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Republic of The Gambia

# National Guidelines for the Management of Malaria in The Gambia

National Malaria Control Program
Ministry of Health

4th Edition
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Investing in our future
The Global Fund
To Fight AIDS, Tuberculosis and Malaria

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# Foreword

This revised national guidelines provide updated information, on how to diagnose and manage uncomplicated and severe malaria in public and private health facilities. The NMCP held a series of consultative meetings with stakeholders to adapt the WHO Guidelines for Malaria 2022 to our local context.

Before 2010, previous editions of the guideline, health care providers diagnosed malaria based on the presenting symptoms of patients, as part of the Integrated Management of Neonatal and Childhood Illnesses (IMNCI) approach. However, from 2010 onwards, there has been a shift away from diagnosing malaria based solely on symptoms to emphasising the importance of laboratory confirmation of all cases of malaria in all age groups as the country moves towards achieving malaria elimination in line with the National Malaria Strategic Plan, 2021-2025. All categories of care providers: doctors, nurses, midwives, pharmacists, and laboratory scientists can use these guidelines in community/Minor health facilities, Major Health Centres and Hospitals. This guideline also stresses the importance of how to manage malaria effectively within the home and when a caregiver should seek help.

The guideline aims to support users: 1) to cure malaria infection, 2) to promptly and effectively treat malaria to prevent it progressing from uncomplicated to severe disease and reduce malaria related deaths; 3) to break malaria transmission by clearing parasites and gametocytes in patients towards achieving elimination; and 4) reduce the development and spread of antimalarial drug resistance.

I urge health care providers to familiarize themselves with and use the contents of this National Malaria Guideline in their practice. I hope that the user-friendly format of this guideline will encourage its widespread use so that cases and deaths from malaria will significantly reduce as we work towards eliminating malaria in the country.

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**Ministry of Health**

# Acknowledgements

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The Ministry of Health would also like to thank the WHO Country Office for providing technical support to review and update the guideline, WHO GMP and WHO/AFRO for providing relevant technical information and materials for the review and adaptation process and partners within and outside the Ministry for their valuable technical contributions.

The Ministry extends its sincere appreciation to the Manager and staff of the National Malaria Control Program for the excellent manner in which they coordinated the development of this guideline.

# Abbreviations

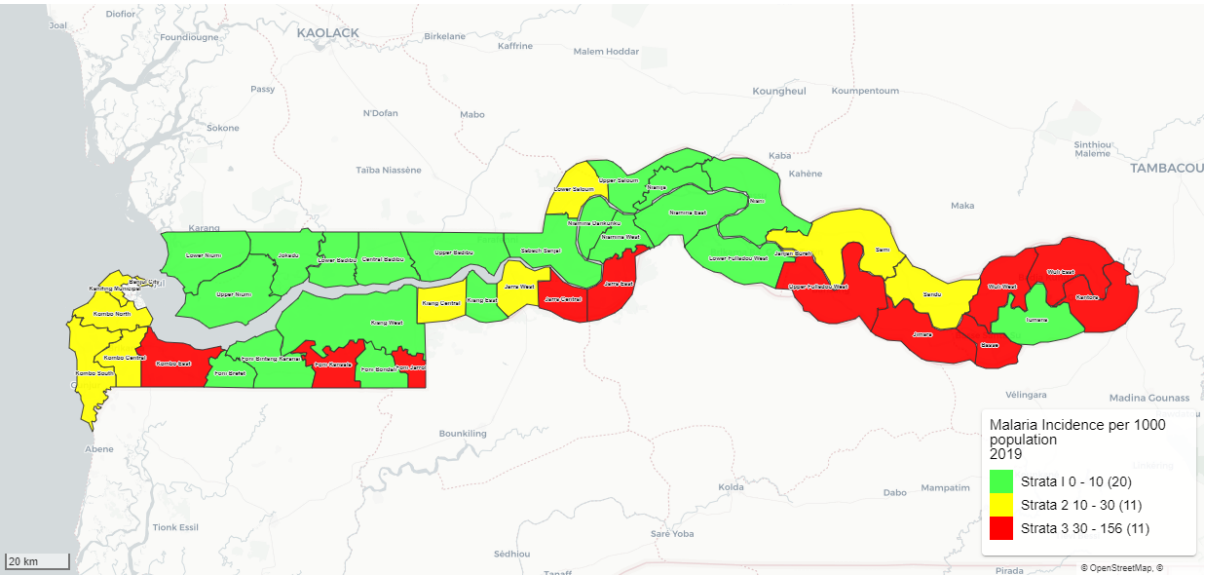
| | |
|---|---|
| ACT | Artemisinin-Based Combination Therapy |
| AIDS | Acquired Immuno-Deficiency Syndrome |
| ARDS | Acute Respiratory Distress Syndrome |
| AL | Artemether-lumefantrine |
| BHS | Basic Health Services |
| BD (BID) | Two Times Daily |
| BF | Blood film |
| BP | Blood Pressure |
| BW | Body Weight |
| CRR | Central River Region |
| CS | Coma Score |
| CSF | Cerebrospinal fluid |
| DHA-PPQ | Dihydroartemisinin-piperaquine |
| Hb | Haemoglobin |
| HC | Health Centre |
| HIV | Human Immuno- Deficiency Virus |
| IM | Intramuscular |
| IMNCI | Integrated Management of Childhood and Neonatal Illness |
| IPT | Intermittent Preventive Treatment |
| ITN | Insecticide Treated Nets |
| IV | Intravenous |
| Kg | Kilogram |
| LP | Lumbar puncture |
| LRR | Lower River Region |
| MP | Malaria Parasite |
| NGT | Nasogastric Tube |
| PCV | Packed Cell Volume |
| QDS (QID) | Four Times Daily |
| SP | Sulphadoxine-Pyrimethamine |
| Tab | Tablets |
| TDS (TID) | Three Times Daily |
| TPR | Temperature, Pulse, Respiration |
| URR | Upper River Region |

| | |
|---|---|
| VHS | Village Health Services |
| VHW | Village Health Worker |
| WBC | White Blood Cells |
| WHO | World Health Organisation |

# Chapter 1: Introduction

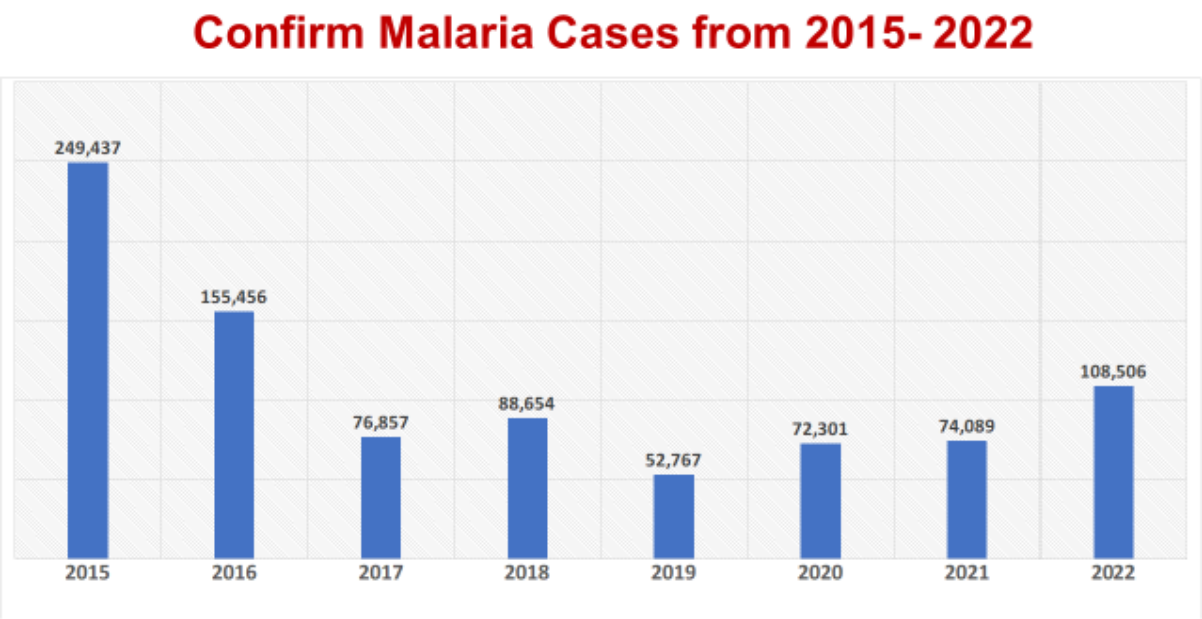
In The Gambia, malaria is still a public health problem with the whole population at risk of infection despite huge advances in reducing cases and deaths from the disease. The Gambia has a perennial transmission with most cases (approximately 90%) occurring in the later stages of the rainy season (September to December). Plasmodium falciparum is the dominant malaria parasite species and accounts for more than 95% of all reported cases whilst plasmodium malariae and ovale account for the remaining 3%.

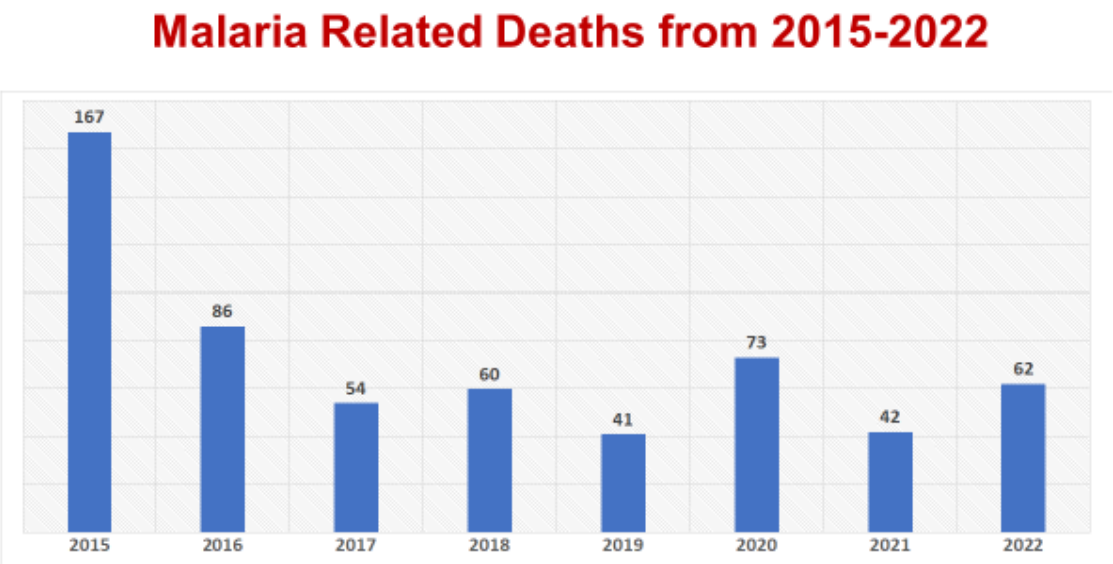
**Figure 1: Operational risk stratification of malaria in The Gambia and the primary value for categorizing the strata was annual malaria incidence (API)**




Since 2004, The Gambia has made such significant progress to reduce malaria mortality and morbidity, that the country is now in a prime position to begin the transition from control to elimination of malaria. The annual malaria incidence has steadily declined by 43% across all seven regions over the six years from 149 per 1,000 population in 2011 to 85 in 2014 and finally to 23 per 1,000 population in 2017. Between 2014 and 2017 parasite prevalence declined in children under 5 from 0.2% to 0.1%.

**Figure 2: Malaria cases and deaths in The Gambia: 2015-2022**




Over the last 18 years, the coverage of malaria prevention and treatment interventions for the target population in the country has risen substantially with funding from Global Fund and other partners. In 2005 the first-line drug for treatment of uncomplicated malaria was changed to Artemisinin-Based Combination Therapy (ACT). By February 2008, ACT was available in all public health facilities across the country.

The 2021 – 2025 Malaria Policy aims to reduce malaria transmission to zero by rapidly scaling up proven and highly effective malaria prevention and treatment measures. These measures include:

- Integrated Vector Management (IVM);
- Malaria case management;
- Chemo-prevention interventions;
  Intermittent Preventive Treatment of pregnant women (IPTp),
  Seasonal Malaria Chemoprevention(SMC); and,
- Surveillance, Monitoring and Evaluation and Operational Research (SMEOR)

Advocacy, communication and social mobilization, programme management and partnership support the implementation of these interventions. The long-term vision of the policy is to sustain a high coverage of malaria prevention and treatment interventions of over 90% throughout the country to achieve the ultimate goal of eliminating malaria in The Gambia by 2030.

The vision, objectives and strategies of the 2021-2025 Malaria Policy is aligned with this guideline and recognises the progress made over the past decade and new developments in managing cases of malaria.

If malaria is not diagnosed promptly and treated correctly vulnerable groups who contract malaria can rapidly deteriorate. Therefore, prompt and effective management at all levels of the health care delivery system is essential to reduce deaths due to malaria. This guideline will explain in detail how health care providers should manage cases of malaria at all levels of service delivery points.

# Chapter 2: Malaria in Children

Malaria can present with a variety of symptoms in children aged 0-14 years. Malaria can be either uncomplicated or severe based on clinical presentation.

