GUIDELINES
for the Management and Treatment of Patients with Malaria

Third edition (2023)

Anti-Malaria Campaign, Ministry of Health, Sri Lanka

Anti-Malaria Campaign, Ministry of Health, Sri Lanka

Guidelines for the management and treatment of patients with malaria

This guideline has been developed for clinicians and relevant healthcare personnel. The guideline is available on the Anti Malaria Campaign (AMC) website http://www.malariacampaign.gov.lk/en/.

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Abbreviations

ACT	Artemisinin-based combination therapy
AMC	Anti Malaria Campaign
DHAP	Dihydroartemisinin-piperaquine
EDTA	Ethylenediaminetetraacetic acid
MOH	Medical Officer of Health
PCR	Polymerase Chain Reaction
POR	Prevention of Re-establishment
PUO	Pyrexia of unknown origin
RDT	Rapid diagnostic test
RMO	Regional Medical Officer-Malaria
TSG	Technical Support Group
WHO	World Health Organization

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General Circular No: 01 - 25 /2023

Deputy Director General NHSL/TH Kandy
All Provincial Directors of Health Services
All Regional Directors of Health Services
All Directors of Teaching hospitals/Provincial General Hospitals/District General Hospitals
All Medical Superintendents of Base Hospitals
All hospital directors of Tri- forces and Police
All Directors of Private hospitals
All heads of institutions

Guidelines for the Management and Treatment of Patients with Malaria in Sri Lanka

Sri Lanka is a malaria-eliminated country certified by the World Health Organization (WHO) in 2016 and is now in the phase of Prevention of Re-establishment (PoR) of malaria. However, Sri Lanka continues to report imported cases, approximately 40 cases per year, and most of these infections have been acquired from India or from African countries.

Imported malaria cases pose challenges for diagnosis and management as malaria is not a frequently encountered disease for many physicians in the country. Further, with Anopheles vectors still present in the country, delayed treatment of imported cases can also increase the risk of onward transmission and re-establishment of malaria in Sri Lanka.

The Anti-Malaria Campaign (AMC) updated the "national guidelines for the treatment and management of patients with malaria" in Sri Lanka. This was developed by using the most updated evidence reported in the latest editions of the WHO Guidelines for the treatment of malaria and incorporating the experts' opinions mainly based on evidence of the cases reported in Sri Lanka over the past years.

The AMC followed the core principles of early diagnosis and prompt, effective treatment as malaria can progress rapidly to severe forms of the disease and severe falciparum malaria is almost always fatal without treatment and rational use of antimalarial medicines to reduce the spread of drug resistance, and to assure that the antimalarial medicines should be administered only to patients confirmed of having malaria. The third edition of the Guidelines on the Treatment and Management of Patients with Malaria replaces the existing guidelines (Circular number 01-28/2021) issued by the Ministry of Health in 2021.

You are requested to bring the contents of the attached circular to the attention of the clinical staff and other relevant healthcare personnel of your institution.

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385, Rev. Baddegama Wimalawansa Thero Mawatha, Colombo 10, Sri Lanka.

The medicines to treat malaria are available at the government hospitals with medical specialists, at the office of Regional Medical Officers (malaria) in each district and at the Anti-Malaria Campaign Headquarters at 555/5/Elvitigala Mawatha, Colombo 05.

For any information, it is advised to contact AMC Hotline: 0117 626 626/ 071 284 1767. Email of the AMC: antimalariacampaignsl@gmail.com.

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Provincial /District Consultant Community Physicians
Regional Medical Officers (Malaria),

Executive Summary

Malaria case management, comprising early diagnosis and prompt effective treatment remains a vital component in the Prevention of re-establishment phase (POR) of malaria in Sri Lanka. Uncomplicated malaria can progress quickly into severe forms of the disease particularly in those with minimal or no immunity, such as Sri Lankan nationals, in the POR phase of malaria. Severe malaria is almost always fatal without treatment.

