate

Definition of the indicator: Under 5 malaria case fatality rate is defined as the proportion of children under five years of age who die of malaria out of the total number of children under-five (5) years admitted with malaria. In other words it expresses the proportion of children under five years with malaria who die from it (ratio of deaths to cases).

Numerator:	Number of children under-five (5) years dying of malaria.
Denominator:	Number of children under five years admitted with malaria.
Data Sources:	The data is obtained from the hospital In-patient Morbidity and Mortality Returns .
Use:	This indicator is used to assess the performance of the malarial control programme and quality of inpatient care of the health services.

9. Malaria-specific deaths per 1,000 persons

Rationale

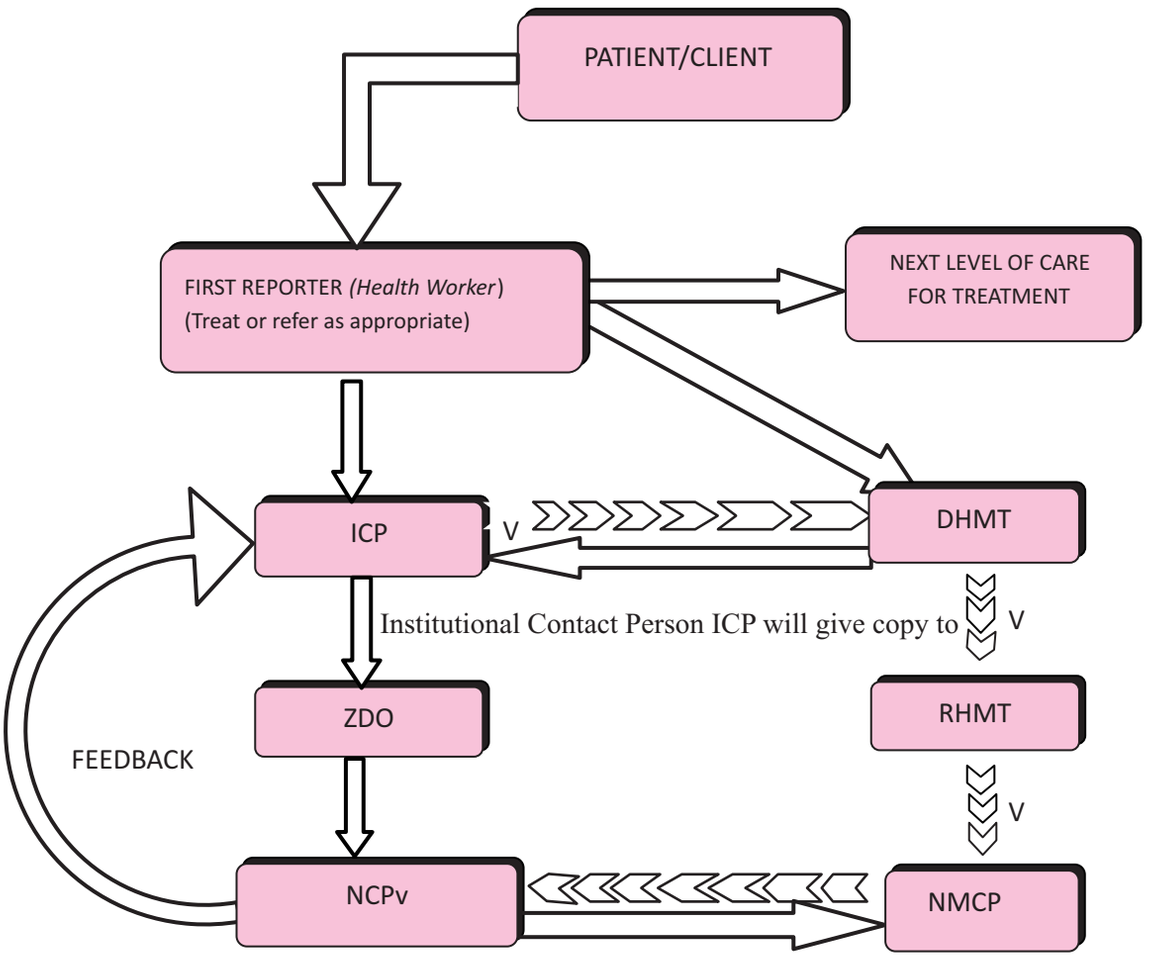
Mortality is a major component of the burden caused by malaria, and the overall goal of the Roll Back Malaria Partnership is a 50 percent reduction in malaria-associated mortality among children under-five (5) years old by 2010.

Numerator:	Number of malaria deaths per year x 1,000.
Denominator:	Number of people in the population.

10. Pharmacovigilance

Data sources:	Complete or sample vital registration systems, verbal autopsy (surveys).
Frequency:	Monthly, quarterly.