## 2.1 Uncomplicated Malaria in Children

### 2.1.1. Clinical features

Children with uncomplicated malaria have fever and peripheral parasitaemia. They are fully alert, able to walk, drink well and are not pale. Signs and symptoms of malaria are non-specific. Malaria cannot be reliably distinguished from other causes of fever and making a diagnosis based only on clinical features can result in overtreatment.

Main symptoms of malaria could include the following:

| | |
|---|---|
| Fever (more than or equal to 37.5$^0$C<br>Vomiting<br>Cough<br>Reduced activity<br>Diarrhoea<br>Weakness | Poor feeding<br>Chills and rigors<br>Joint pain<br>Headache<br>Abdominal pain |

### 2.1.2. Diagnosis

The focus of malaria diagnosis should be to identify patients who truly have malaria, to guide the rational use of antimalarial medicines. Health providers should carry out a parasitological test on all suspected cases for malaria to confirm the diagnosis. Only treat those patients who test positive for malaria. Patients should also be assessed for other conditions that may cause fever and be managed accordingly.

**Laboratory investigations**

**Parasitological diagnosis**:

The two methods used routinely for parasitological diagnosis of malaria are light microscopy and Rapid Diagnostic Tests (RDT).

**Microscopy**

Microscopy is the gold standard for parasitological diagnosis of malaria. A microscopist will examine stained thick or thin blood films for malaria parasites. Thick films are recommended to detect parasites; to quantify the level of parasitaemia and to monitor response to treatment. Thin films are recommended to identify the species of plasmodium.

**Rapid Diagnostic Test (RDT)**

If a microscopy is not immediately possible or feasible, the health care provider should use a malaria Rapid Diagnostic Test (RDT). These tests detect parasite-specific antigens in a finger-prick blood sample and are conclusive. It is unnecessary to reconfirm with microscopy.

Parasite density cannot be determined using these tests. Also, despite effective antimalarial, treatment and clearance of parasites most RDTs can remain positive for between 2 to 3 weeks following treatment. Therefore, health care providers should not use RDTs to follow-up previously confirmed cases.

**Haemoglobin (Hb)**

The haemoglobin should be checked or the Packed Cell Volume (PCV) if unable to do the hameoglobin.

**Differential diagnoses**

The health provider should consider other possible causes of fever aside from malaria as the child may require alternative or additional treatment. Other diagnoses may include:

| | |
|---|---|
| Upper respiratory tract infection (cough and running nose)<br>Flu (general body ache and high fevers)<br>Pneumonia (fever, fast breathing, cough, side pain)<br>Acute otitis media | Urinary tract infection<br>Measles<br>Tonsillitis<br>Mumps<br>Typhoid<br>Meningitis |

## 2.1.3 Treatment

Treatment of uncomplicated malaria aims to: a) clear the parasite and prevent the disease from progressing into severe illness; and, b) interrupt transmission by clearing the gametocytes.

**First line treatment**

For patients with uncomplicated malaria, the recommended first line treatment is an Artemissinin-Based Combination Therapy (ACT), a fixed dose Artemether 20mg-Lumefantrine (AL) 120mg for all patients.

The type of treatment given to a patient with uncomplicated malaria depends on the level of malaria transmission in the area where they live in the country. There are two

main categories of transmission: low and moderate to high transmission areas and very low transmission areas.

In low and moderate to high transmission areas of the country, treatment aims to clear parasites to prevent the disease progressing into severe illness. In areas of the country where malaria transmission is very low, treatment aims to clear parasites and gametocytes in order to break malaria transmission

**Table 1: Treatment of uncomplicated malaria in different transmission sites**

| Low and Moderate to High Transmission Areas | Very Low Transmission Areas |
|---|---|
| Artemether 20mg-Lumefantrine 120mg according to weight. | Artemether 20mg-Lumefantrine 120mg<br>**AND**<br>Single dose of Primaquine 7.5mg according to the weight (0.25mg/kg) except where Primaquine is contraindicated. |

**Table 2: Dosing schedule for Artemether 20mg-Lumefantrine 120mg**

| Weight | Age | Day 1 | Day 2 | Day 3 |
|---|---|---|---|---|
| Less than 5kg | Birth up to 3months | 1 tablet start dose and repeat after 8 hours | 1 tablet 12 hourly (twice daily) | 1 tablet 12 hourly (twice daily) |
| 5kg up to 14kg | 3 months up to 3 years | 1 tablet start dose and repeat after 8 hours | 1 tablet 12 hourly (twice daily) | 1 tablet 12 hourly (twice daily) |
| 15kg up to 24kg | 3 years up to 8 years | 2 tablet start dose and repeat after 8 hours | 2 tablet 12 hourly (twice daily) | 2 tablet 12 hourly (twice daily) |
| 25kg up to 34kg | 8 years up to 12 years | 3 tablet start dose and repeat after 8 hours | 3 tablet 12 hourly (twice daily) | 3 tablet 12 hourly (twice daily) |
| Above 35kg | 12 years up and above | 4 tablet start dose and repeat after 8 hours | 4 tablet 12 hourly (twice daily) | 4 tablet 12 hourly (twice daily) |

**Table 3: Dosing schedule for Primaquine tablet**

| Weight (kg) | Single dose of Primaquine (7.5mg base) |
|---|---|
| 10 to <25 | 3.75 |
| 25 to <50 | 7.5 |
| 50 to 100 | 15 |

**Note: Please note contraindications to giving primaquine (as in figure 3)**

1. Primaquine tablet is ONLY given as a single dose with the last dose of AL or DHA-PPQ.
2. Glucose-6-Phosphate Dehydrogenase (G6PD) testing is **NOT** required before giving Primaquine tablet)

**Figure 3: Primaquine contraindications**

Primaquine should **NOT** be given to the following people: -

- Pregnant women,
- Infants less than 6 month of age
- Breastfeeding/lactating women breastfeeding infants less than 6 months

**Approaches to treating children with malaria**

1. Aim to treat by weight NOT by age. Weigh every child before starting treatment. Artemether 20mg-Lumefantrine 120mg is supplied in 4 different dosage packs based on weight and age, it is important that the patient gets the right dose.
2. The health worker responsible for the case should always give the first dose under direct observation and **OBSERVE** the child for 30 minutes. Advise caregiver to give the medicines preferably after a fatty meal.
    a. For small children, use dispersible Artemether 20mg-Lumefantrine120mg. If this is not available crush the tablet before giving it.
    b. If vomiting occurs, repeat first dose after 30 minutes and observe.
    c. If the patient continues vomiting and cannot tolerate oral medication treat as severe malaria.
    d. Give advice on additional fluids
    e. Give paracetamol 15mg/kg - as an antipyretic/analgesic

**Second line treatment**

The recommended second line Artemisinin-Based Combination Therapy (ACT) for patients with uncomplicated malaria is the fixed dose Dihydroartemisinin 40mg-Piperaquine 320mg (DHA-PPQ).

**Table 4: Dosing schedule for Dihydroartemisinin Piperaquine (DHA-PPQ).**

| Body Weight (Kg) | Tablet strength | Dihydroartemisinin-Piperaquine 40 mg/320mg base tablets | | |
|---|---|---|---|---|
| | | Day 1 | Day 2 | Day 3 |
| 5 to <7 | 20/160 | ½ | 1/2 | 1/2 |
| 7 to <13 | 20/160 | 1 | 1 | 1 |
| 13 to <24 | 40/320 | 1 | 1 | 1 |

| | | | | |
|---|---|---|---|---|
| 24 to <36 | 40/320 | 2 | 2 | 2 |
| 36 to <75 | 40/320 | 3 | 3 | 3 |

**Note: Please note contraindications to giving primaquine as in figure 3.**

1. Primaquine tablet is ONLY given as a single dose with the last dose of AL or DHA-PPQ.
2. Glucose-6-Phosphate Dehydrogenase (G6PD) testing **NOT** required before giving Primaquine tablet)

### 2.1.4 Treatment failure

Treatment failure is failure to clear the malaria parasite or a patient continues to have symptoms within 28 days after starting treatment or clinically deteriorates at any time. The commonest cause of treatment failure is failure to complete the full course of Artemether 20mg-Lumefantrine 120mg, because of either vomiting or missed doses. Note that recurrence of symptoms and or parasitaemia after 28days of start of initial treatment should be considered as a re-infection (new infection) and not treatment failure. All new infections after 28 days should be treated with the first line medicine (AL).

**If treatment failure occurs check if:**

1. the patient has adhered to the treatment regimen;
2. malaria parasites were confirmed through slide microscopy **AND NOT RDT**; and,
3. other common illnesses with similar presentation to malaria are present

Note: **RDTs should not be used in diagnosing treatment failure**. They may remain positive for weeks after the initial infection and treatment, even if there is no treatment failure

**Why treatment failure may occur:**

- Non-adherence with medication (patient did not take all medications as directed)
- Vomiting of oral medication
- Failure to take fatty foods with Artemether20mg-Lumefantrine120mg leading to poor absorption of Lumefantrine component
- Parasite resistance to the anti-malarial medicines used
- Re-infection

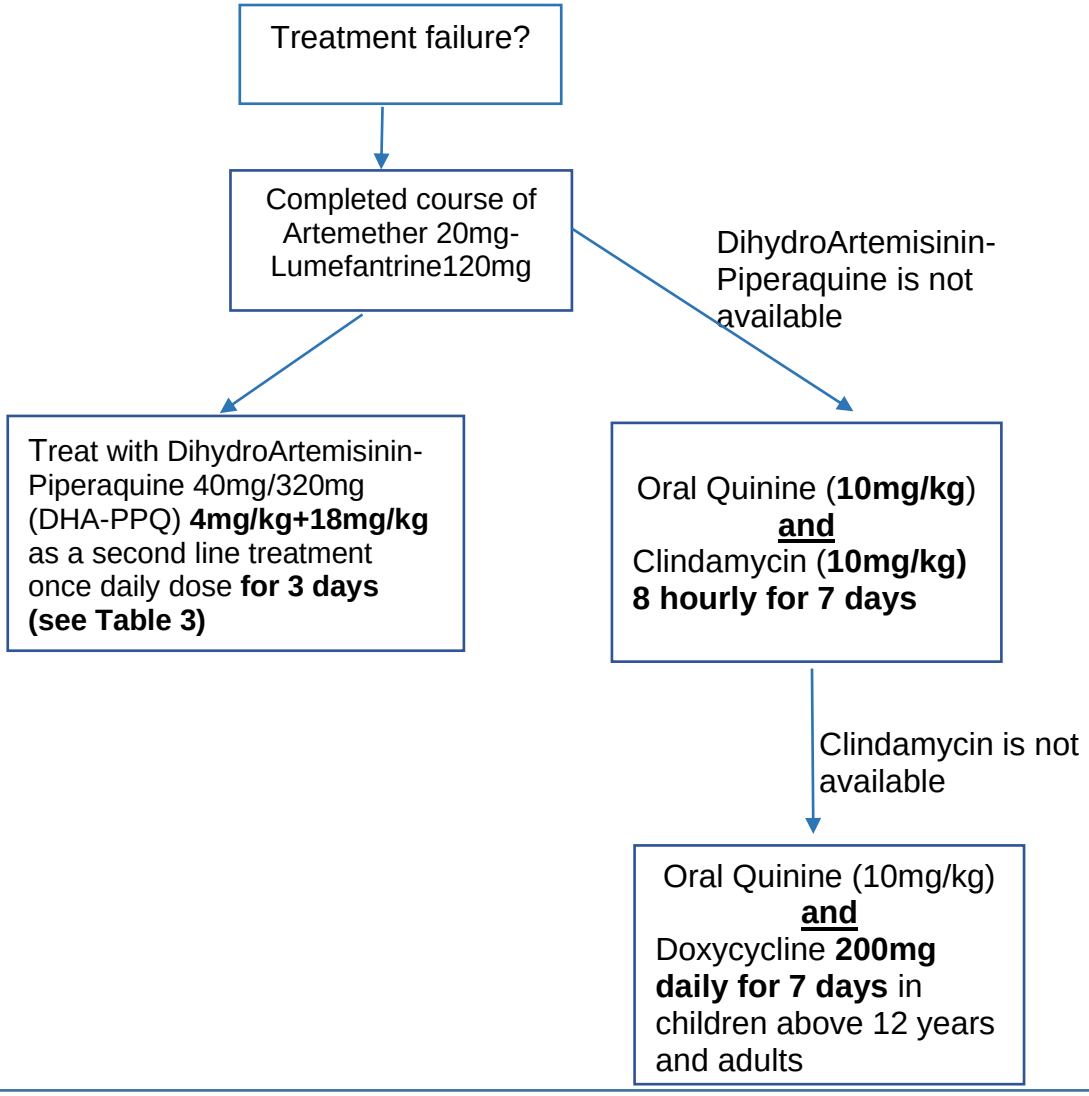
**Management of treatment failure**

Due to the potency of Artemether 20mg-Lumefantrine 120mg, treatment failure within 14 days of receiving Artemether20mg-Lumefantrine120mg is unusual.

Cases of suspected treatment failure should be referred to the next higher level where microscopy and DHA+PPQ are available for management.

**Figure 4 below** explains how to manage treatment failure if this has been confirmed after a completed course of Artemether 20mg-Lumefantrine120mg.

