# Malaria

## *Executive summary*

## Introduction

Malaria is a preventable and curable disease which is caused by parasites of the genus Plasmodium. Species that can cause malaria in Africa include *P. falciparum, P. vivax, P. ovale and P. malariae*. *P knowlesii* is a cause of malaria in parts of SE Asia. Of these, *P. falciparum* is the deadliest as well as the most common species in sub-Saharan Africa. All malaria species are usually transmitted through the bite of an infected female Anopheles mosquito. As the endemicity of malaria reduces in The Gambia, non-development of immunity in childhood may cause increased number of severe malaria cases among older patients in the near future.

This guideline covers the diagnosis and treatment of both uncomplicated and severe malaria.

## Target users

* Nurses
* Doctors

## Target area of use

* Gate Clinic
* Outpatient Department
* Ward

## Key areas of focus / New additions / Changes

This guidelines describes the features of uncomplicated malaria and those of severe malaria. The differential diagnoses of malaria is extensive. The diagnosis of malaria requires the use of rapid diagnostic tests (antigen tests) or blood films.

Most patients with uncomplicated malaria should be treated with co-artem at the Gate Clinic. Babies under 5 kg, pregnant women in first trimester and patients with positive blood smears despite treatment within the preceding fortnight should be referred to the outpatient department.

Severe malaria is a medical emergency requiring inpatient parenteral therapy for at least 24 hours. The drug of choice is artesunate. Quinine and artemether are alternatives.

Febrile patients should not be tepid sponged.

## Limitations

Patients with coma, severe anaemia, spontaneous bleeding or shock cannot be managed adequately at Keneba. Such patients should be given parenteral antimalarials and referred immediately.

## Presenting symptoms and signs

Initial symptoms are non-specific and may include

* Myalgia
* Arthralgia
* Headache
* Abdominal discomfort
* Fatigue

Following the initial stage, other symptoms such as fever ( > 37.5ºC), chills, anorexia, vomiting and increasing malaise may arise.

Younger children may present with lethargy and refusal of feeds.

The following symptoms/signs, if present, allow for the diagnosis of **severe malaria**.

* Impaired consciousness: Glasgow coma score < 11 in adults, Blantyre coma score < 3 in children
* Weakness such that the patient cannot walk or sit without help
* In a young child, failure to feed
* Convulsions: more than 2 episodes in 24 hours
* Respiratory distress
* Shock
* Jaundice\*
* Hematuria
* Spontaneous bleeding
* Pulmonary oedema: oxygen saturation of < 92% with a respiratory rate of > 30 /minute or confirmed radiologically
* Hypoglycemia: blood glucose < 2.2 mmol/l
* Severe anaemia: Hb < 5 g/dl or PCV < 15%\*
* Persistent vomiting
* Hyperparasitaemia: Malaria smear > 100/l
* Renal impairment: serum creatinine > 265 µmol/l or blood urea >20 mmol/l
* Acidosis – bicarbonate < 15 mmol/L

\*WHO guidelines suggest that jaundice and severe anaemia should be accompanied by a malaria parasite density >100 000/uL and 10 000/uL respectively. However accurate parasite densities are not always available at CSD and any patient with jaundice of anaemia at the thresholds indicated and a positive test for falciparum malaria should be treated as severe.

## Examination findings

General examination: Fever, Pallor

Central Nervous system: coma score and orientation (especially important in cases of severe malaria). Patients with reduced conscious levels should be carefully examined for signs of convulsions, which can be subtle.

### Important things to look for

## Any patient with a positive slide despite adequate therapy should be highlighted to a senior clinician to consider an additional sample to look for resistance to antimalarials. The senior clinician should consider involving the malaria research lab under these circumstances.

Any patient with a positive slide and a negative RDTshould be highlighted to a senior clinician to consider an additional sample to look for mutations affecting the HRP-2 gene.

Any symptom or sign indicative of severe malaria should be looked for to ensure early treatment.

## Differential diagnoses

Not all fever is malaria. The list of differential diagnoses is long and includes:

* Bacteraemia from any cause
* African trypanosomiasis
* Amoebiasis and amoebic liver abscess
* Enteric fever
* Viral haemorrhagic fevers
* Dengue fever
* Encephalitis
* Hepatitis

## Investigations

Rapid diagnostic test (RDT).

Malaria microscopy smear (Blood film):

* if no RDT available or
* if the patient was treated for malaria within the last 2 weeks (the RDT may still be positive from the last infection).

Blood glucose.

Hb or PCV (if patient is pale).

Liver function tests (should not be routinely requested unless clinically indicated).

Renal function tests (should not be routinely requested unless clinically indicated).