Diagnosis of Malaria
All cases of suspected malaria should have a parasitological test (microscopy / Rapid Diagnostic test (RDT) to confirm the diagnosis.
Treating uncomplicated *P vivax*, *P. ovalae* and *P. malariae*
Treat with chloroquine (25mg/kg bw for 3 days) in all three species and followed by primaquine (0.5mg/kg bw for 7 days) to prevent relapses in patients infected with *P. ovale* and in *P. vivax.*
Treating uncomplicated *P falciparum*
Treat with artemisinin-based combination therapy (ACT) followed by primaquine stat (0.75mg/kg bw) dose to destroy gametocytes.
Treating severe *P falciparum / P vivax* malaria
Treat with IV artesunate for at least 24 hours and until the patient can tolerate oral medicine. Give the full course of oral ACT.
Treating P.falciparum with high parasitaemia (non-severe)
▪ When the parasite density is between 100,000 - 200,000 (2.5- 5.0 %) and if the patient has NONE of the other signs of severe malaria and even if he/she can take medicines orally, they should be treated with one dose of IV artesunate (2.4 mg/kg body weight) followed by ACT for 5 days (10 doses).

- A major revision made in the 3rd edition of the "guidelines for the management and treatment of patients with malaria" is the change in the dose of primaquine required for the treatment of uncomplicated *P.vivax* and *P.ovale* for the prevention of relapses. The dose has been changed from 0.25mg/kg bw which was given for 14 days to **0.5 mg/kg bw per day** for **7 days**.

1. Background

With no indigenous malaria cases being reported since October 2012 and certified as a malaria eliminated country by the World Health Organization (WHO) in 2016, Sri Lanka is currently in the prevention of re-establishment (POR) phase. Early diagnosis and treatment of imported malaria patients have become the highest priority during the POR phase. Most of these infections have been acquired from India or in African countries. Over the past 5 years from 2018 to 2022 of the 194 total cases, 140 (72%) were reported from African countries and 42 (21%) were reported from India.

Currently, a low level of clinical suspicion in the backdrop of a very low disease burden has led to a significant delay in diagnosis of malaria patients. As a result of delay in diagnosis, patients who present to health care institutions with early symptoms risk developing severe malaria even while in hospital.

2. Patients likely to have malaria

Malaria should be suspected in:

1. Any febrile / afebrile patient with symptoms and signs suggestive of malaria, such as fatigue, joint pain, headache, myalgia, and vomiting:
   - with a travel history to a malaria endemic country within the past *one* year (esp. India and African countries). Refer Annex II for the list of malaria endemic countries.
   - belonging to high-risk groups (individuals/groups returning from malaria endemic countries, e.g., security forces personnel returning from United Nations peace keeping missions, gem traders, other businessmen, pilgrims, seafarers, re-settled communities, migrant workers, illegal / irregular migrants, refugees, asylum seekers, and tourists traveling from malaria endemic countries.
   - with a history of malaria infection within the past 3 years
   - with Pyrexia of Unknown Origin (PUO)
2. Any patient presenting with clinical features suggestive of severe malaria.
   (Refer Annex I for clinical features of severe malaria)
3. Any patient with multiple organ failure
4. Patients with anemia of unknown cause
5. Patients with hepatomegaly and/or splenomegaly
6. Recipients of blood or blood products who develop fever within 3 months of transfusion.

Please note:

- Malaria can present with non-specific symptoms and sometimes even with no fever.
- Travelers from malaria endemic countries may be negative for parasites by microscopy at their scheduled screening tests even though they may be infected, particularly in the case of *Plasmodium vivax* and *Plasmodium ovale* because they may harbor hypnozoites. Therefore, they need to be tested for malaria whenever they present with symptoms and signs suggestive of malaria, despite having previous negative results.
- *Thrombocytopenia* is a common consequence of malaria infections and has been a frequent finding among patients with malaria reported in recent years. Yet, a diagnosis of malaria had not been considered in individuals presenting with fever because of them being suspected of having dengue and repeatedly tested for the latter. Consequently, a delayed diagnosis of malaria had led to adverse sequalae.