**Figure 4: Management of treatment failure**




**Give single dose of primaquine 0.25mg/kg BW with the last dose of treatment to patients in areas with very low transmission**

### 2.1.5 Follow up care

Advice the mother to return immediately if the child has any of these symptoms

**Danger Signs for follow up care**

Not able to drink or breastfeed
Becomes sicker
Fast breathing
Difficulty in breathing
Develops convulsions
Becomes lethargic or unconscious

**Management of mild & moderate anaemia**

Anaemia is the commonest complications of uncomplicated malaria in children especially where malaria was not being promptly diagnosed and treated. In The Gambia, especially at the end of the rainy season, children treated with uncomplicated malaria may recover with mild or moderate anaemia and may be under-nourished.

Treat all anaemia in children with Haemoglobin equal to or less than 10g/dl

**Figure 5: Treatment of anaemia**

**Ferrous sulphate**
3-6 mg/kg to be given daily in 2 to 3 divided doses. The treatment should continue for 3 months to fill body iron stores.

**Fefa**
Only for children **above 12 years:** 1 tablet to be given as a daily dose for 3 months

Give advice on iron rich diet

# Chapter 3: Severe Malaria in Children

Severe malaria is malaria with life threatening complications always caused by Plasmodium falciparum infection. It may result from a delay in treating uncomplicated malaria, the use of ineffective medicines and incorrect dosing or may start from onset.

Severe malaria is a common cause of avoidable death. Prompt diagnosis and effective treatment can usually improve the clinical outcome and reduce rapid deterioration.

Treatment should start immediately while efforts are being made to confirm the diagnosis. Management of severe malaria in hospitals and Major Health Centres includes clinical assessment of the patient, specific antimalarial treatment, adjunctive therapy and supportive care.

## 3.1.1. Clinical features

**Severe manifestations of falciparum malaria**

Severe malaria is defined as one or more of the following clinical features, occurring in the absence of an identified alternative cause and in the presence of P. falciparum asexual parasitaemia.

**Clinical features of severe malaria**

- impaired consciousness (including unrousable coma);
- prostration, i.e. generalized weakness so that the patient is unable to sit, stand or walk without assistance;
- multiple convulsions: more than two episodes within 24h;
- deep breathing and respiratory distress (acidotic breathing);
- acute pulmonary oedema and acute respiratory distress syndrome;
- circulatory collapse or shock, systolic blood pressure < 50mm Hg in children;
- acute kidney injury;
- clinical jaundice plus evidence of other vital organ dysfunction; and abnormal bleeding.

**Note:**
**These manifestations can occur singly or, more commonly, in combination in the same patient**.

**Table 5: Signs and symptoms of severe malaria in children**

| Sign or symptom | Frequency of presentation |
|---|---|
| Respiratory distress/ deep breathing (acidosis) | Common |
| Convulsions | Very common (30%) |
| Posturing (decorticate/decerebrate and opisthotonic rigidity)[1] | Common |
| Prostration/obtundation | Common |
| Resolution of coma | Faster (1–2 days) |
| Neurological sequelae after cerebral malaria | Common (5-30%) |
| Jaundice | Uncommon |
| Hypoglycaemia | Common |
| Metabolic acidosis | Common |
| Pulmonary oedema | Rare |
| Renal failure | Rare |
| CSF opening pressure | Usually raised |
| Bleeding/clotting disturbances | Rare |
| Invasive bacterial infection (co-infection) | Common (10%) |

**Table 6: Clinical parameters and definitions of severe malaria**

| Clinical features | Definition |
|---|---|
| Impaired consciousness | Blantyre coma Scale <3 in children |
| Prostration | Generalized weakness so that the child is unable to sit, stand or walk without assistance |
| Multiple convulsions | More than 2 episodes within 24 hours |
| Pulmonary oedema | Radiologically confirmed oxygen saturation <92% on room air with respiratory rate >30/minute often with chest in-drawing and crepitations on auscultation |
| Significant bleeding | Including recurrent or prolonged bleeding from the nose, gums or venepuncture sites; haematemesis or malaena |
| Shock | Compensated shock is defined as capillary refill≥3s or temperature gradient on leg (mid to proximal limb), but no hypotension<br>Decompensated shock is defined as systolic blood pressure <70mmHg in children, with evidence of impaired perfusion (cool peripheries or prolonged capillary refill). |

[1] Opisthotonos: A tetanic spasm in which spine and extremities are bent with convexity forward, the body resting on the heel and the head.

**Initial Assessment:**

- Secure the airway in unconscious patients and assess breathing and circulation.
- Assess blood glucose and correct immediately if hypoglycaemic (less than 2.2mmol/l)
- Insert an IV cannula
- Weigh the patient or estimate body weight so that drugs, including anti-malarial drugs and fluids can be given on a body weight basis.
- Conduct a detailed clinical examination, particularly noting the level of consciousness and documenting the coma score using the Blantyre coma score.
- Do a lumbar puncture for cerebrospinal fluid (CSF) analysis to exclude bacterial meningitis in unconscious children.
- Assess fluid balance as this is critical in severe malaria. Respiratory distress, with acidotic breathing, in severely anaemic children, often indicates hypovolaemia and requires prompt rehydration and, where indicated, blood transfusion.

### 3.1.2. Diagnosis

As with uncomplicated malaria the diagnosis of severe malaria is based upon clinical features confirmed by parasitological findings. However, although early testing with microscopy or RDT is essential, treatment should start and not be delayed whilst awaiting laboratory results. The health care provider can also perform an RDT at the bedside. If parasitological confirmation of malaria is not readily feasible, make a blood film and start treatment for severe malaria on the basis of the clinical presentation.

The following investigations are recommended to assess for complications that cannot be observed by physical examinations:

| | |
|---|---|
| **Urgent investigations** | • Check for malaria parasites with microscopy or RDT<br>• Haemoglobin or Haematocrit (PCV) to exclude anaemia<br>• Blood glucose (sugar) to exclude hypoglycaemia OR hyperglycaemia<br>• Cerebro-Spinal Fluid analysis (CSF) to exclude meningitis. Give antibiotics if not possible |
| **Other investigations** | • Urinalysis for sugar (to exclude diabetes) if blood glucose is not possible<br>• Full blood count to exclude sepsis<br>• Blood culture to exclude sepsis<br>• Renal Function Test (RFT)<br>• Chest x-ray (patients with pulmonary oedema)<br>• Liver Function Test (LFT)<br>• COVID-19 Rapid Diagnostic Test |

The Table below defines laboratory findings associated with clinical states in severe malaria

**Table 6: Clinical states and laboratory findings**

| Clinical state | Laboratory findings |
|---|---|
| Renal impairment | Plasma or serum creatinine >265 µ/L (3g/dL) or blood urea >20mmol/L |
| Hyperparasitaemia | Plasmodium falciparum >10% |
| Jaundice | Plasma or serum bilirubin >50 µ /L (3mg/dL) with a parasite count of 100000/ µL |
| Severe malaria anaemia | Hb of ≤ 5g/dl or a haematocrit of ≤ 15% (high-transmission settings), or Hb of ≤ 7g/dl or a haematocrit of ≤ 20% (low transmission settings) is an indication for blood transfusion, whatever the clinical condition of the child |
| Hypoglycaemia | Blood or plasma glucose <3.0mmol/L (<40mg/dL) |
| Acidosis | A base deficit of >8mEq/L or, if not available, plasma bicarbonate level<15mmol/L or venous plasma lactate ≥5mmol/L. Severe acidosis manifests clinically as respiratory distress (rapid, deep, laboured breathing). |

**Differential Diagnoses**

It is important to consider other diseases that could be confused with as severe malaria:

**Meningitis** – patient may have a stiff neck

**Severe pneumonia** – usually difficult breathing with chest in-drawing

**Encephalopathy** – repeated convulsions or deep coma

**Septicaemia** – usually very ill and toxic with warm peripheries

Febrile convulsions

Diabetic hypoglycaemia or hyperglycaemia

### 3.1.3 Pre-referral management of severe malaria (Community/ Minor Health Centres)

Severe malaria is a medical emergency. Severe malaria cases including cerebral malaria patients should be managed **ONLY** in **MAJOR HEALTH CENTRES OR HOSPITALS**.

In Community Clinics and Minor Health Centres, while waiting for referral, treatment of a patient with severe malaria should begin so that life-saving therapy is not delayed.

Health care providers should follow the following steps BEFORE referring a child with severe malaria:

1. Ensure an open airway by putting the child in a semi-prone position during the referral
2. Give STAT DOSES of Rectal Artesunate OR IM Artesunate OR IM Artemether OR IM Quinine
3. Give stat dose of available broad-spectrum antibiotic as in the National Standard Treatment Guideline.
4. Treat the child to prevent low blood sugar through nasogastric dextrose or IV infusion). Insert a Nasogastric tube if possible
5. Give one dose of paracetamol 15mg/kg in clinic for fevers above 38.5$^0$C
6. Remove the child's clothes and initiate cooling before referral
7. For convulsions, diazepam should be given rectally 0.1ml/kg (0.5mg/kg) or IV injection 0.05ml/kg (0.3mg/Kg) SLOWLY OVER 2 MINUTES.
8. Refer urgently to hospital or nearest higher level

**Administration of rectal artesunate**

**Table 7: Rectal Artesunate (Pre-referral treatment in children less than 6 years)**

| **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 |

**NOTE: Do NOT** give Rectal Artesunate to children above 6 years

**Figure 6: Administration of intramuscular Artesunate**

**How to prepare IM Artesunate**

Dilute 1ml of the bicarbonate solution with 2mls of saline solution. This will give a total volume of 3mls. Therefore, 60mg of Artesunate will be in 3mls.

If 3ml contains 60mg, then, 1ml contains 20mg every 1ml of the solution withdrawn will contain 20mg of Artesunate.

Dosage Calculation:

$$\frac{(2.4\text{mg or } 3\text{mg}) \times \text{body weight}}{20\text{mg/ml}}$$

Artesunate solution is now ready to be used.

Inject slowly. Divide the doses over different sites if more than 2ml for children and more than 5ml for adults

**Administration of Intramuscular Artemether**

Give IM Artemether 3.2mg/kg body weight (to the anterior thigh)

**Administration of intramuscular Quinine**

- Quinine MUST be diluted (maximum concentration is 50mg/ml for children) before intramuscular injection.
- A loading dose of 20 mg/kg of quinine (diluted to a maximum 50mg/ml for children) is given by intramuscular injection (preferably the anterior thigh).
- A maximum of 3ml should be injected into one site. Multiple sites should be used if the amount to be injected exceeds 3ml.

**NOTE: DO NOT USE THE BUTTOCKS TO GIVE INTRMISCULAR INJECTIONS TO CHILDREN LESS THAN 6 YEARS**

### 3.1.4. Treatment

Artesunate is provided as artesunic acid powder. It has to be dissolved in 1ml of sodium bicarbonate (5%) to form sodium artesunate. The sodium artesunate solution is then diluted in normal saline after which it can then be given by intravenous injection or by intramuscular injection to the anterior thigh of the patient. Whenever needed, the solution should be freshly prepared and used within 1 hour. It should NEVER be stored (see **Figures 7 and 8**).

**Table 7: Dosing schedule for Artesunate**

| Treatment | Dosage | Frequency |
|---|---|---|
| Child less than 20kg | Artesunate **3mg/kg** per dose | **0, 12, 24 hours;**<br>then **once every 24 hours** until able to tolerate oral medication after at least 24 hours of artesunate injection,<br>then change to full course of Artemether-Lumefantrine after at least 24 hours of Artesunate injection and the patient is able to tolerate oral medication |
| Child weighing 20kg or more | Artesunate **2.4mg/kg** per dose | |
| Adults | Artesunate 2.4mg/kg per dose | |
| NOTE: Artesunate injection doses should be given for a minimum of 24 hours irrespective of the clinical condition of the patient before it can be stopped | | |

Where Artesunate injection is not available, GIVE Artemether injection as an alternative treatment

**Table 8: Dosing schedule for Artemether**

| | |
|---|---|
| • Initial dose IM 3.2mg/kg BW<br>• Followed by IM 1.6mg/kg BW daily. Change to full course of Artemether-Lumefantrine according to the weight when patient is able to tolerate oral treatment | Patients in **very low transmission areas**<br><br>**Day 3**: give single dose of primaquine 0.25mg/kg with the last dose of Artemether-Lumefantrine |

**How to reconstitute Artesunate injection**

1. First inject full contents of bicarbonate ampoule into Artesunate vial.
2. Shake until dissolved. The solution will be cloudy at first but will clear in about 2 minutes. **Discard if not clear after a few minutes.**
3. Withdraw all the air from the vial and inject the required amount of saline into the reconstituted solution. Each vial contains 60mg of Artesunate *therefore* the amount of saline solution added will depend on the route of administration as follows:

**Figure 7: How to prepare Artesunate to give via the Intravenous (IV) and intramuscular (IM) routes**

**How to prepare IV Artesunate**

Dilute 1ml of the bicarbonate solution with 5mls of the saline solution. This will give a total volume of 6mls.

Therefore 60mg of Artesunate will be in 6mls. If 6ml contains 60mg, then, 1ml contains 10mg every 1ml of the solution withdrawn will contain 10mg of Artesunate.

Dosage Calculation:

$$\frac{(2.4\text{mg or } 3\text{mg}) \times \text{body weight}}{10\text{mg/ml}}$$

Artesunate solution is now ready to be used.

**Slowly give bolus of Artesunate injection over 3 to 5 minutes**

**How to prepare IM Artesunate**

Dilute 1ml of the bicarbonate solution with 2mls of saline solution. This will give a total volume of 3mls. Therefore, 60mg of Artesunate will be in 3mls.