Figure 1: FLOW CHART FOR REPORTING ADVERSE EVENTS



Reporting

Primary reporter refers to any health professional
Institutional contact persons (ICP) are nominated by the hospitals and trained by the National Centre for Pharmacovigilance (NCPv). The ICP sends copies of the report to the DHMT to be forwarded to the RHMT and the national level.

When to Report
Reporting may be considered as expedited or non-expedited.

Expedited Reporting Requirements
An expedited ADR report is an ADR report that falls under serious unexpected and serious expected adverse drug reactions.

Spontaneous ADR Case Reports
All expedited ADR reports received from spontaneous reporting should be reported **immediately** and not later than 15 calendar days from date of receipt.

Non-Expedited Reporting Requirements

All other reports of ADRs that do not qualify under expedited reporting do not need to be reported on an expedited basis, but should be reported on request or within a period of 28 days.

Reporting Timelines

Reporting of serious adverse events (death, life threatening, prolonged hospitalisation) should be reported immediately and not later than 7 calendar days. For non-serious adverse effects, reports could be submitted within a period of 28 days.

How to Report

To report a suspected ADR for drug products marketed in Ghana, health care professionals should complete a copy of the ADR Reporting Form of suspected adverse reaction due to drug products marketed in Ghana.

All ADR reports should be sent to the nearest Health Centre; to be sent through the DHMT to the RHMT to National Centre for Pharmacovigilance, Food and Drugs Authority.

REFERENCES

Ashley et al., 2005. Clinical Infectious Diseases; vol. 41 pp. 425-432.

Ghana Health Service 2009. Guidelines for Case Management of Malaria in Ghana.

Ghana Health Service 2009. National Guidelines for Laboratory Diagnosis of Malaria.

Ghana Health Service 2009. National Guidelines for Malaria In Pregnancy.

Ghana Health Service 2009. Home Management of Malaria, ARI and Diarrhoea in Ghana: Implementation Guidelines.

J. Tarning et al 2008. *"Population Pharmacokinetics of Piperaquine after Two Different Treatment Regimens with Dihydroartemisinin-Piperaquine in Patients with Plasmodium falciparum Malaria in Thailand", Antimicrobial Agents and Chemotherapy, March 2008.*

Vol. 52, no. 3, pp.1052-1061.

Ministry of Health, Ghana 2012. Revised Anti-Malaria Drug Policy for Ghana (3rd Revised Version September 2012).

National Malaria Control Programme 2012. Annual Report

RBM/WHO 2001. The Use of Anti-Malaria Drugs-Report of an Informal Consultation (2001) WHO, Geneva.

Ghana Health Service 2012. Standard Operating Procedure on Health Information

The Global Fund to Fight AIDS, Tuberculosis and Malaria. Monitoring and Evaluation

Tool kit; HIV, Tuberculosis, Malaria and Health and Community Systems Strengthening;

Part 4: Malaria; Fourth Edition, November 2011

WHO Expert Committee on Malaria. Twentieth Report. Chapter 9. WHOEXPERT

WHO. Guidelines for the Treatment of Malaria. 2nd Edition, WHO: Geneva

WHO 2009. International Travel and Health. WHO: Geneva.

ANNEXES

ANNEX A

COMA SCALES

1. *THE GLASGOW COMA SCALE*

		Score
Eyes open:	Spontaneously	4
	To speech	3
	To pain	2
	Never	1
Best verbal response	Oriented	5
	Confused	4
	Inappropriate words	3
	Incomprehensible sounds	2
	None	1
Best motor response	Obeys command	6
	Localises pain	5
	Withdrawal	4
	Abnormal flexion to pain	3
	Abnormal extension to pain	2
	None	1
Total:		**(From 3 to 15)**

To obtain the Glasgow coma score, obtain the score for each section, then add the three figures to obtain a total.

2. *BLANTYRE COMA SCALE*

This score has been modified to be applicable to children, including those who have not learned to speak.

Eye movements	Directed (e.g., Follow mothers face)	1
	Not directed	0
Verbal response	Appropriate cry	2
	Moan or inappropriate cry	1
	None	0
Best motor response	Localizes pain stimulus	2
	Withdraws limb from pain	1
	None specific or absent response	0
Total		**(From 0 to 5)**

To elicit pain during coma evaluation:

a) Rub knuckles on patient's sternum.

b) Firm pressure on thumb nail with horisontal pencil.