3. Notification of malaria patients

Any patient strongly suspected of having malaria should *immediately* be notified via telephone to the Regional Medical Officer (RMO) -Malaria, (Refer Annexure III for contact numbers) and/or the Anti Malaria Campaign (AMC) Headquarters via the **hotlines (0117 626 626/ 071 284 1767).** In addition, it should be notified to the Medical Officer of Health (MOH) of the area where the patient resides, following the standard notification procedure (Form H544).

Once informed the AMC will ensure:

- confirmation of diagnosis by species
- determination of parasite densities
- provision of appropriate anti-malarial medicines
- guidance on treatment where needed.
- initiation of rapid response to search for additional cases and carryout entomological surveys followed by vector control activities to prevent onward transmission of the disease[1.]
- follow up of the patient as per guidelines for parasitological surveillance[1.]

4. Diagnosis of malaria

In every *suspected case of malaria*, laboratory confirmation by microscopic examination of blood smears and/or Rapid Diagnostic Test (RDT) is mandatory prior to initiation of anti-malarial treatment. If for any reason the patient was diagnosed by RDT and treatment for malaria was started, it should be confirmed by the microscopic examination of blood smears even after the commencement of treatment.

4.1 Blood should be collected in the following manner:

2ml of venous blood collected to an EDTA bottle and refrigerated until transported to the AMC Headquarters.
If venous blood cannot be taken, collect three blood spots (approx. 125 microliters) on to a filter paper for Polymerase Chain Reaction (PCR) analysis[2.]

- Blood should be collected for further investigations *prior to the administration* of anti-malarial medicines from all *confirmed malaria patients* for reconfirmation at the AMC Headquarters reference lab.
- Treating malaria based on clinical suspicion without laboratory confirmation should be avoided. However, as a life saving measure antimalarial treatment can be given based on clinical suspicion without laboratory confirmation of malaria *after informing AMC* and preserving a blood sample for examination later.
- If there is a strong clinical suspicion of malaria and the initial tests are negative, a minimum of three consecutive blood smears and RDT should be done prior to excluding malaria.

[1]Guidelines for the parasitological surveillance and for the entomological surveillance and vector control: http://www.malariacampaign.gov.lk/en/
[2]Please contact AMC Headquarters for any clarifications.

4.2 Screening of pregnant mothers for malaria

- Screening of pregnant mothers for malaria at the ante-natal clinics is no longer considered a routine activity. However, during the first antenatal visit, screening for malaria should be carried out on pregnant mothers presenting with a travel history to malaria endemic countries.

- In addition, testing for malaria is required for any pregnant mother presenting with fever and having a travel history to a malaria endemic country, irrespective of previous screening.

- Testing for malaria should also be done for any pregnant mother on clinical suspicion of malaria.

5. Monitoring during treatment and follow up of patients

- To monitor the response to the anti-malarial medicines, a blood smear should be examined daily for a minimum of three days. If parasitemia persists beyond 3 days, blood smears should be taken daily until parasitemia clears completely. In severe malaria patients, or in patients who need frequent monitoring, blood smears need to be taken more frequently.

- Thereafter the patient will be followed up to one year. The frequency and the duration will be based on the species.

6.Treatment of patients with malaria

Specific treatment and management of malaria will depend on the parasite species, parasite density, severity of disease and the biological factors of the patient.

Objectives of treatment are twofold:

- To ensure rapid and complete elimination of the *Plasmodium* parasite from the patient's blood to prevent progression of uncomplicated malaria to severe disease or death.

- To ensure that the patient can no longer infect another person through a mosquito bite, i.e., to abolish infectivity of the parasite to mosquitoes and arrest the transmission of infection. This is critically important to prevent the re-introduction and re-establishment of malaria in Sri Lanka.

- All confirmed malaria patients should be admitted to a medical institution under the care of a consultant physician and the patient should be in ward, until the parasite count is zero.