If 3ml contains 60mg, then, 1ml contains 20mg every 1ml of the solution withdrawn will contain 20mg of Artesunate.

Dosage Calculation:

$$\frac{(2.4\text{mg or } 3\text{mg}) \times \text{body weight}}{20\text{mg/ml}}$$

Artesunate solution is now ready to be used.

**Inject slowly.**

Divide the doses over different sites if more than 2ml for children and more than 5ml for adults

- **Artesunate is more efficacious and has a better safety profile than Artemether. It has been shown to significantly reduce the risk of death from severe malaria compared to Artemether and Quinine injection.**
- Monitor the malaria parasite and blood sugar while on the course of treatment.
- HOWEVER, if child is seriously ill and fitting give available appropriate broad spectrum antibiotics according to the National Standard Treatment Guideline (STG)
- Consider doing a Lumbar Puncture (LP) when fitting has stopped
- Treat any concomitant infections with antibiotics – especially children with signs of posturing who cannot have lumbar puncture, lower respiratory tract infections (aspirations) and children in shock.

**IM Artemether**

- Where Artesunate injection is not available, give initial dose I.M Artemether 3.2mg/kg body weight (to the anterior thigh) (omit initial dose if Artemether injection has been given in the proceeding 24 hours).
- Then continue IM Artemether 1.6mg/kg BW daily until the child has regained consciousness and is able to take tablets,
- Artemether should be stopped and a full course of oral Artemether-Lumefantrine given.

**IV or IM Quinine**

- If Artemether injection is not available, give Quinine injection 20mg/kg BW loading dose (omit initial dose if Quinine injection has been given in the proceeding 24 hours).
- Then continue10mg/kg BW 12 hourly IV until the patient can tolerate oral medication.
- Change to full course of Artemether-Lumefantrine.

## 3.1.5. Treatment of Neonates

A new-born infant diagnosed with malaria should be treated as severe malaria.

**Do NOT give primaquine tablets to neonates**

**Table 8: Treatment regime for neonates**

| | |
|---|---|
| Neonates | IV/IM Artesunate 3mg/kg body weight at 0hrs, 12hrs, 24hrs then once daily until recovery from the acute stage at least for 24 hours<br>Where Artesunate injection is not available, give IM Artemether injection 3.2mg/kg BW initial dose then 1.6mg/kg BW daily until the patient can tolerate oral antimalarial medication<br>**OR** Where Artemether inj. is not available give IM Quinine injection 20mg/kg BW initial dose then 10 mg/kg BW 12 hourly until the patient can tolerate oral antimalarial medication as alternative. |
| Treatment Failures | Treatment failures with Artemether-Lumefantrine: use oral DHA+PPQ 4mg/kg +18mg/kg daily for 3 days<br>**DO NOT GIVE PRIMAQUINE TABLETS TO NEONATES** |
| | Rule out alternative diagnosis |

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## Figure 8: Guideline for administration of injectable Artesunate for severe malaria

# GUIDELINES FOR ADMINISTRATION OF INJECTABLE ARTESUNATE FOR SEVERE MALARIA

WHO RECOMMENDED TREATMENT [2]


### PRODUCT DESCRIPTION [1]

**Dose: For children < 20 kg: 3.0 mg/kg**
**For children > 20 kg and adults: 2.4 mg/kg**

Can be given by intravenous route (IV) or intramuscular route (IM).
IV is the preferred route of administration.
Please refer to the patient information leaflet for more information.
*** Water for injection is not an appropriate dilutant**

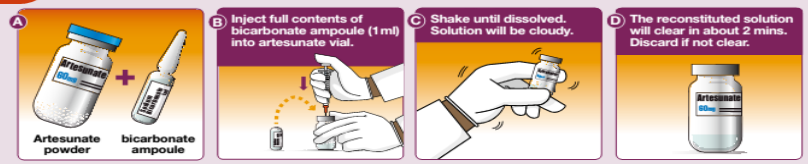
### 1 WEIGH THE PATIENT

### 2 DETERMINE THE NUMBER OF VIALS NEEDED

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

### 3 RECONSTITUTE

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

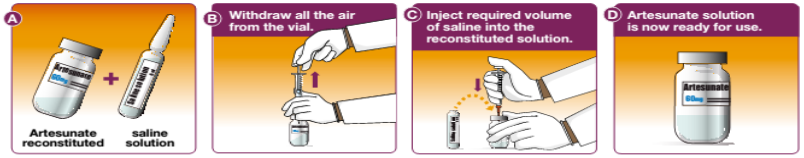



### 4 DILUTE

- Reconstituted artesunate + saline solution (or dextrose 5%)
- Volume for dilution

| | IV | IM |
|---|---|---|
| Bicarbonate solution volume | 1 ml | 1 ml |
| Saline solution volume | 5 ml | 2 ml |
| **Total volume** | **6 ml** | **3 ml** |
| Artesunate 60 mg solution concentration | 10 mg/ml | 20 mg/ml |

**IMPORTANT**
Water for injection is not an appropriate dilutant




### 5 CALCULATE THE DOSE

- Calculate and withdraw the required dose **in ml** according to route of administration:

**For intravenous route (IV)**
**Concentration: 10 mg/ml**

3.0 mg x body weight (kg) / IV artesunate solution concentration 10 mg/ml
Round up to the next whole number

**Example:**
Dose needed (ml) for 8 kg child:
$\frac{3.0 \times 8}{10} = 2.4$ ml
2.4 ml rounded up to 3 ml

**For intramuscular route (IM)**
**Concentration: 20 mg/ml**

3.0 mg x body weight (kg) / IM artesunate solution concentration 20 mg/ml
Round up to the next whole number

**Example:**
Dose needed (ml) for 8 kg child:
$\frac{3.0 \times 8}{20} = 1.2$ ml
1.2 ml rounded up to 2 ml

**Less than 20 kg**

| Weight kg | Dose mg | Dose ml |
|---|---|---|
| 6 - 7 | 20 | 2 |
| 8 - 10 | 30 | 3 |
| 11 - 13 | 40 | 4 |
| 14 - 16 | 50 | 5 |
| 17 - 20 | 60 | 6 |

| Weight kg | Dose mg | Dose ml |
|---|---|---|
| 6 - 7 | 20 | 1 |
| 8 - 10 | 30 | 2 |
| 11 - 13 | 40 | 2 |
| 14 - 16 | 50 | 3 |
| 17 - 20 | 60 | 3 |

**More than 20 kg**

**Concentration: 10 mg/ml**

2.4 mg x body weight (kg) / IV artesunate solution concentration 10 mg/ml
Round up to the next whole number

**Example:**
Dose needed (ml) for 26 kg child:
$\frac{2.4 \times 26}{10} = 6.24$ ml
6.24 ml rounded up to 7 ml

| Weight kg | Dose mg | Dose ml |
|---|---|---|
| 20 - 25 | 60 | 6 |
| 26 - 29 | 70 | 7 |
| 30 - 33 | 80 | 8 |
| 34 - 37 | 90 | 9 |
| 38 - 41 | 100 | 10 |
| 42 - 45 | 110 | 11 |
| 46 - 50 | 120 | 12 |
| 51 - 54 | 130 | 13 |
| 55 - 58 | 140 | 14 |
| 59 - 62 | 150 | 15 |
| 63 - 66 | 160 | 16 |
| 67 - 70 | 170 | 17 |
| 71 - 75 | 180 | 18 |
| 76 - 79 | 190 | 19 |
| 80 - 83 | 200 | 20 |
| 84 - 87 | 210 | 21 |
| 88 - 91 | 220 | 22 |
| 92 - 95 | 230 | 23 |
| 96 - 100 | 240 | 24 |

**Concentration: 20 mg/ml**

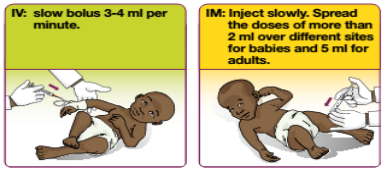
2.4 mg x body weight (kg) / IM artesunate solution concentration 20 mg/ml
Round up to the next whole number

**Example:**
Dose needed (ml) for 26 kg child:
$\frac{2.4 \times 26}{20} = 3.12$ ml
3.12 ml rounded up to 4 ml

| Weight kg | Dose mg | Dose ml |
|---|---|---|
| 20 - 25 | 60 | 3 |
| 26 - 29 | 70 | 4 |
| 30 - 33 | 80 | 4 |
| 34 - 37 | 90 | 5 |
| 38 - 41 | 100 | 5 |
| 42 - 45 | 110 | 6 |
| 46 - 50 | 120 | 6 |
| 51 - 54 | 130 | 7 |
| 55 - 58 | 140 | 7 |
| 59 - 62 | 150 | 8 |
| 63 - 66 | 160 | 8 |
| 67 - 70 | 170 | 9 |
| 71 - 75 | 180 | 9 |
| 76 - 79 | 190 | 10 |
| 80 - 83 | 200 | 10 |
| 84 - 87 | 210 | 11 |
| 88 - 91 | 220 | 11 |
| 92 - 95 | 230 | 12 |
| 96 - 100 | 240 | 12 |

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

### 6 ADMINISTER




### 7 DOSING SCHEDULE

1. Give **3 parenteral doses** over 24 hours as indicated in the opposite table

2. Give **parenteral doses** for a minimum of 24 hours once started irrespective of the patients ability to tolerate oral treatment earlier.

- **Day 1** **Dose 1: on admission (0 Hours)**
  **Dose 2: 12 hours later**
- **Day 2** **Dose 3: 24 hours after first dose**

- When the patient can take oral medication, prescribe a full 3-day course of recommended first line oral Artemisinin Combination Therapy (ACT). The first dose of ACT should be taken **between 8 and 12 hours** after the last injection of artesunate.
- Until the patient is able to take oral medication, continue parenteral treatment (one dose a day) **for a maximum of 7 days.**
- A course of injectable artesunate should always be followed by a 3-day course of ACT.

- Evaluate the patient's progress regularly.

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



1. World Health Organization (WHO) List of Prequalified Medicinal Products (http://apps.who.int/prequal/query/ProductRegistry.aspx?list=ma): artesunate injectable, reference N° MA051, prequalified on 05-Nov-2010.
2. World Health Organization, Management of Severe Malaria - A practical handbook - Third edition - April 2013 - (http://www.who.int/malaria/publications/atoz/9789241548526/en/index.html)

## 3.2. Complications of severe malaria

The commonest, most important complications of P. falciparum infection in children are cerebral malaria, severe anaemia, respiratory distress (acidosis) and hypoglycaemia.

### 3.2.1 Cerebral malaria in children

This is defined as unrousable coma not attributable to any other cause in a patient with plasmodium falciparum malaria.

The diagnosis should be considered in an unconscious child with a Blantyre coma score (CS) of 3 or less at least 30 minutes after a convulsion has stopped and hypoglycaemia has been effectively treated. A child with malaria and loss of consciousness after a febrile convulsion should not be diagnosed as cerebral malaria unless coma persists more than half an hour after the convulsion.

A positive blood film (BF) for malaria may confirm the diagnosis, but is sometimes not seen due to cerebral sequestration. The clinical features for severe malaria listed above in **Table 4** may also be present.

**Blantyre Coma Score**

This is the sum of verbal, visual and physical responses to standardised painful stimuli. This scale should be used to monitor improvement or deterioration.

**Figure 9: Blantyre coma scale for children under 5**

| **Best Motor Response:** | **Score** |
|---|---|
| localizes painful stimulus[2] | **2** |
| withdraws limb from pain | **1** |
| nonspecific or absent response | **0** |
| | |
| **Verbal Response:** | |
| appropriate cry | **2** |
| moan or inappropriate cry | **1** |
| none | **0** |
| | |
| **Eyes directed to object:**<br>directed (follows mothers face or objects) | **1** |
| not directed | **0** |
| | |
| **Total score** | **0-5** |

The total score is the sum of the individual scores in each section.