ANNEX B

REFERRAL FORM

DATE: DAY…… MONTH…….. YEAR……

REFERRING HEALTH FACILITY INFORMATION

NAME OF REFERRING CLINIC/HOSPITAL
ADDRESS OF REFERRING CLINIC(INCLUDE TELEPHONE NO)

PATIENT/CLIENT INFORMATION

SURNAME		**OTHER NAMES**	
SEX ☐ MALE ☐ FEMALE	**DATE OF BIRTH** DAY / MONTH / YEAR	AGE	INSURANCE STATUS ☐ INSURED (IF INSURED STATE ID #) ☐ UNINSURED
ADDRESS OF CONTACT PERSON / RELATIVE: (INCLUDE TEL NO)			

REFERRAL DETAILS

CLINIC/HOSPITAL REFERRED TO					**TIME**
DIAGNOSIS					
PRESENTING COMPLAINT(S)					
EXAMINATION FINDINGS	HEIGHT	WEIGHT	TEMPERATURE	BP	PULSE
RESULTS OF ANY INVESTIGATIONS CARRIED OUT					
TREATMENTS GIVEN					
COMMENTS					

REFERRING OFFICER:

NAME OF OFFICER REFERRING SIGNATURE	POSITION OF OFFICER REFERRING……

RECEIVING CLINICIAN:

NAME OF OFFICER RECEIVING SIGNATURE	POSITION OF OFFICER RECEIVING……
COMMENTS (PLEASE WRITE SUMMARY OF FINAL DIAGNOSIS AND TREATMENT GIVEN)	
	DATE……

ANNEX C

DIAGNOSTIC PROCEDURES

C. 1 Microscopy

Microscopy is the established method for laboratory diagnosis of malaria. A drop of the patient's blood is collected by finger prick, or from a larger venous blood specimen. It is then spread on a glass slide ("blood smear"), dipped in a reagent that stains the malaria parasites (Giemsa stain), and examined under a microscope at a 1000-fold magnification. Malaria parasites are recognisable by their physical features and by the appearance of the red blood cells that they have infected. These characteristics often allow the laboratory technicians to identify the type (species) of parasite causing the infection, a finding that will guide the treatment. The laboratory technicians or Biomedical Scientist can also assess the percentage of red blood cells that are infected, a measure of severity of the infection.

Microscopy can only be performed by specially trained laboratory technicians and other specially trained health care workers. For microscopy guidelines and Standard Operating Procedures, refer to the Guidelines for Laboratory Diagnosis of Malaria (Ghana Health Service: 2014).

C.2 Rapid Diagnostic Tests

Microscopic examination remains the "gold standard" for laboratory confirmation of malaria. Rapid Diagnostic Tests (RDTs) have the potential for improving diagnosis of malaria, particularly at the sub-district and community level. There is currently no international consensus on any particular brand and type, although the field is advancing rapidly.

RDTs may be used in the following circumstances:

- where microscopy is not available, such as in a facility with no laboratory, or in a facility where the laboratory is closed, such as at night or weekends,
- in other situations, such as a very busy facility to reduce waiting time.

For a full set of technical guidelines, refer to the Guidelines for Laboratory Diagnosis of Malaria (Ghana Health Service: 2014).

C.2.1 Basic Principles of RDTs

Rapid diagnostic tests are immunochromatographic tests. In other words, they are a combination of (1) a test that uses antibodies with (2) a test that is based on protein

migration on a wet film. RDTs are simple to use and can be carried out by non-laboratory health staff after formal training with supervisory follow-up.

RDTs detect specific parasite antigens in blood, mainly Histidine Rich Protein 2 (HRP2) or Plasmodium lactate dehydrogenase (pLDH). Most RDTs in routine use are HRP2-based, which means they detect only *P. falciparum* and cannot be used for follow-up of patients after treatment. RDTs cannot be used to determine parasite density. Some RDTs can achieve sensitivities similar to those commonly achieved by microscopy. It is recommended to use RDTs of sensitivity≥ 95% at ≥ 100 parasites/µL for *P. falciparum*. (More recent WHO quality control documents suggest ≥200 parasites/µL.) Refer to Table C-1 for a comparison of microscopy with the two main types of RDTs.

Table C- 1: Comparison between RDTs and microscopy
Source: Malaria Diagnosis: New perspectives. WHO 2000

Characteristics	Microscopy	HRP2	*p*LDH
Cost (test alone)*	Low: up to US$ 0.5 per slide	Low: up to US$ 0.6 per test	Higher: up to US$ 0.9 per test
Time	30 - 45 minutes	Less than 15 minutes	15-20 minutes
Quantification of parasitaemia	Yes	No	No
Species differentiation	Yes	No. Tests only detect *P. falciparum*	Yes. Tests that differentiate *P. falciparum* from other species available
Possibility of use for patient follow-up	Yes	No	No
Ease of use	Requires qualified staff & laboratory equipment	Can be performed by non-laboratory staff after training; no additional equipment is needed	Can be performed by non-laboratory staff after training; no additional equipment needed
Availability	Available where laboratory services established	Depends on supply	Depends on supply
Parasite detection threshold	5-10 parasites/µl of blood*	100-200 parasites/µl of blood	100-200 parasites/ µl of blood
Stability at high temperatures, high humidity	Stable	Less stable	Less stable

C.2.2 Standard Operating Procedure for RDTs

Staff qualified to perform malaria rapid diagnostic tests (RDTs):

All medical laboratory technical staff and trained staff at all health facility levels are qualified to perform malaria rapid diagnostic tests.