- In the event of a patient requiring treatment for 07 days with primaquine (i.e., in *P. vivax* and *P. ovale* infections for radical cure i.e., the elimination of hypnozoites), it is recommended to test for G6PD deficiency prior to the administration of this medicine.

6.1 Mono-infection with *Plasmodium vivax*

For radical cure of *P. vivax* malaria, the patient should be treated with chloroquine and primaquine.

- **Chloroquine**: the dose is 25 mg base / kg body weight over **three days**. This dose should be divided as 10 mg base / kg on the first and second day followed by 5 mg base / kg on the third day.
- Usual adult dose for persons more than 35 kg body weight is: day one- 4-tablets, day two-4 tablets, day three-2 tablets.

- **Primaquine:** the adult dose is 0.5 mg/kg per day for **07 days**.

Administration of Primaquine

The administration of primaquine is not recommended during pregnancy, lactation, infants (under one year of age) and in severe G6PD deficiency (<10% of residual enzyme activity).

In patients with mild to moderate G6PD deficiency, (10-60% of residual enzyme activity) primaquine can be administered at a dosage of 0.75 mg/kg weekly for 8 weeks under specialized supervision.

Primaquine is known to cause haemolysis in people with G6PD deficiency. Patients on primaquine should be informed to report immediately to the nearest hospital if there is any change in the color of urine.

6.1.1 Mono-infection with Chloroquine resistant *Plasmodium vivax*

Chloroquine-resistant *P. vivax* infections should be treated with an Artemisinin-based Combination Therapy (ACT) containing lumefantrine, piperaquine or mefloquine. The ACT used in Sri Lanka contains 20mg of artemether and 120 mg of lumefantrine.

6.2 Uncomplicated mono-infection with *Plasmodium falciparum*

Treatment regimen for uncomplicated mono-infection with *P.falciparum* is determined based on the parasite density.

6.2.1 Uncomplicated mono-infection with *P.falciparum with parasite density* <100,000/ul

Patients with *P.falciparum* malaria, should be treated with Artemisinin-based Combination Therapy (ACT) and primaquine.

- **Artemisinin-based Combination Therapy:** ACT used in Sri Lanka contains 20mg of artemether and 120 mg of lumefantrine. It is given as a weight appropriate dose.
- The recommended treatment of the artemether (20 mg) and lumefantrine (120 mg) combined tablet format is: 6-dose regimen over three days based on the body weight of the patient as indicated in **Table 1**.
- **Primaquine**: A weight appropriate single dose of primaquine 0.75 mg / kg body weight should be administered **unless contraindicated,** on day 3 of treatment or prior to discharge from hospital to destroy gametocytes.

Table 1. Dosage of artemether (20 mg) and lumefantrine (120 mg) combined tablets administration based on body weight of the patient.

Interval between doses	No of tablets for 5 -14 kg	No of tablets for 15 – 24 kg	No of tablets for 25- 34 kg	No of tablets for >35 kg
0 Hours	1	2	3	4
8 Hours	1	2	3	4
24 Hours	1	2	3	4
36 Hours	1	2	3	4
48 Hours	1	2	3	4
60 Hours	1	2	3	4
Total	**6**	**12**	**18**	**24**

Administration of ACT

ACT should be taken immediately after a meal or drink containing at least 1.2g of fat (e.g., a glass of milk) throughout the course, since its bioavailability is enhanced by co-administration with fat. This is to prevent treatment failure due to inadequate absorption of the medicine. It is essential that patients or care givers are informed about this requirement.