[2] Painful stimulus: Rub knuckles on patient's sternum

Painful stimulus: Firm pressure on thumbnail bed with horizontal pencil

**Table 9: Management of complications of severe malaria**

| Clinical state | Clinical features | Management |
|---|---|---|
| **Severe anaemia**<br>The rate of development and degree of anaemia depends on the severity and duration of parasitaemia.<br>In some children, repeated untreated episodes of otherwise uncomplicated malaria may lead to anaemia in which changes in the bone marrow are permanent.<br>Children with hyper-parasitaemia may develop severe anaemia rapidly due to acute destruction of parasitized red cells. | • Respiratory distress (acidosis) – resulting from hypoxia.<br>• Impaired consciousness.<br>• Hyper-parasitaemia (20% or more of red cells parasitized).<br>• Congestive cardiac failure (less common).<br>**Signs and Symptoms**<br>• Tachycardia (pulse rate is often rapid, weak and thready)<br>• Dyspnoea (respiratory rate is rapid and often shallow)<br>• Confusion,<br>• Restlessness<br>• Coma<br>• Retinal haemorrhage<br>• Acidosis (deep, sometimes laboured breathing).<br>• Gallop rhythm (rare cardiopulmonary signs)<br>• Hepatomegaly<br>• Pulmonary oedema | HB of ≤ 5g/dl or a haematocrit of ≤ 15% (high-transmission settings), or HB of ≤ 7g/dl or a haematocrit of ≤ 20% (low transmission settings) a is an indication for blood transfusion, whatever the clinical condition of the child.<br>Packed red cells 10ml/kg (or whole blood 15-20ml/kg) transfused over 4 hours<br>Give frusemide 1mg/kg IV if evidence of fluid overload during the transfusion and extremely close observation is mandatory during transfusion<br>In children with less severe anaemia (packed cell volume 18%, Hb 6g/dl), transfusion should be considered for high-risk patients with any one of the following clinical features:<br>1. Respiratory distress (acidosis) –resulting from hypoxia.<br>2. Impaired consciousness.<br>3. Hyper-parasitaemia (20% or more of red cells parasitized).<br>4. Congestive cardiac failure (less common).<br>**Note: ONLY HIV, Hepatitis B&C, and syphilis negative screened blood MUST be used at all times** |

| Clinical state | Clinical features | Management |
|---|---|---|
| **Respiratory Distress (acidosis)**<br>Causes<br>• Severe anaemia<br>• Aspiration pneumonia after severe malaria<br>• Pulmonary oedema due to malaria<br>• Lactic acidosis | Deep breathing with in-drawing (recession) under the bony structures of the lower chest wall, in the absence of localizing chest signs suggests metabolic acidosis (sometimes lactic acidosis).<br>Respiratory distress (acidosis) commonly accompanies cerebral malaria or anaemia but it may develop in a child without impaired consciousness. There is increased risk of death | • Correct any reversible acidosis particularly dehydration: - Use Ringers Lactate or Normal saline 30mls/kg in 1hour followed by 80 – 100ml/kg/day<br>• Correct anaemia if present.<br>• Treat for complicated pneumonia<br>• Prevent and control seizures<br>• Monitor response by continuous clinical observation supported by repeated measurement of haematocrit or haemoglobin concentration, glucose, urea and electrolyte levels.<br>• Monitor oxygen using a pulse oximeter |
| Hypoglycaemia<br>Hypoglycaemia is particularly common in children under 5 years who have severe malaria or who are on treatment with quinine.<br>. | It is easily overlooked clinically because the manifestations may be similar to those of cerebral malaria | Blood or plasma glucose <3.0mmol/L (<40mg/dL)<br>**CORRECT URGENTLY:**<br>50% dextrose (glucose) IV (1ml/kg BW diluted in equal volume of water for injection given slowly over 2 minutes)<br>**Then if 10% dextrose available** (add 50mls of 50% dextrose in 450mls of 5% dextrose to make 10% dextrose) give 5ml/kg of 10% dextrose through a peripheral line **immediately.** Continue feeding orally via naso-gastric tube using expressed breast |

| Clinical state | Clinical features | Management |
|---|---|---|
| | | milk or milk – based feeds or if not possible continue with up to 5ml/kg per hour of 10% dextrose<br><br>**If only 50% dextrose is available**, dilute 1 volume of 50% dextrose with 4 volumes sterile water to get 10% dextrose solution (e.g. 0.4ml/kg of 50% dextrose with 1.6ml/kg of water for injection or 4ml of 50% with 16ml of water for injection).<br><br>Continue feeding orally via naso-gastric tube using expressed breast milk or milk – based feeds or if not possible then continue IV fluid dextrose 5% 500mls or dextrose saline (80-100ml/kg/24hours) |

### 3.2.2 Supportive treatment for severe malaria

**Table 9: Management of conditions associated with severe malaria**

| Clinical state | Management | |
|---|---|---|
| **Convulsions** | **Maintain airways**<br>**Treat promptly with:**<br>**NEVER give IM diazepam** because it is poorly absorbed):<br>**Diazepam Rectal dose** 0.1ml/kg (0.5mg/kg) OR<br>**IV dose** 0.05ml/Kg (0.3mg/kg) given over 2 minutes by slow bolus injection.<br>Wait 10 minutes after giving diazepam. If the convulsions persist, give a second dose. Do not give more than two doses in 12hours<br>If convulsions continue give: -<br>IM Phenobarbitone 10mg/kg stat dose and then 5mg/kg, 12 hourly to control convulsions. **Monitor respiration** | |
| **Fever** | Administer tepid sponging, fanning, a cooling blanket<br>Give antipyretic – Paracetamol 15mg/kg/dose | |
| **Severe dehydration/ shock)**<br>Lethargic or unconscious<br>Sunken eyes<br>Not able to drink or breastfeed<br>Skin pinch goes back very slowly (longer than 2 seconds)<br>Reduced urine output | Infants under 12 months | Ringers Lactate solution or Normal saline:<br>30ml/kg in I hr then<br>70ml/kg in 5 hours |
| | Children: 12 months up to 5 years | Ringers Lactate solution or Normal saline:<br>30mls/kg in 30 minutes then<br>70mls/kg over 2 hours 30 minutes<br>Repeat once if radial pulse is still very weak or not detectable<br>Reassess the child every 1-2 hours. If hydration status is not improving, give IV drip more rapidly.<br>Also give ORS (about 5ml/kg/hour) by NGT or orally as soon as the child can drink: usually after 3-4 hours in infants and 1-2 hours in children.<br>Reassess any infant or child after 3 hours. |
| Septicaemia | Appropriate broad spectrum antibiotic as in the STG<br>(Ampicillin 25-50mg/kg 6 hourly + Gentamicin 2.5mg/kg 12 hourly for neonates and 8 hourly for children above 1 month) while awaiting results | |

**Nursing Care for Severe Malaria**

Comatose patients should be given meticulous nursing care

- Nurse the patient in the lateral or semi-prone position to avoid aspiration of fluid.
- Insert a nasogastric tube to minimise the risk of aspiration pneumonia. Aspiration pneumonia is a potentially fatal complication that must be dealt with immediately.
- Turn the patient every 2 hours
- Do not allow the patient to lie in a wet bed. Pay particular attention to pressure points.
- Keep a careful record of fluid intake and output. If this is not possible, weigh the patient daily in order to calculate the approximate fluid balance.
- Note any appearance of black urine (haemoglobinuria).
- Check the speed of infusion of fluids frequently. Too fast or too slow an infusion can be dangerous.
- Monitor the temperature, pulse, respiration, blood pressure, blood sugar and level of consciousness using the Blantyre coma score. These observations should be made four hourly (or more often) until the patient is out of danger.
- Report changes in the level of consciousness, occurrence of convulsions or changes in behaviour of the patient immediately and take appropriate action. All such changes suggest developments that require additional treatment.
- If the temperature rises above 38.5C, remove the patient's clothes and start tepid sponging and fanning. Give rectal paracetamol (suppositories) 15mg/kg OR nasogastric PCM if no suppositories available.

### 3.2.3. Follow-up of patients

- Monitor for possible complications and manage accordingly.
- Monitor Hb levels and give haematinics as appropriate.
- Monitor and rehabilitate patients with neurological sequelae. Neurological sequelae occur in up to 10% of children who survived. This may take various forms such as: cerebellar ataxia, hemiparesis, speech disorders, cortical blindness, behavioural disorder, hypotonia or generalised spasticity.

# Chapter 4: Malaria in Adults

Severe infection with the parasite is uncommon among the adult population in The Gambia. The clinical features of uncomplicated plasmodium falciparum malaria are non-specific and may mimic many other disease conditions. Culturally the Gambian adult population assumes that febrile illnesses are due to malaria.

## 4.1 Uncomplicated Malaria

Development of partial immunity of an individual depends on repeated exposure to malaria infection and this immunity may weaken with time spent away from malaria risk areas. Severe malaria among adult population resident in The Gambia have developed partial due to repeated exposures malaria infection

However, Expatriates and West Africans including Gambians who have spent significant periods of time outside malaria risk areas may have little or no in-built immunity to malaria infection. Malaria in non- immune should be regarded as a medical emergency in the same way as in infants with malaria. If not properly and promptly managed the patients may deteriorate and die quickly.

Given the high susceptibility of non-immune individuals it is important to maintain a high level of suspicion, even if a patient claim to take regular antimalarial prophylaxis at all times. Parasitaemia may be very low or undetectable, especially if the patient has been taking prophylaxis.

### 4.1.1 Signs and Symptoms

Symptoms of malaria are non-specific and some patients may feel unwell with vague body pains and loss of appetite. Fever (37.5ºC or above) or history of fever is usually present but may be absent in some cases. Flu-like symptoms are a common presentation. Any of the following may be present.

| | |
|---|---|
| Fever | Loss of appetite |
| Headache | Diarrhoea |
| Rigors (cold shivers and hot sweats) | Nausea and vomiting |
| Myalgia | Abdominal pain |
| Weakness or tiredness | Muscles or Joint Pain |
| Dizziness | Sweating |

Consider other diagnoses, many of which could lead to severe illness if not diagnosed early. Some illnesses could occur simultaneously with malaria in the same patient.

**Diseases that can mimic malaria**

Influenza
Typhoid fever
Urinary tract infection
Hepatitis
Pneumonia
Gastroenteritis or
HIV seroconversion
COVID-19

### 4.1.2 Diagnosis

**Laboratory investigations**

Check for malaria parasite with microscopy or RDTs. Microscopy is the mainstay for parasitological diagnosis of malaria while RDT should be used only as an alternative where microscopy is not feasible or unavailable.

**Other investigations to consider include:**

- Haemoglobin (Hb) or Packed Cell Volume (PCV) if Hb is not available
- Blood sugar
- Urinalysis
- COVID-19 Rapid Diagnostic Test

### 4.1.3 Treatment

Artemether 20mg-Lumefantrine 120mg: Start with an initial dose of 4 tablets and repeat dose after 8 hours on day one and 4 tablets 12 hourly (twice) daily after food on the second and third days.

Adjust doses for adults with weight below 35Kg according to weight.

Antipyretic – Paracetamol 1G 6-hourly or Aspirin 600mg 6 hourly

**Table 10: Dosing schedule for Artemether -Lumefantrine in adults**

| Day | Artemether 20mg-Lumefanthrine 120mg |
|---|---|
| Day 1 | 4 tablets (Start), then 4 tablets after 8 hours. |
| Day 2 | 4 tablets every twelve hours (twice a day) |
| Day 3 | 4 tablets every twelve hours (twice a day) |
| | Give single dose of Primaquine 0.25mg/kg BW (up to maximum of 15mg) with the last dose of AL on day 3 to patients in very low transmission areas to clear gametocytes |

**NOTE:** Glucose-6-Phosphate Dehydrogenase (G6PD) testing NOT required before giving Primaquine tablet

## 4.3. Treatment failure

Treatment failure is failure to clear the malaria parasite or a patient continues to have symptoms within 28 days from start of treatment or clinically deteriorates at any time.

The commonest cause of treatment failure with Artemether 20mg-Lumefantrine 120mg, is failure to complete the full course because of either vomiting or missed doses.

Consider other diagnoses (differential diagnosis)

**NEVER** use a malaria RDT to confirm treatment failure.

**Confirm diagnosis of treatment failure using microscopy only.**

**IF POSTIVE, TREAT AS FOLLOWS**:

- **NEVER** use a malaria RDT to confirm treatment failure. **Confirm diagnosis of treatment failure using microscopy only.**
- DihydroArtemisinin-Piperaquine (DHA 40mg-PPQ 320mg) daily for 3 days.
- Single dose of primaquine 0.25mg/kg (up to maximum of 15mg) with the last dose of DHA-PPQ on day 3 to patients in very low transmission areas.
- If DHAPPQ is not available, give oral Quinine plus Clindamycin (Oral Quinine 600mg + Clindamycin 450mg three times daily for 7 days).
- Advise patient to return immediately (or later the same days) if condition worsens.
- Give paracetamol 1g PRN as analgesic/antipyretic.
- If anaemia is detected treat with ferrous iron 60mg once daily for more than 3 months to establish a steady haemoglobin above 11.5g/dl. Give advice on iron-rich diets.
- Treat any secondary bacterial infections with appropriate antibiotics according to the national standard treatment guideline.

# Chapter 5: Severe Malaria in Adults

## 5.1 Severe Malaria in Adults

Most individuals, including most Gambian adults, exposed to repeated malaria infections develop partial immunity to malaria infections. Severe malaria in a semi immune adult rarely leads to life – threatening illness. Therefore, health providers should thoroughly search for an alternative diagnosis whenever a long-term-resident West African adult presents with a severe illness and confirm the diagnosis of malaria before starting treatment.

**In non-immune, uncomplicated malaria may quickly deteriorate to severe malaria if not promptly diagnosed and treated (i.e. within 24 hours).**

Remember to first consider and exclude each of the following: - meningitis, COVID-19, septicaemia, septic shock, typhoid fever, gastroenteritis, viral haemorrhagic fever, UTI and relapsing fever.

**Clinical features of severe malaria in semi and non-immune adults**

**Common**

- Prostration (unable to sit or walk without help)
- Impaired consciousness (confusion or drowsiness or coma)
- Cerebral malaria (more likely in non-immune)
- High parasitaemia
- Respiratory distress (difficulty in breathing, fast deep breath)
- Jaundiced (yellowness of the eye)
- Multiple convulsions (more than 2 episodes within 24 hours)
- Metabolic acidosis
- Cocoa-cola-like urine (haemoglobinuria)
- Acute Kidney Injury (renal failure)
- Abnormal spontaneous bleeding

**Less common semi-immune but common in non-immune adults**

- Hypoglycaemia (blood glucose <2.2mmol/L)
- Pulmonary oedema
- Severe anaemia(<7g/dl)
- Circulatory collapse or shock (systolic pressure <70mmHg)
- Invasive bacterial infection (co-infection (<5%)

These symptoms and signs can occur singly, or more commonly, in combination in the same patient.