Principle and Purpose

The test utilises a device coated with monoclonal antibodies against malaria parasite antigens. Blood flows along the device and if malaria parasite antigens are present in the sample, the antigen antibody complex binds with a conjugate forming a coloured line (usually red). To ensure assay validity, a control band is incorporated into the test device.

The purpose of the test is to determine if a person has been recently exposed to malaria infection. Currently, available tests detect the following parasite products: histidine rich protein 2 (HRP2); Plasmodium lactate dehydrogenase (pLDH); aldolase. Tests may not distinguish current from recently treated infection. Some tests are able to distinguish Plasmodium falciparum from other malaria species. RDTs are now available as strips or cassettes. The HPR2 test detects trophozoites and young gametocytes, and for this reason can test positive even if the patient received effective treatment. The pLDH is only produced by trophozoites, and normally will disappear after effective treatment. As a general rule, if treatment failure is suspected, use microscopy for (evaluation) not RDTs.

Reagents and Materials

Tests contain the following components in the kit:

- Instruction sheet.
- Packaged cassettes or strips.
- Lancets.
- Blood collection devices (micropipettes or micro-capillary tubes).
- Reagent buffer.
- Swabs (70% alcohol, cotton wool or gauze).

Additional requirements are:

- Gloves.
- Gauze or cotton wool.
- Sharps box or container.
- Disposal bucket.

Sample Required:

Whole blood obtained from a finger prick or anticoagulated venous blood.

Method:

a· Ensure the kits have not expired by checking the date at the back of the package and read manufacturer's insert.
b· Carefully read the instructions on how to use the malaria test kit.
c· If devices are individually packaged, ensure the packaging is not damaged by squeezing gently and feeling/listening for air leakage.
d· Remove the dipstick or cassette from the foil and write the patient's number on the device or strip.
e· Wearing gloves, clean the patient's finger using an alcohol swab and allow to dry.
f· Prick the side of the finger and collect the blood into the capillary tube up to the mark. Place dry cotton wool over the puncture site to stop the bleeding.
g· Immediately touch the tip of the capillary tube into the sample well and allow the blood to be drawn onto the dipstick or cassette pad.
h· Place the appropriate number of drops of buffer in the buffer well, according to the manufacturer's instructions, and read the results after the time specified by the manufacturer.
i· Validate and interpret the results. If the control band does not appear, repeat the test.
j· Store positive devices after drying, in a plastic bag, for reference. Place negative devices and used cotton wool in the bucket marked "INCINERATION". Place used lancets and capillary tubes in the Sharps Box or container marked "SHARPS".

Procedural Note

Follow the storage instructions for each test kit. Some kits require storage in a refrigerator. Note that kits may deteriorate at high temperatures and at high humidity.

Quality Control

- Ensure kits have not reached the expiry date.
- Ensure packaging and test strips and cassettes are not damaged.
- Ensure the control band appears for both positive and negative tests.

Interpretation

- Two or three RED lines, depending on the type of kit (patient and control windows) = a positive test. 3 lines may mean presence of P. falciparum OR mixed infection.
- One RED line (control window only) = a negative test
- No RED line in the control window = invalid test, repeat the test

Reporting Results

- Report as rapid diagnostic test for malaria Positive or Negative. Invalid results should be repeated with a new test kits.
- Indicate date and name of technical staff reporting.

C.2.3 Points to remember when using RDTs

- Prior instruction in the use and interpretation of every product is vital.
- The manufacturer's instructions must be strictly followed.
- Always check the expiry date on the test packet, and discard expired tests.
- The RDT should be discarded if its envelope is punctured or badly damaged.
- The test envelope should be opened only when it has reached ambient temperature (if refrigerated), and the RDT must be used immediately after opening.
- If the procedure is delayed after opening the envelope, humidity can damage the RDT.
- The result should be read within the time specified by the manufacturer.
- Test lines may become "positive" several hours after preparation. Therefore, test results must be read only within the time specified by the manufacturer.
- An RDT cannot be re-used.
- A patient management plan for utilisation of results must be in place.

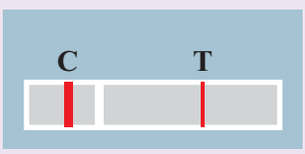
When used correctly, malaria RDTs can provide a useful guide to the presence of malaria disease caused by the species of parasite they are designed to detect. RDTs can help to guide case management, particularly when good quality microscope-based diagnoses are unavailable.

FIGURE C.1

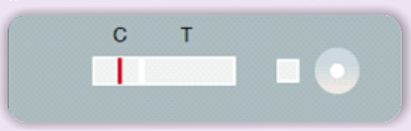
Example of a Generic RDT, with guide to interpretation.
Users should refer to product-specific instructions.
(Source: WHO, Malaria Rapid Diagnostic Test Performance,
Report of Round 1 Result, 2008).

Type A: Malaria Generic Pf RDT Result Guide

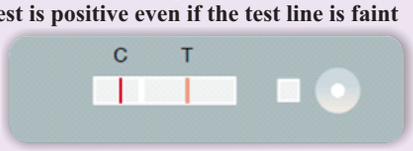
Results Window: C = control line; T=test line with bound HRP-2 antibody.