## Management of malaria in Gate clinic

Refer the following patients to the doctor:

* Patients with any sign or symptom of severe malaria (call the doctor).
* Babies under 5 kg.
* Pregnant women in first trimester.
* Patients who were treated in the last 2 weeks and have a positive malaria smear.

All other patients can be treated in Gate clinic.

Co-artem is given in 6 doses based on body weight. Give first dose under supervision. Repeat after an anti-emetic if it is vomited. Advise patient to take second dose 8 hours later after food and to continue taking subsequent doses morning and evening.

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| **Weight in Kg** | **Dose** | **Number of tablets** |
| 5 to < 15 | 20/120 | 1 |
| 15 to < 25 | 40/240 | 2 |
| 25 to < 35 | 60/360 | 3 |
| ≥ 35 | 80/480 | 4 |

Give paracetamol for symptom relief.

## Management of malaria in OPD

### Uncomplicated malaria in special groups:

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| **Group** | **Treatment** |
| Pregnant women (1st trimester) | Oral quinine and clindamycin for 7 days |
| Infants < 5 kg | Artemether / lumefantrine at 4 mg artemether / 24 mg lumefantrine /kg body weight |
| Non-immune travellers | Artemether / lumefantrine |

### Uncomplicated *P. ovale, P. malariae, P. vivax* malaria

Treat as for *P. falciparum* malaria with co-artem. Add primaquine to eliminate hypnozoites if confirmed to have *P. ovale* or *P. vivax*.

## Management of severe malaria on the ward

The drug of choice for severe malaria is parenteral artesunate. If not available, consider parenteral artemether or quinine.

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| **Drug** | **Dosage** |
| Artesunate | 2.4 mg/kg iv or im on admission, then at 12 hours, then at 24 hours, then daily until oral medications can be tolerated. It should be given for a **minimum** of 24 hours.  **Note**: Children < 20 kg should receive a higher dosage of 3 mg/kg. |
| Quinine | Loading dose by infusion at 20 mg/kg in 10 ml/kg of iv fluid over 2-4 hours, then after 8 hours, 10 mg/kg in iv fluid over 2 hours, 8 hourly until patient can tolerate oral medications. |
| Artemether | 3.2 mg/kg im on admission, then 1.6 mg/kg daily until patient can tolerate oral medication. |

Parenteral drugs should be given to ALL patients with severe malaria for *at least* 24 hours and then followed by a full-course of an artemisinin-based combination therapy (ACT).

### Complications of severe malaria

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| **Complication** | **Treatment** |
| Coma | Treat as an unconscious patient; regular turning, maintain airway, rule out or treat other potential causes.  *Keneba: Commence antimalarial therapy and refer patient.* |
| Hyperpyrexia | Expose and give paracetamol – **do not tepid sponge.** |
| Convulsions | Exclude hypoglycaemia  Prompt treatment with iv or rectal benzodiazepine (diazepam/midazolam) to terminate convulsion  Recurrent convulsions should be treated with phenobarbitone |
| Hypoglycaemia | Threshold for intervention is 3.0 mmol/l in children younger than 5 years and 2.2 mmol/l in patients aged 5 years or older. Correct hypoglycemia and give maintenance fluid which contains glucose (50% dextrose 1 ml/kg diluted in an equal strength of water for injection). |
| Severe Anaemia | Transfusion with fresh whole blood.  *Keneba: Commence antimalarial therapy and refer patient* |
| Acute Pulmonary Oedema | Nurse in 45° propped-up position.  Start oxygen therapy.  Give diuretic (intravenous furosemide). |
| Spontaneous Bleeding | Transfuse with fresh whole blood.  *Keneba: Commence antimalarial therapy and refer patient* |
| Shock | Suspect bacterial sepsis.  Take samples for cultures.  Give broad spectrum parenteral antibiotics.  *Keneba; Commence antimalarial therapy, parenteral antibiotics and refer patient* |

## Key issues for nursing care

Do not tepid sponge febrile patients. Check charts and consider giving paracetamol if not already given.

## References

World Health Organization (WHO). Factsheet on malaria [internet].Geneva: WHO; 2018. Available from: <http://www.who.int/en/news-room/fact-sheets/detail/malaria> Accessed: June 11th 2018

World Health Organization (WHO). Guidelines for the treatment of malaria. 3rd ed. Geneva: WHO; 2015. Available from: <http://apps.who.int/iris/bitstream/handle/10665/162441/9789241549127_eng.pdf;jsessionid=3B5C932E177AC0E91DFA84112DEBD6C7?sequence=1> Accessed: June 9th 2018

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