Remember to look for pointers to another diagnosis, some of which may also occur in the same patient with malaria.

### 5.1.1 Diagnosis

**Laboratory investigations**

- Check for malaria parasites with microscopy or RDTs
- Haemoglobin or Haematocrit (PCV)
- Urinalysis
- Blood Sugar
- Full Blood Count, where not available, perform White Blood Cell Count
- Blood culture and sensitivity
- Cerebro-spinal fluid Analysis (CSF)
- Liver Function Test
- Renal Function Test (urea and creatinine)
- COVID-19 Rapid Diagnostic Test

### 5.1.2. Pre-referral management of severe malaria (Community/ Minor Health Centres)

Cases of severe malaria in adults should be managed in hospitals or Major Health Centres.

In Community Clinics and Minor Health Centres, treatment of a patient with severe malaria should begin while waiting for referral so that life-saving therapy is not delayed.

Health providers should follow the following steps before referring rapidly to hospital or nearest higher level:

1. **Antimalarials**: IM/IV Artesunate 2.4mg/kg stat dose OR if not available give,

2. IM Artemether 3.2mg/kg body weight (to the anterior thigh) **OR**
   IM Quinine stat dose. Quinine MUST be diluted (maximum concentration is 100mg/ml) before intramuscular injection. A loading dose of 20 mg/kg of quinine (diluted to a maximum 100mg/ml) is given by intramuscular injection (preferably the anterior thigh). A maximum of 3ml should be injected into one site. Multiple sites should be used if the amount to be injected exceeds 3ml,

3. **Antibiotics :** IM Ampicillin + Gentamycin or Ceftriaxone (or alternative broad spectrum antibiotics as in the STG).

### 5.1.3 Treatment in Major Health Centres and Hospitals

Severe malaria is a medical emergency. Management of severe malaria includes clinical assessment of the patient, specific antimalarial treatment, adjunctive therapy and supportive care. After a rapid clinical assessment and confirmation of the diagnosis, full doses of parenteral Artesunate treatment should be started without delay.

**Initial Assessment:**

- Secure the airway in unconscious patients and assess breathing and circulatory systems.
- Weigh the patient if feasible or estimate body weight so that medicines, including antimalarials and fluids can be given based on body weight.
- Insert an intravenous cannula and immediately measure the blood glucose. Conduct a detailed clinical examination, assess the level of consciousness and record the Glasgow coma score.
- Do a lumbar puncture for cerebrospinal fluid (CSF) analysis to exclude bacterial meningitis in unconscious patients.
- Assess fluid balance as this is critical in severe anaemia. Respiratory distress, with acidotic breathing, in severely anaemic adults, often indicates hypovolaemia and requires prompt rehydration and, where indicated, blood transfusion.
- Collect nasopharyngeal swab should to exclude COVID-19

**Table 11*:* Dosing schedule for Artesunate**

| Treatment | Dosage | Frequency |
|---|---|---|
| Adults | Artesunate 2.4mg/kg per dose | **0, 12, 24 hours;**<br>**then once every 24 hours** until able to tolerate oral medication,<br>then change to full course of Artemether-Lumefantrine after at least 24 hours of Artesunate injection and the patient is able to tolerate oral medication |
| **NOTE:** Artesunate injection doses should be given for a minimum of 24 hours irrespective of the clinical condition of the patient before it can be stopped | | |

Where Artesunate injection is not available, use Artemether or Quinine as alternative treatment.

**Table 12: Dosing Regimen for Artemether and Quinine**

| Artemether | Quinine |
|---|---|
| Artemether 3.2mg/kg BW initial dose, then 1.6mg/kg daily until patient can tolerate oral treatment | • Give Quinine loading dose 20mg/kg body weight (up to maximum of 1.2g) diluted in 10ml/kg body weight of 5% dextrose solution (500mls) infused over 4 hours.<br>• Omit loading dose if the patient has received quinine in the preceding 24 hours.<br>• Then eight hours after the start of the loading, give a maintenance dose of 10mg/kg (up to maximum of 600mg) diluted in 10ml/kg body weight of 5% dextrose (500ml) solution infused over 4 hours<br>• This maintenance dose should be repeated every 8 hours until conditions improves<br>• In the presence of acute renal failure, after 72 hours, consider reducing Quinine dose to 5-7mg/kg 8 hourly.<br>• Change to full course of Artemether20mg-Lumefantrine120mg as soon as patient can tolerate oral treatment.<br>• Give single dose of Primaquine 0.25mg/kg BW (up maximum of 2 tablets) with the last dose of AL on day 3 to patients in very low transmission areas |

**Supportive care**

- Monitor the pulse rate, respiration rate, blood pressure hourly and blood sugar every four hours.
- Monitor blood sugar repeatedly and correct by intravenous glucose if less than 2.2mmol.
- Monitor the blood film for malaria parasites daily, every 12 hours if feasible, during the first three days of treatment to monitor parasite response to treatment with antimalarial medicine. A negative RDT result may be indicative of another cause of infection.
- The assessment of fluid balance is critical in severe malaria. Monitor intake and output 6 hourly.
- Use antipyretics if necessary.
- Treat convulsion with diazepam 10Mg IV slowly **OVER 2 MINUTES.**
- If necessary, start nasogastric feeding

If no clinical improvement, rule out other clinical conditions.

# Chapter 6: Malaria in pregnancy (MIP)

Since both the pregnant woman and her unborn baby are at risk of significant morbidity and mortality all pregnant women with malaria should receive prompt treatment with the most effective but safe antimalarial available. Malaria is often mistaken for other infections in pregnancy and vice versa. Conversely, pregnancy is often mistaken for malaria in the early weeks. In health facilities, pregnancy should always be considered and excluded in women of childbearing age especially in young single women.

In pregnancy, the disease is frequently more severe, with higher parasitaemia, and may lead to maternal anaemia, abortion, intra-uterine foetal growth retardation; premature labour, stillbirth and low birth weight. Maternal anaemia due to malaria may lead or contribute to maternal death. Pregnancy related morbidity and mortality from malaria in pregnancy extend into the post-partum period.

## 6.1 Uncomplicated malaria in pregnancy

Pregnant women at most risk of malaria infection

- First or second pregnancy in malaria endemic areas.
- Immigrants or visitors from areas of low or no malaria transmission.
- HIV infected.

**Signs and symptoms usually present**

Fever
Shivering/chills/rigors
Headache
Muscle/joint pain
Nausea and vomiting
False labour pain (uterine contractions)

### 6.1.1. Diagnosis

**Laboratory investigations**

Check for malaria parasites with microscopy or RDT
Haemoglobin or haematocrit (PCV)

Urinalysis

At health facilities where malaria diagnostics (microscopy or RDT) are not available, patients suspected to have malaria should be treated for malaria.

### 6.1.2. Treatment

**For all trimesters**

The drug of choice for uncomplicated malaria is Artemether 20mg-Lumefantrine 120mg on weight basis. Pregnant women receiving Artemether-Lumefantrine should be encouraged to eat fatty meals or food before or immediately after every dose to enhance absorption of the medicine.

**Alternatives:** DihydroArtemissinin-Piperaquine should be used where Artemether-Lumefantrine is not available.

Side effects related to Artemether-Lumefantrine or DihydroArtemissinin-Piperaquine should be monitored and reported.

Primaquine tablet should **NEVER** be given to pregnant women

***NOTE:*** Avoid using Quinine for treatment of malaria in pregnancy given the demonstrated poorer treatment outcomes along with the challenges of adherence to a seven-day course of treatment

Antifolates are contraindicated in the first trimester of pregnancy. Therefore, ACTs containing sulphadoxine-pyrimethamine are contraindicated during the first trimester of pregnancy. Secondly, sulphadoxine-pyrimethamine is the drug used for IPTp, therefore, Artesunate- sulphadoxine-pyrimethamine cannot be used as an alternative treatment for malaria in pregnancy

There is currently no documented record of the use of Artesunate-Pyronaridine during the first trimester of pregnancy. Avoid using Artesunate-Pyronaridine in the first trimester of pregnancy

**Table 13: Treatment regime for uncomplicated malaria during pregnancy**

| Anti-malarial drug | Treatment | |
|---|---|---|
| Artemether 20mg-Lumefantrine | Use Artemether 20mg-Lumefantrine 120mg in all trimesters | |
| | Day 1 | 4 Tablets stat |
| | | After 8 hours 4 tablets |
| | Day 2 | 4 Tablets Twelve hourly at 24 and 36 hours after second dose |
| | Day 3 | 4 Tablets Twelve hourly at 48 and 60 hours after third dose |
| | | DO NOT GIVE PRIMAQUINE TABLET |
| DihydroArtemisinin-Piperaquine (DHA-PPQ) | Alternative treatment if Artemether-Lumefantrine (AL) is not available or where treatment failure has been established with Artemether-Lumefantrine. | |
| ***NOTE:*** Avoid giving Artesunate-Pyronaridine in the first trimester of pregnancy as its safety has **NOT** yet been fully documented | | |

## 6.2 Severe Malaria in Pregnancy

Severe malaria in pregnancy is a medical emergency. The rate of mortality from severe malaria in pregnancy is approximately 50%, which is higher than in non-pregnant women. After rapid clinical assessment and confirmation of the diagnosis parenteral antimalarial agents should be given to pregnant women with severe malaria at any stage of pregnancy, in full doses without delay.

**Symptoms and signs of severe malaria usually present**

Convulsions
Severe jaundice
Signs of severe dehydration, especially if woman has been vomiting repeatedly
Sudden weight loss
Sunken eyes
Reduced skin turgor
Dry mouth
Reduced amount of urine or no urine at all
Spontaneous bleeding from the gums, skin and vein puncture sites

**Convulsions in pregnancy**

Eclampsia is a differential diagnosis in pregnant women presenting with convulsions or
alteration in level of consciousness. The table below should be used to differentiate the two conditions

**Table 14: Convulsions in pregnancy**

| | **Severe malaria** | **Eclampsia** |
|---|---|---|
| Recent history of fever, chills (from patient or family) | Yes | No |
| Temperature | >38.5 | <38.5 |
| Blood pressure | Diastolic < 90mm hg | Diastolic > 90mm hg |
| Enlarged spleen | Yes | No |
| Jaundice | Yes | No |

### 6.2.1. Diagnosis

**Laboratory investigations**

- Check for malaria parasites with microscopy or RDT
- Haemoglobin or haematocrit (PCV)
- Urine microscopy

The following are important if the patient's condition does not improve

- Full blood count
- Urinalysis and microscopy, culture and sensitivity

- Blood sugar
- Renal function tests
- Liver Function Tests
- COVID 19 Rapid Diagnostic Test

### 6.2.2 Pre-referral treatment for severe malaria in pregnancy (Community/ Minor Health Centres)

- A pregnant woman with severe malaria should be treated as an emergency in Community/ Minor health facilities (while waiting for referral) so that life-saving therapy is not delayed.
- Artesunate is the drug of choice and the dose for adults should be used. A start dose of Artesunate at 2.4 mg/kg body weight should be administered.
- If Artesunate is not available, Artemether can be administered.
- The patient should be taken to the nearest Major Health Centre or Hospital. Severe malaria cases should be managed **ONLY** in **MAJOR HEALTH CENTRES OR HOSPITALS**.
- Give antibiotics to patients with altered consciousness before referring them.

### 6.2.3 Treatment

Artesunate is the drug of choice.

**Table 15: Dosing regime for Artesunate**

| Treatment | Dosage | Frequency |
|---|---|---|
| Adults | Artesunate 2.4mg/kg per dose | **0, 12, 24 hours;**<br>**then once every 24 hours** until able to tolerate oral medication, then change to full course of Artemether-Lumefantrine after at least 24 hours of Artesunate injection and the patient is able to tolerate oral medication |
| Where Artesunate injection is not available, Artemether can be used.<br><br>***NOTE:*** Artesunate injection doses should be given for a minimum of 24 hours irrespective of the clinical condition of the patient before it can be stopped | | |

**Table 16: Dosing schedule for Artemether**

| |
|---|
| Artemether 3.2mg/kg BW initial dose, then 1.6mg/kg daily until patient can tolerate oral treatment<br><br>Change to full course of Artemether20mg-Lumefantrine120mg as soon as patient can tolerate oral treatment<br><br>**DO NOT** give Primaquine tablet |
| Monitor the pulse rate, respiration rate, blood pressure hourly and blood sugar every four hours.<br>Monitor the blood film for malaria parasites |

**Additional Treatment**

- Paracetamol tablets 1g (2 tablets) PRN for fever and/or body aches and pains
- Promethazine tablets 25mg twice daily for nausea and vomiting
- Treat anaemia and hypoglycaemia
- The patients should be re-evaluated if her condition does not improve after 48 hours consider and rule out other conditions such as urinary tract infections, pre-eclampsia, eclampsia, diabetes, COVID-19 and respiratory tract infections

## 6.3 Management of anaemia in pregnancy

Malaria is a significant contributing factor to anaemia in pregnancy. Severe anaemia increases the risk of death.

Maternal anaemia increases the risk of abortion, premature delivery, Intrauterine Growth Retardation (IUGR), Intra Uterine Fetal Death (IUFD) and low birth weight.