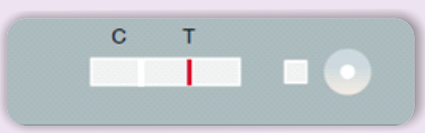
Negative Results: One line 'C' appears in the result window



Positive Results: *P. falciparum* infection. Two lines 'C' and 'T' appear in the results window. Test is positive even if the test line is faint



Invalid Results: No 'C' line appears in the results window. Repeat the test using a new RDT if no control line appears.



Use new package and lancet for each patient.

ANNEX D

USE AND INTERPRETATION OF DIAGNOSTIC TESTS

D.1 General Principles

The current WHO recommendation for malaria diagnosis is the use of laboratory confirmation (microscopy and rapid diagnostic tests).

In Ghana, diagnosis is by laboratory confirmation as the basis for treatment. This means that, in patients with suspected malaria, a confirmed diagnosis is recommended, wherever possible, before giving anti-malaria treatment.

Following is a summary of guidelines to using and interpreting diagnostic tests. These are also captured in the accompanying flow chart.

D.2 All persons with uncomplicated malaria

- All febrile patients should be carefully examined for other causes of fever and managed accordingly.
- When a malaria diagnostic test is available:
  - If the test is positive, treat
  - If the test is negative and danger signs are absent, clinicians should in general withhold anti-malaria treatment and follow the patient. Clinical judgment, as always should be applied.
- If no malaria diagnostic test is available, patients should be examined carefully for other causes of fever. On the basis of clinical judgement, these patients may be treated for malaria in addition to any other cause of fever. (see flowchart for diagnosis and treatment of malaria in Annex E)

D.3 Other Patients Requiring Confirmatory Diagnostic Tests for Malaria

- *Suspected treatment failures:* Treatment failure is defined as failure to achieve the desired therapeutic response within 28 days after the initiation of therapy for malaria. Treatment failure is not synonymous with drug resistance. Treatment failure may be due to drug resistance, poor adherence to treatment, poor quality of drugs, unusual pharmacokinetic properties in that individual, or misdiagnosis. Malaria microscopy must be used to assess suspected treatment failure; and use of rapid diagnostic tests (RDTs) is not recommended in this setting. The development of malarial symptoms and signs 28 days or more after the initiation of malaria therapy is considered as indicative of a new infection, and requires appropriate investigation. (Confirmation of treatment failure -- after 28 days).

- *Severe/complicated malaria:* Delay in diagnosis and inappropriate treatment, such as administering the wrong drug or inadequate dosage, may lead to a rapid worsening of the condition, especially in children under five (5) years of age, pregnant women, and non-immune adults, (for example, a person who has been out of the country for several years). In all patients with suspected severe/complicated malaria with or without fever or history of fever, the use of a confirmatory blood slide is recommended, so that parasitaemia can be quantified. However, treatment should not be withheld while confirming the diagnosis. Note that, high parasitaemia is not always present in severe disease and initial blood slide examination may be negative.

- *Malaria in pregnancy:* In all pregnant women with fever or history of fever, a confirmatory diagnostic test for malaria is recommended.

- *Malaria surveillance:* The National Malaria Control Programme or research partners may request blood slides on samples of children less than five (5) years old, even if these are not used for a treatment decision, to monitor malaria prevalence in this age group. When effective malaria prevention strategies are in place, the number of children with fever due to malaria may markedly reduce. This information will be used to determine the need for change in national diagnostic guidelines.