6.2.2 Mono-infection with *P. falciparum* with parasite density between 100,000 to 200,000 parasites per microliter (approximately 2.5%- 5.0%)[3] but no clinical manifestation of severe malaria

- When the parasite density is between 100,000 - 200,000 (2.5-5.0 %) and if the patient has NONE of the other signs of severe malaria and even if he/she can take medicines orally, they should be treated with one dose of IV artesunate (2.4 mg/kg body weight) followed by ACT for 5 days (10 doses).
- When the parasite density exceeds 200,000 per microliter the patient should be treated as for severe malaria (see severe malaria in section 6.7 and Annex II).
- Primaquine should be prescribed unless contraindicated, prior to discharge from hospital to destroy gametocytes. The dosage of ACT and the Primaquine are as described in section 6.2.1.

[3]The percentage parasitemia for the parasite densities was estimated based on red blood cell (RBC) counts during acute malaria infections.[a] The average RBC counts are 4,330,000/ul in *P. falciparum* infections and 4,450,000/ul in *P. vivax* infections.[b] The simple average of these two values (4,390,000/ul) was used as the basis. Thus at 100,000 parasites/ul, it works out to 2.28% and 200,000 parasites/ul, 4.56%, respectively. The equivalent percentage parasitemia we use here are approximations of these values as 2.5% for 100,000 parasites/ul and 5% for 200,000 parasites/ul.
[a] https://www.cdc.gov/dpdx/diagnosticprocedures/blood/microexam.html
[b] https://malariajournal.biomedcentral.com/articles/10.1186/1475-2875-13-218

6.3 Uncomplicated *P. falciparum* malaria in pregnancy

- Treat pregnant women with uncomplicated *Plasmodium falciparum* malaria with ACT during the first, second and third trimesters of pregnancy[4]
- Primaquine should not be administered during the entire period of pregnancy.

6.4 Uncomplicated *P. falciparum* malaria during lactation

- Lactating women can receive the recommended dose of ACT (Artemether and Lumefantrine).
- Primaquine should not be given during lactation.

6.5 Uncomplicated *P. falciparum* malaria in infants and young children

- Artemether and lumefantrine is the first line treatment in infants and young children.
- Primaquine should be avoided in children less than 1 year of age.
- An acutely ill child requires careful clinical monitoring as his/her clinical condition may deteriorate rapidly.

6.6 Uncomplicated mixed infections with *P. falciparum* and *P.vivax*

- Artemisinin-based combination therapy (ACT): Artemether and Lumefantrine is given at a weight appropriate dose.
- Primaquine 0.5mg/kg body weight per day for 07 days unless it is contraindicated.

6.7 Severe *P. falciparum* / *P.vivax* malaria

Severe malaria is a medical emergency requiring intensive care treatment. Diagnostic criteria for severe malaria are provided in Annex II. After rapid clinical assessment and confirmation of the diagnosis, full doses of parenteral antimalarial treatment should be started without delay. Clinical observations such as monitoring of vital signs, coma score and urine output should be documented as frequently as possible. Measuring blood glucose is mandatory at least every four hours, particularly in unconscious patients.

Patients with severe *P.falciparum/ P vivax* malaria, should be treated with intravenous artesunate.

- **Intravenous artesunate**; intravenous artesunate 2.4 mg/kg body weight given on admission (time = 0), then at 12 hours and 24 hours, followed by once-a-day administration until the patient can take oral medication. If intravenous administration is not possible, it can also be given as an intramuscular injection.
- In the treatment of severe malaria, intravenous artesunate should be given for a minimum of 24 hours, even if the patient can tolerate oral medication.
- **Follow up on oral treatment:** In a patient with severe malaria, the treatment schedule should be completed giving **a full course** of ACT (Artemether and lumefantrine) as soon as the patient is able to take oral medication. This should be followed by a single dose of primaquine, 0.75 mg/ kg body weight).