During the past decade, the burden of malaria - related anaemia, for the pregnant women (the risk of death) and foetus (low birth weight) has increasingly been recognised.

All pregnant women (except those with a Hb over 12g/dl) should receive 60mg of ferrous iron and 5mg of Folic Acid daily throughout pregnancy.

Haemoglobin checked in early pregnancy (1$^{st}$ trimester) should be re-assessed in 2$^{nd}$ & 3$^{rd}$ trimesters as physiological haemodilution and foetal demand may result in a low Hb despite a level initially above 12g/dl.

Oral iron may be given as sulphate, fumarate or gluconate salts. However, the quantity of ferrous iron in each salt must be taken into consideration and the daily dose adjusted

accordingly to ensure the pregnant woman receives at least 60mg (1 tablet of 200mg ferrous sulphate) of ferrous iron daily.

Iron should ***NOT BE GIVEN*** to women with sickle cell anaemia unless iron deficiency is demonstrated

Women should be counselled about the side effects of iron treatment and encouraged to continue the drug. Minor side effects include nausea, vomiting, constipation, and diarrhoea. Taking the drug at bedtime or with a full meal may reduce the severity of symptoms

**Table 17: Management of anaemia in pregnancy**

| Hb concentration | Treatment regime |
|---|---|
| 10 – 11.9g/dl | 60mg of Ferrous iron once daily / 5mg of Folic acid once daily |
| 8 -9.9g/dl | 60mg of Ferrous iron twice daily / 5mg of Folic acid once daily |
| 6.5 – 7.9g/dl | 60mg of Ferrous iron twice daily / 5mg of Folic acid once daily<br>150mg of Levamisole stat at ANC booking.<br>Consider blood transfusion if pregnancy is above 34 weeks |
| Less than 6g/dl | Blood transfusion<br>60mg of ferrous iron twice daily / 5mg of folic acid once daily.<br>Full course of malaria treatment<br>150mg of Levamisole stat/ Advice about iron rich foods |

## 6.4. Prevention of Malaria in Pregnancy

The strategies to prevent malaria in pregnancy are part of the antenatal care package and include:

- Intermittent preventive treatment for malaria in pregnancy (IPTp);
- Long lasting insecticide-treated nets (ITNs) and
- Prompt and effective diagnosis and treatment of malaria cases

All pregnant women should register for antenatal care early - as early as possible (ONE MONTH or WITHIN 3 MONTHS) and receive skilled care throughout pregnancy, delivery and during the puerperium.

**Insecticide treated nets**

- ITNs are an important strategy in preventing malaria in pregnancy.
- ITNs should be provided to women as early in the pregnancy as possible preferably at the first contact visit to the ANC,
- Each pregnant woman should be shown how to hang the LLIN and encouraged to use the net each and every night during her pregnancy and thereafter

**Intermittent Preventive Treatment for Malaria in pregnancy (IPTp)**

- Pregnant women should receive Intermittent Preventive Treatment (IPTp) at the correct times and intervals (At least 3 or more doses of sulphadoxine-pyrimethamine before delivery).
- The first IPTp-SP dose should be administered as early as possible during the 2nd trimester of gestation
- Each SP dose should be given at least 1 month apart
- The last dose of IPTp with SP can be administered up to the time of delivery without safety concerns
- IPTp should ideally be administered as directly observed therapy (DOT)
- SP should not be administered to women receiving co-trimoxazole prophylaxis

Health care providers should always ask a pregnant woman if she is allergic to sulpha drugs before giving SP

**Sulphadoxine- pyrimethamine**

Four doses - for pregnant women (IPT) **ONLY.** The doses must be separated by at least 4 weeks interval

**Table 18: Timing of Sulphadoxine- pyrimethamine prophylaxis in pregnancy**

| Dose | Timing in relation to gestation age | Dose (tablets) |
|---|---|---|
| First (1st) | At 16 weeks or above | 3 Tablets |
| Second (2nd) | At least 1 month after the first dose | 3 Tablets |
| Third (3rd) | At least 1 month after the second dose | 3 tablets |
| Fourth (4th) | At least 1 month after the third dose | 3 tablets |

# Chapter 7: Malaria Prophylaxis

In endemic areas, chemoprophylaxis is no longer recommended as a malaria control measure for young children or other population groups except for temporal use in special circumstances. The drugs available for prophylaxis are limited because of increasing drug resistance and drug – specific side effects. In recent years there has been a trend to better geographical target chemoprophylaxis advice, and take into account the type of travellers and specific risk. There is also renewed emphasis on prevention of mosquito bites as opposed to chemoprophylaxis therefore; chemoprophylaxis should be used in conjunction with other preventive measures.

## 7.1. Indications for chemoprophylaxis

- Children or adults from non-malarious areas.

## 7.2. Medicines for chemoprophylaxis

**Mefloquine**

Mefloquine is administered 250mg once weekly. Prophylaxis should begin 1 to 2 weeks before arrival in an endemic area and should continue for 4 weeks after leaving such areas.

**Table 19: Mefloquine dosing for prophylaxis**

| Age/ weight | Dose (tablets) |
|---|---|
| Children less than 5kg (3 months) | Not recommended |
| 20 to 30 kg | 125 mg (1/2 tablet) orally once a week |
| 30 to 45 kg | 187.5 mg (3/4 tablet) orally once a week |
| Greater than 45 kg | 250 mg (1 tablet) orally once a week |

**Side effects**

Nausea, vomiting abdominal pain and diarrhoea these are most common but are dose related and self-limiting. Other CNS related ones include dysphoria, dizziness, ataxia, headache some visual and auditory disturbances, sleep disturbances and nightmares, convulsions.

**Contraindications**

- The first trimester of pregnancy.
- Do not administer to patients less than 5 kg.
- Avoid use in history of seizures and in severe neuro-psychiatric disturbance.
- Do not administer concomitantly with quinine and avoid quinine use after administration of mefloquine.

**Caution**

- Mefloquine can compromise adequate immunisation with the live typhoid
- vaccine.
- Mefloquine should only be taken 12 hours after administration of the last

- quinine dose.
- Care should be taken when administering concomitant medications that
- interfere with cardiac function.

**Atovaquone – Proguanil (Malarone)**

- Atovaquone–proguanil is available as film coated adult tablets containing 250 mgatovaquone and 100mg proguanil hydrochloride or paediatric tablets containing 62.5 mg atovaquone and 25 mg proguanil hydrochloride.
- It is administered as a daily dose of 1 tablet commencing 1 day before departure to a malaria endemic area, throughout the stay and continuing 7 days after leaving.
- Adults and children > 40kg should take 1 adult tablet daily. The drug should be taken with food or milk at the same time each day.

**Table 20: Atovaquone – Proguanil dosing for prophylaxis**

| Weight | Dose (paediatric formulation |
|---|---|
| 11 – 20kg | One tablet (paediatric formulation) daily for 3 days |
| 21 – 30kg | Two tablets (paediatric formulation) once daily for 3 days |
| 31 – 40kg | Three tablets (paediatric formulation) once daily for 3 days |
| Above 40 kg | 1 tablet daily (adult formulation |

**Side effects**
Abdominal pain, nausea, vomiting, diarrhoea, headache, anorexia and coughing.

**Contraindications**
- Persons with hypersensitivity to atovaquone and/ or Proguanil.
- Pregnancy because of lack of data.
- Caution is indicated in persons with severe renal failure (creatinine clearance)

**Doxycycline**
Doxycycline is commonly available as capsules containing 100mg doxycycline hydrochloride. Doxycycline is administered as a daily dose of 100 mg daily. It is taken a day before departure to a malaria endemic area and continued daily throughout the stay and for 4 weeks after departure from the endemic area.

**Table 21: Doxycycline dosing for prophylaxis**

| Age | Dose (tablets) |
|---|---|
| Children less than 15 years | Not recommended |
| Adults | 100mg once daily |

**Side effects**
GIT irritation, increased vulnerability to sun-burn (phototoxic reaction), transient depression of bone growth and discoloration of teeth, vaginal candidiasis.

**Contraindications**
Doxycycline shouldn't be used in:
- Children under 8 years of age.
- Pregnant and lactating mothers.

- Persons with hepatic insufficiency.
- Persons with known hypersensitivity to tetracyclines.

**Caution**

Doxycycline should not be used for prophylaxis for periods exceeding 4 months. Antacids and milk impair absorption of tetracycline and concurrent administration should be avoided.

# References

Malaria Control Policy, 2021-2025, Ministry of Health, The Gambia

Malaria Control Strategic Plan, Ministry of Health, The Gambia 2021-2025

Management of severe Malaria, A practical handbook, second Edition, WHO, 2000.

Ministry of Health, HMIS Data 2022

National Guidelines for the diagnosis, treatment and prevention of malaria in Kenya, Ministry of Health, Fifth Edition, 2016

Standard Treatment Guidelines, 2022, Ministry of Health, The Gambia

WHO, Guidelines for Malaria, November 2022

WHO, Guidelines for the Treatment of Malaria 2006

WHO, Guidelines for Treatment of Malaria, Third Edition, 2015

WHO, Management of Severe Malaria. A Practical Handbook, Third Edition 2012

# Annexes

## Annex 1: Operational malaria stratification of The Gambia

| Strata | Cases per 1000 inhabitants | Districts in each stratum |
|---|---|---|
| I: Very Low | 1-10 | Upper Niumi, Lower Niumi, Jokadu, Upper Badibu, Sabach Sanjal, Lower Badibu, Central Badibu, Kiang West, Kiang East, Nianija, Upper Saloum, Niamina West, Niamina East, Niani, Niamina Dankunku, Lower Fulladou West, Foni Bintang Karanai, Foni Bondali, Foni Brefet, |
| II: Low | 11-30 | Janjan Bureh, Lower Saloum, Sami, Jarra West, Kiang Central, Sandu, Banjul City, Kanifing Municipal, Kombo North, Kombo Central, Kombo South |
| III: Moderate | 31-156 | Upper Fulladou West, Jarra Central, Jarra East, Basse, Jimara, Kantora, Wuli East, Wuli West, Foni Jarrol, Foni Kansala, Kombo East, Tumana |
| **TOTAL** | | **42** |

## Annex 2: Antimalarial drugs

1. Artemether-Lumefantrine
2. DihyroArtemissinin-Piperaquine
3. Artesunate
4. Artemether
5. Primaquine
6. Sulphadoxine-Pyrimethamine
7. Amodaiquine
8. Quinine
9. Clindamycine
10. Doxycycline

**For the pharmacology of these antimalarial drugs listed above - Refer to WHO Guidelines for the Treatment of Malaria, Third Edition, 2015 (Annex 5) using this link: -**https://www.afro.who.int/publications/guidelines-treatment-malaria-third-edition

## Annex 3: Drugs not currently recommended in the treatment of malaria

- Corticosteroids (dexamethasone)
- Other anti-inflammatory agents
- Other anti-cerebral oedema agents (urea, mannitol, invert sugar)
- Low molecular weight Dextran
- Adrenaline
- Heparin
- Prostacycline
- Oxypentofylline (trental)
- Hyperbaric oxygen
- Cyclosporin A
- Hyperimmune serum

## Annex 4: The Blantrye and Glasgow coma scales

**Blantyre coma scale for children under 5**

| **Best Motor Response:** | **Score** |
|---|---|
| localizes painful stimulus[3] | **2** |
| withdraws limb from pain | **1** |
| nonspecific or absent response | **0** |
| | |
| **Verbal Response:** | |
| appropriate cry | **2** |
| moan or inappropriate cry | **1** |
| None | **0** |
| | |
| **Eyes directed to object:**<br>directed (follows mothers face or objects) | **1** |
| not directed | **0** |
| | |
| **Total score** | **0-5** |

The total score is the sum of the individual scores in each section.

**The Glasgow coma score for adults and children over 5 years**

| | | |
|---|---|---|
| Eye open: | Spontaneous<br>To speech<br>To pain<br>Never | 4<br>3<br>2<br>1 |
| Best verbal response | Oriented<br>Confused<br>Inappropriate<br>In comprehensive sounds<br>None | 5<br>4<br>3<br>2<br>1 |
| Best motor response | Obeys commands<br>Localizes pain<br>Flexion to pain<br>Extension to pain<br>None | 5<br>4<br>3<br>2<br>1 |
| | **Total** | **3-14** |

A state of unarousable coma is reached at a score of < 10.
This scale can be used repeatedly to assess improvement or deterioration.

[3] Painful stimulus: Rub knuckles on patient's sternum
Painful stimulus: Firm pressure on thumbnail bed with horizontal pencil

## Annex 5. Laboratory diagnosis of malaria

The role of the laboratory is to support the clinical diagnosis and management of malaria cases.
It is desirable to confirm the diagnosis even of uncomplicated malaria, treatment failures and in severe malaria.
Giemsa/Field stain thick blood smears are the basis for microscopic diagnosis with a standard of looking at 100 fields at a magnification of 600-700 (equivalent to 0.25 micro litres of blood).
The limit of detection is usually 10-20 parasites per micro litre of blood.
Therefore a negative slide may not necessarily mean that the patient does not have malaria parasites in blood. Repeat examination of the blood should be performed after a few hours.