D.4 Patients with Negative Test Results

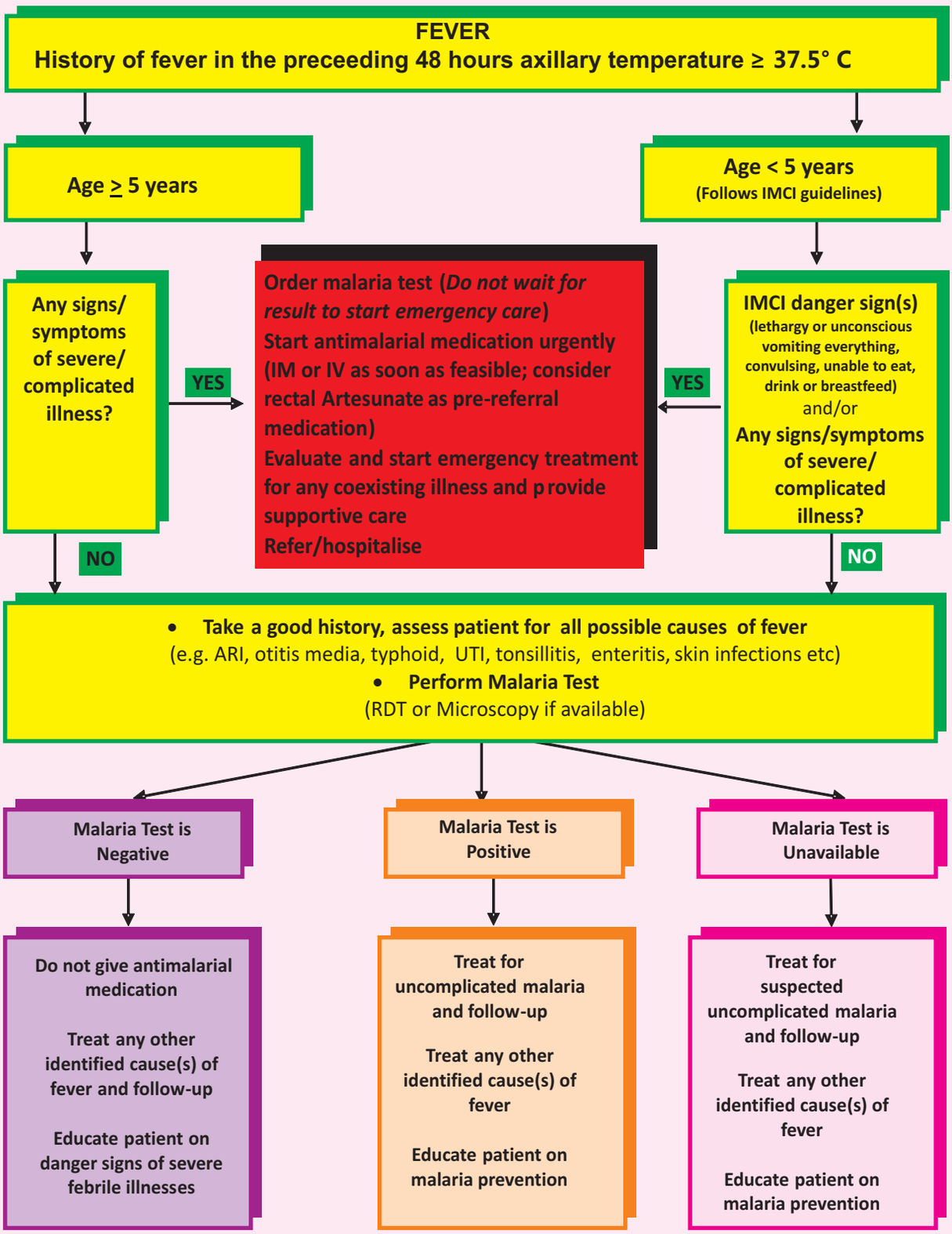
Negative test results require careful examination of all patients for other causes of fever, including performing other laboratory tests, such as urine microscopy to detect urinary tract infection. Blood film examination may be repeated after six hours, or the next day. An appropriate RDT may be used for confirmation where the clinician has a strong clinical suspicion of malaria and has ruled out other causes of fever. In patients with non-severe symptoms and signs, anti-malaria treatment may be withheld if the diagnostic test is negative, and the patient carefully observed. In patients with severe symptoms and signs, anti-malaria treatment should be offered if the malaria test results are negative, and repeat blood film examination is recommended to confirm the diagnosis.

Although clinicians may treat patients for malaria even if the test results are negative, they must note that, in all cases, fever may have another cause.

ANNEX E

Flow chart for the diagnosis and treatment of malaria

(To be used in all health facilities in Ghana, including private facilities)



ANNEX F

IMCI CASE MANAGEMENT GUIDELINES – FOR USE IN CHILDREN BELOW FIVE YEARS

VITAL SIGNS	(1) Temperature (2) Respiratory Rate (3) Weight (4) MUAC (if >6months of age)	If any danger sign(s) is(are) present, proceed to assess, classify and offer the recommended emergency treatment (USING THE PINK ROW) & refer to hospital.
Malaria RDT	Positive or Negative	
DANGER SIGNS	Not able to drink or breastfeed / vomits everything/history of convulsion or convulsing now/ lethargic or unconscious + other signs of severe/complicated illness.	

ASSESSMENT *(based on main IMCI symptoms)*		**CLASSIFICATION**	**TREATMENT**
Fever (by history or feels hot or temperature >37.5C)	Any general danger sign or any of the following: (1) Stiff neck, (2) Severe pallor, (3) Deep and fast breathing, (4) Rapid pulse (cold extremities), (5) Dark urine (cola-coloured), (6) Jaundice, (7) Abnormal bleeding.	**Severe malaria and/or other severe disease.**	**Give 1st dose of rectal artesunate or I/M Artesunate or IM Quinine.** **Give 1st dose of an appropriate antibiotic.** **Give diazepam if convulsing.** **Treat the child to prevent low blood sugar.** **Give one dose of paracetamol for high fever (≥38.5°C).** **Refer URGENTLY to hospital.** **If referral or access to the nearest health facility is likely to be delayed continue rectal or parenteral artesunate or quinine.**
	No general danger signs or above mentioned signs of severe malaria. **MALARIA TEST POSITIVE**	**Uncomplicated malaria**	**Give oral Artesunate-Amodiaquine Or Artermether-Lumefantrine.** **Give one dose of paracetamol in clinic for high fever (38.5°C or above).** **Teach mother how to reduce fever at home.** **Advise mother when to return immediately.** **Follow-up in 3 days if fever persists.** **Give advice on malaria prevention and use of ITN.** **If on initial assessment fever has been present every day for more than 7 days start treatment for malaria and refer for further assessment.**
	No general danger signs or above mentioned signs of severe malaria. **MALARIA TEST NEGATIVE**	**Non malaria febrile illness**	**Do not give antimalarial drugs.** **Look for and treat other causes of fever according to IMCI classification and treatment guidelines.** **Give one dose of paracetamol in clinic for high fever (38.5°C or above).** **Advise mother when to return immediately.** **Follow-up in 2days if fever persists.** **If fever is present every day for >7days, refer for assessment.**
	Has measles rash now or had measles within last 3 months and (1) Any general danger sign present or (2) Clouding of cornea or (3) Extensive mouth ulcers.	**Severe complicated measles**	**Give vitamin A.** **Give first dose of an appropriate antibiotic.** **If clouding of the cornea or pus draining from the eye, apply tetracycline eye ointment.** **Refer urgently to hospital.**
	Has measles rash now or had measles within last 3 months and has no signs of severe measles but has pus draining from the eye or mouth ulcers.	**Measles with eye or mouth complications**	**Give vitamin A.** **If pus draining from the eye, treat eye infection with tetracycline eye ointment or chloramphenicol eye ointment.** **If mouth ulcers treat with gentian violet. Follow-up in 3 days.**
	Has **measles** now or within past 3 months but no signs of severe measles or above mentioned complications.	**Uncomplicated measles**	**Give Vitamin A.** **Give mother one dose to give to the child at home the next day. Advise mother to return in one month for a 3rd dose.**

IMCI CASE MANAGEMENT GUIDELINES – FOR USE IN CHILDREN BELOW FIVE YEARS

	ASSESSMENT	CLASSIFICATION	TREATMENT
Cough or difficulty in breathing	**Any danger sign or chest in-drawing or stridor in calm child.**	**Severe pneumonia or very severe disease.**	**Give first dose of an appropriate antibiotic.** **Refer URGENTLY to hospital**.**
	Fast breathing(2-12mths RR>50b/min, 12-60mths RR`>40b/min).	**Pneumonia.**	Give appropriate antibiotics for 5 days***. If wheezing (that disappeared after rapidly acting bronchodilator) give an inhaled bronchodilator for 5 days****. If chest indrawing in HIV exposed/infected child, give first dose of amoxicillin and refer. Soothe the throat and relieve the cough with a safe remedy. If coughing for more than 14 days or recurrent wheeze, refer for possible TB or asthma assessment. Advise mother when to return immediately. Follow-up in 3 days.
	No signs of very severe disease or pneumonia.	**Cough or cold.**	If wheezing (that disappeared after rapidly acting bronchodilator) give an inhaled bronchodilator for 5 days****.Soothe the throat and relieve the cough with a safe remedy.If coughing for > 14 days or recurrent wheezing, assess for TB or asthma. Advise mother when to return immediately. Follow-up in 5 days if not improving.
Diarrhoea	**Has any two of the following signs:** • **Weak or unconscious.** • **Sunken eyes.** • **Unable to drink or drinking poorly.** • **Skin pinch goes back very slowly.**	**Severe dehydration.**	If child has no other severe classification give fluid for severe dehydration (Plan C) OR If child also has another severe classification refer URGENTLY to hospital with mother giving frequent sips of ORS on the way. Advise the mother to continue breastfeeding. If child is 2 years or older and there is cholera in your area, give antibiotic for cholera.
	Two of the following signs: • Restless or irritable. • Sunken eyes. • Drinks eagerly, thirsty. • Skin pinch goes back slowly.	**Some dehydration.**	Give fluid, zinc supplements, and food for some dehydration (Plan B). If child also has a severe classification refer URGENTLY to hospital with mother giving frequent sips of ORS on the way. Advise the mother to continue breastfeeding. Advise mother when to return immediately. Follow-up in 5 days if not improving.
	Signs inadequate to classify severe or some dehydration.	**No dehydration.**	Give fluid, zinc supplements, and food at home (Plan A). Advise mother when to return immediately. Follow-up in 5 days if not improving.
	Diarrhoea 14 days or more plus has signs of dehydration.	**Severe persistent diarrhoea.**	**Treat dehydration before referring unless child has another severe classification. Refer to hospital**
	Diarrhoea 14 days or more but has no signs of dehydration	**Persistent diarrhoea.**	Advise the mother on feeding a child who has PERSISTENT DIARRHOEA. Give multivitamins and minerals (including zinc) for 14 days.Follow-up in 5 days.
	Blood in the stool	**Dysentery.**	Give the appropriate antibiotic for 3 days. Follow-up in 3 days.