The following semi-quantitative method is often used:-

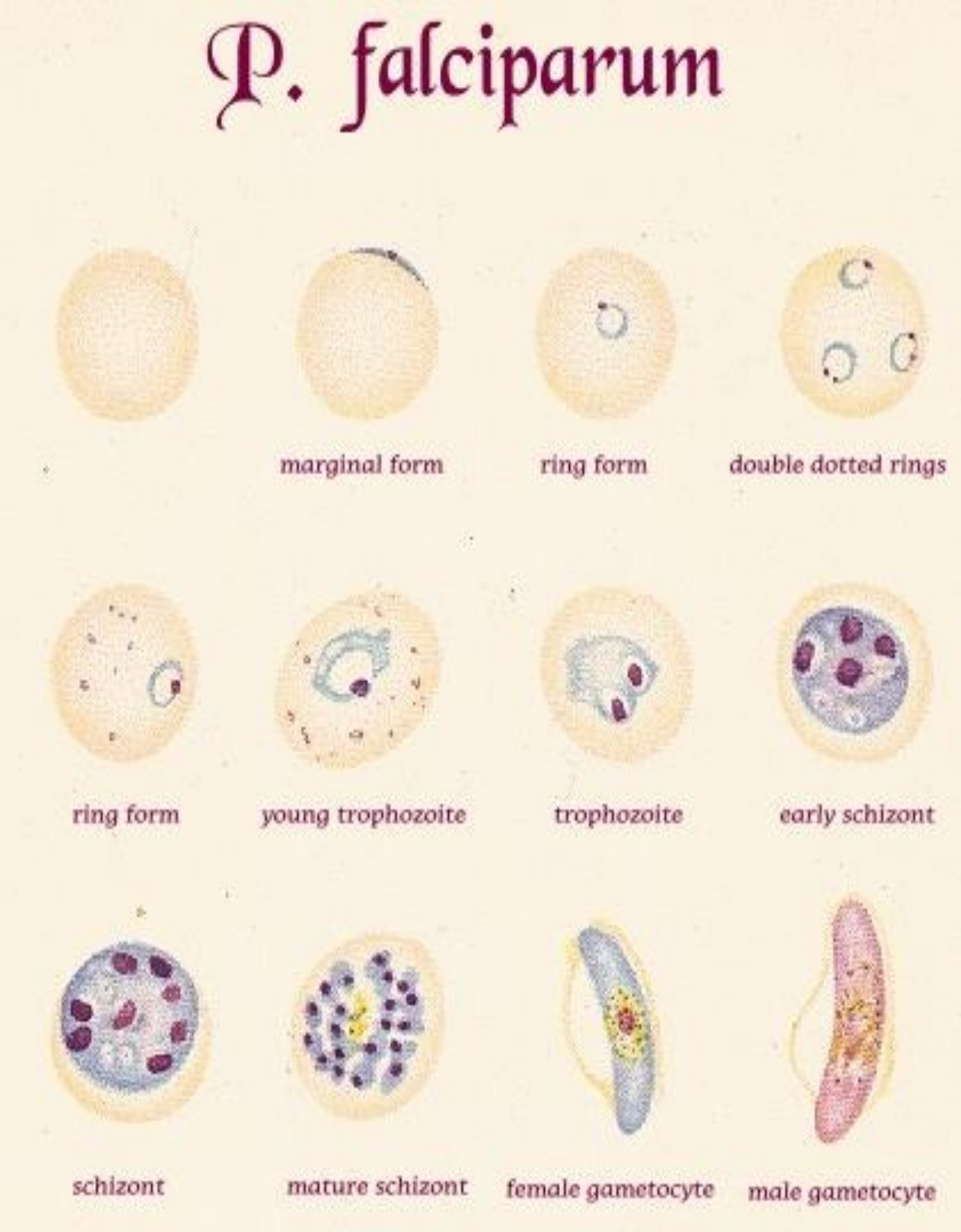
| | |
|---|---|
| + | = 1-10 parasites per 100 thick fields |
| ++ | = 11-100 parasites per 100 thick film fields |
| +++ | = 1-10 parasites per 1 thick film field |
| ++++ | = More than 10 per 1 thick film field |

This method of reporting is not appropriate for monitoring severe malaria because it will not objectively show changes in the parasite load. Thus in monitoring severe malaria use of parasite count per white blood cells, as shown below, is recommended
Parasite count per WBC
Giemsa-stained and thick blood smear are the basis of microscopic diagnosis. Parasites are counted against 200 WBC on the thick film and this is converted to parasite / micro litre using the formula:

$$\text{Parasite / micro litre of blood} = \frac{\text{Number of parasite counted x total WBC}}{\text{Number of WBC counted}}$$

An average figure of 8000 is used as the total WBC where the patient's total WBC counts are not available. Microscopy is not without its own limitations and may be fraught with a number of pitfalls e.g. it requires great skill to identify the parasite correctly and artefacts may be mistaken for parasites. It is therefore essential for laboratory personnel to be well trained and they should constantly undergo refresher training.

**Figure 10: Microscopic appearance of different stages of P. Falciparum**

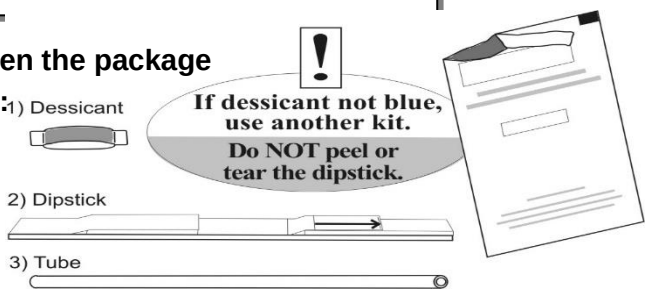



**Note: Figure showing the different stages of the parasite in the blood**

## Annex 6: Instructions for malaria Rapid Diagnostic Test (RDT)

**1** FIRST, read carefully the instructions **on how to use the malaria test kit.**

**2** **Now, open the package and find:**

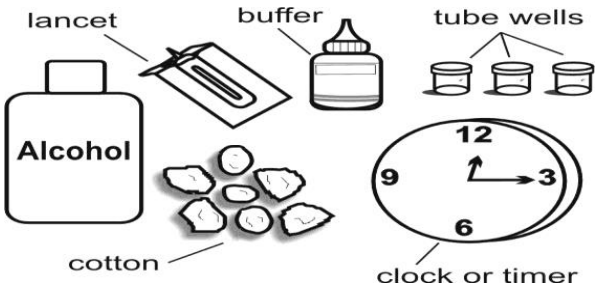



**3** **Next, look at the expiry date at the back of the package.**

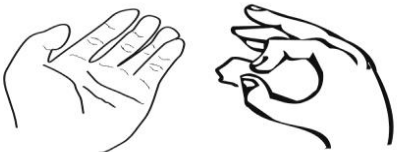
**Use another package if expiry date has passed.**


**4** **Collect:**

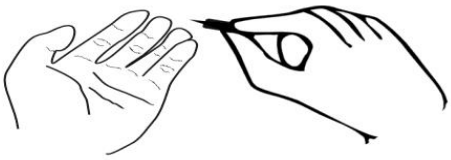
**1) alcohol**
**2) cotton**
**3) lancet**
**4) buffer**
**5) timer**
**6) tube wells**



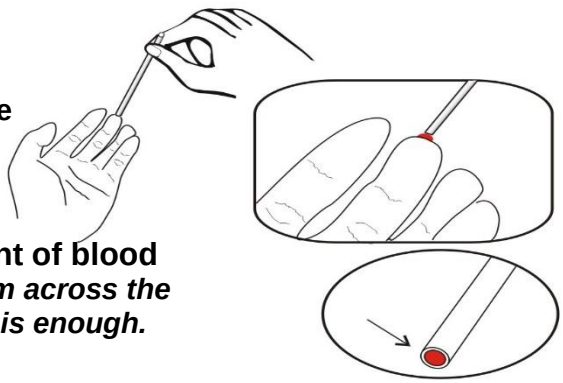

**5** **Clean the patient's finger. The alcohol MUST be dry before pricking, or test may not work.**



**6** **Prick the patient's finger to get just a very small amount of blood.**



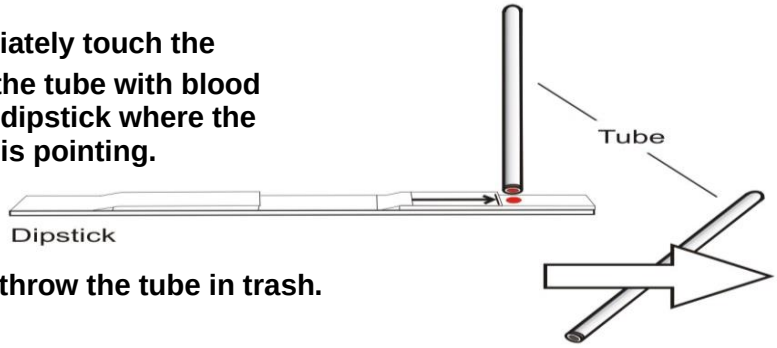
**7** **Barely touch the tip of the tube to the blood.**



**Only a small amount of blood** ***is needed. A film across the end of the tube is enough.***

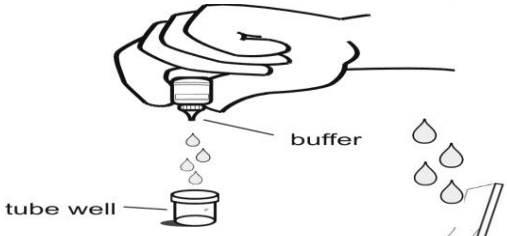
*Too much blood may give wrong results.*

**8** **Immediately touch the tip of the tube with blood to the dipstick where the arrow is pointing.**



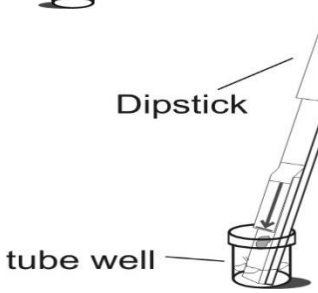

**9** **Then, throw the tube in trash.**

**10** **Put four (4) drops of buffer into a clean tube well.**

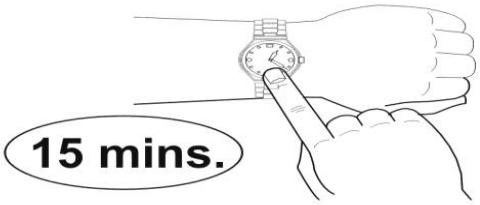



**11** **Place the dipstick with blood into the tube well where you put buffer drops.**

**Leave for fifteen (15) minutes.**

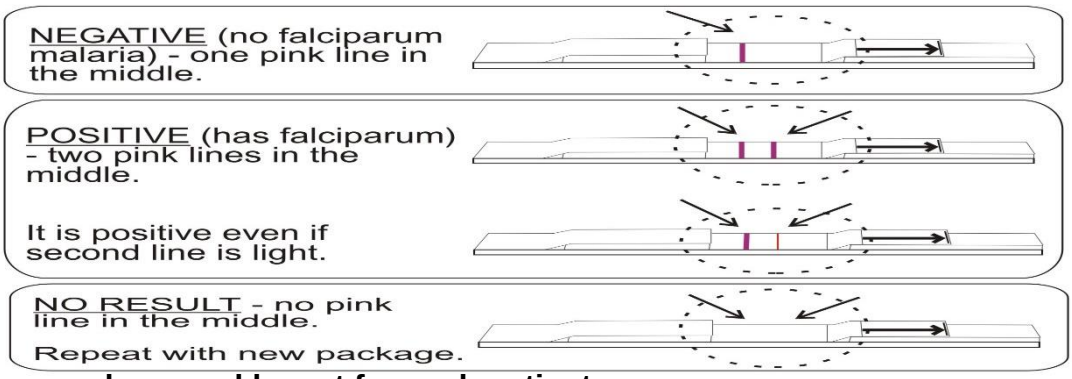



**12** **Read results exactly fifteen (15) minutes after placing the dipstick in the tube well.**




**<u>Do not read the results before fifteen (15) minutes.</u> Reading too early or too late can give false results.**

**13** **<u>HOW TO READ:</u>**




**<u>Use new package and lancet for each patient.</u>**

**Further information: www.wpro.who.int**

**Email: mal-rdt@wpro.who.int WHO, QAP 2004**

# Annex 7: Treatment failures

## A7.1 Treatment failure in malaria may manifest as:

### A7.1.1 Early treatment failure

- Development of danger signs or severe malaria on days 1–3 in the presence of parasitaemia
- Parasitaemia on day 2 higher than the day 0 count irrespective of axillary temperature
- Parasitaemia on day 3 with axillary temperature ≥ 37.5 °C
- Parasitaemia on day 3 that is ≥ 25% of count on day 0.

### A7.1.2 Late treatment failure

#### A7.1.2.1 Late clinical failure

- Development of danger signs or severe malaria after day 3 in the presence of parasitaemia, without previously meeting any of the criteria of early treatment Failure
- Presence of parasitaemia and axillary temperature ≥37.5 °C (or history of fever) on any day from day 4 to day 28, without previously meeting any of the criteria of early treatment failure.

#### A7.1.2.2 Late parasitological failure

- Presence of parasitaemia on any day from day 7 to day 28 and axillary temperature < 37.5 °C, without previously meeting any of the criteria of early treatment failure or late clinical failure.

**Treatment failure may be due to:**

- Parasite resistance to the anti-malarial drug used
- Vomiting of oral medication
- Non-adherence with medication
- Failure to take fat/food with Artemether-Lumefantrine leading to poor absorption of Lumefantrine component
- Re-infection (apparent treatment failure)