IMCI CASE MANAGEMENT GUIDELINES – FOR USE IN CHILDREN BELOW FIVE YEARS

	ASSESSMENT	CLASSIFICATION	TREATMENT
Malnutrition Look for pedal oedema Review WFH/L:_____ Review MUAC: _____	**Oedema of feet OR WFH/L less than -3 z-scores OR MUAC less than 115 mm AND any one of the following: (1) Medical complication present or (2) Not able to finish RUTF or (3) Breastfeeding problem.**	**COMPLICATED SEVERE ACUTE MALNUTRITION.**	**Give first dose appropriate antibiotic. Treat the child to prevent low blood sugar.Keep the child warm. Refer URGENTLY to hospital.**
	WFH/L less than -3 z-scores OR MUAC less than 115 mm AND able to finish RUTF.	**UNCOMPLICATED SEVERE ACUTE MALNUTRITION.**	Give oral antibiotics for 5 days. Give ready-to-use therapeutic food for a child aged 6 months or more. Counsel the mother on how to feed the child. Assess for possible TB infection. Advise mother when to return immediately. Follow up in 7 days.
	WFH/L between -3 and - 2 z-scores OR MUAC 115 up to 125 mm.	**MODERATE ACUTE MALNUTRITION.**	Assess the child's feeding and counsel the mother on the feeding recommendations. If feeding problem, follow up in 7 days. Assess for possible TB infection. Advise mother when to return immediately. Follow-up in 30 days.
	WFH/L - 2 z-scores or moreOR MUAC 125 mm or more.	**NO ACUTE MALNUTRITION.**	If child is less than 2 years old, assess the child's feeding and counsel the mother on feeding according to the feeding recommendations. If feeding problem, follow-up in 7 days.
Anaemia Check palmar pallor. Is it: *Severe palmar pallor*?* *Some palmar pallor?*	Severe palmar pallor.	**SEVERE ANAEMIA.**	**Refer URGENTLY to hospital.**
	Some pallor.	**Anaemia**	Give iron**. Give mebendazole if child is 1 year or older and has not had a dose in the previous 6 months. Advise mother when to return immediately. Follow-up in 14 days.
	No pallor	**NO ANAEMIA.**	If child is less than 2 years old, assess the child's feeding and counsel the mother according to the feeding recommendations. If feeding problem, follow-up in 5 days.

IMCI CASE MANAGEMENT GUIDELINES – FOR USE IN CHILDREN BELOW FIVE YEARS

	ASSESSMENT	CLASSIFICATION	TREATMENT
Ear problem	**Tender swelling behind the ear.**	**Mastoiditis.**	**Give first dose of appropriate antibiotic.**
	Pus is seen draining from the ear and discharge is reported for less than 14 days, or ear pain.	**Acute ear infection.**	Give an antibiotic for 5 days. Give paracetamol for pain. Dry the ear by wicking. Follow-up in 5 days.
	Pus seen draining from the ear ≥ 14 days,	**Chronic ear infection,**	Dry the ear by wicking, Treat with topical quinolone eardrops for 14 days, Follow-up in 5 days and if no improvement refer to specialist review,
	No ear pain and no pus seen draining from the ear	**No ear infection**	No treatment
HIV Assessment (If mother is HIV positive)	Positive virological test in child OR Positive serological test in a child 18 months or older,	**CONFIRMED HIV INFECTION,**	**Initiate ART treatment and HIV care, Give cotrimoxazole prophylaxis*** Assess child's feeding and counsel mother,Advise the mother on home care, Assess or refer for TB assessment and INH preventive therapy. Follow-up regularly as per national guidelines.
	Negative virological test in a breastfeeding child or only stopped less than 6 weeks ago OR Child not yet tested OR Positive serological test in a child less than 18 months old.	**HIV EXPOSED.**	**Give cotrimoxazole prophylaxis. Start or continue ARV prophylaxis as recommended.** Do virological test to confirm HIV status**. Advise the mother on home care Counsel mother Follow-up regularly as per national guidelines.
	Negative HIV test in child.	**HIV INFECTION UNLIKELY.**	Treat, counsel and follow-up existing infections.

Completeness of immunization *(relative to age)*	**At birth**	BCG + OPV-0.
	6 weeks **10 weeks**	Penta 1 (DPT1 / HIB-1/ Hep B1) + OPV1 + PCV1+ Rotarix. Penta 2 (DPT2 / HIB-2 / Hep B2) + OPV2 + PCV2 + Rotarix.
	14 weeks	Penta 3 (DPT3 / HIB-3 /Hep B3) + OPV3 + PCV3.
	9 months	Measles.
VITAMIN A STATUS	Give every child a dose of Vitamin A every six months from the age of 6 months. Record the dose on the child's chart.	

Notes

Notes

Notes