[4]ACT is strongly recommended as the preferred treatment of uncomplicated *P.falciparum* malaria during the first trimester of pregnancy, despite the low certainty of evidence because:
• there was a large magnitude of beneficial effect of treatment on efficacy (demonstrated in the second and third trimesters of pregnancy), specifically a six-fold reduction in treatment failures following artemether lumefantrine, compared to the currently recommended quinine-based therapies.
• artemether-lumefantrine was associated with trivial adverse events and significantly lower risk for adverse pregnancy outcomes in the first trimester of pregnancy.
• ACT had much better tolerability compared to quinine-based therapies; and there is probably increased equity, acceptability, and feasibility, resulting from better access to ACTs compared to quinine-based treatments

Administration of IV artesunate

Artesunate is dispensed as a powder of artesunic acid. This powder is dissolved in 1ml of 5% sodium bicarbonate to form sodium artesunate. The solution is then diluted with 5 ml of 0.9% sodium chloride and given immediately by intravenous bolus ('push') injection or by intramuscular injection (to the anterior thigh).

The solution should be prepared freshly for each administration and should not be stored. Any balance should be discarded.

IV artesunate must be made available within two hours in any part of the country.

6.7.1 Severe *P. falciparum* malaria in children, pregnancy and lactation

Parental Artesunate should be given for adults, children, pregnant mothers in all trimesters and lactating mothers with severe malaria for at least 24 hours.

Please note: Primaquine should not be administered during pregnancy, lactation, and infancy.

6.7.2 Severe *P. falciparum* and *P.vivax* mixed infections

- Parenteral administration of artesunate followed by a full course of oral Artemether and lumefantrine (ACT) as described in management of severe falciparum malaria.
- These patients should be given a course of primaquine base at a dose of 0.5 mg/kg body weight per day for 07 days unless it is contraindicated.

6.8 Patients infected with other malaria parasites

The recommended treatment for malaria caused by *P.ovale* is the same as that given to achieve radical cure in *P. vivax* malaria, i.e. with chloroquine and primaquine.

P. malariae should be treated with the standard regimen of chloroquine as for *P. vivax* malaria, but it does not require radical cure with primaquine.

7.Treatment failure

Treatment failure is the inability to clear parasites from a patient's blood or to prevent their recrudescence after the administration of the recommended dose of any anti-malarial medicine. Many factors can contribute to treatment failure, including poor patient compliance, poor absorption, incorrect regime of the medicine, poor quality of the medicine, interactions with other medicines and resistance to the anti-malarial medicine.

All treatment failures should be investigated thoroughly to find out the possible cause. If the investigation is suggestive of any cause other than resistance (e.g., emesis within 30 minutes after ingestion of medicines) after correcting the cause, a full course of the same medicine should be administered again under close supervision.

7.1 Resistance to anti malaria medicines

In case of resistance to anti-malarial medicines, following second-line anti malaria medicines are recommended:

- For Chloroquine: oral ACT (Artemether 20 mg and Lumefantrine 120 mg) combination therapy.
- For ACT (Artemether 20 mg and Lumefantrine 120 mg combination therapy): Dihydroartemisinin-piperaquine (DHAP) i.e. Dihydroartemisinin 40 mg and Piperaquine 320 mg given as second line treatment depending on body weight (less than 75 kg: 3 tablets and over 75 kg: 4 tablets) daily for 3 days.

Please note: High-fat meals should be avoided when on DHAP.

Chemoprophylaxis for malaria

Chemoprophylaxis is recommended for travelers to malaria endemic countries (the list of countries where malaria transmission occurs is given in *Annex II*). The Anti Malaria Campaign Headquarters or the Office of the Regional Medical Officer (Malaria) can be contacted to obtain chemoprophylactic medicines and for further details on malaria prevention. The chemoprophylactic medicines can also be obtained from the Health Clinic at Bandaranaike International Airport. All antimalaria medicines are issued free of charge.

Chemoprophylaxis is not needed for visitors to Sri Lanka nor those who are residing in the country including pregnant women.

For further information refer the Malaria Prophylaxis for Travelers published by Anti Malaria campaign(http://www.malariacampaign.gov.lk/en/**).**

Reference:

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Annex I. Malaria Endemic Countries

Afghanistan	Georgia	Sao Tome & Principe
Angola	Ghana	Saudi Arabia (Yemen boarder)
Bangladesh	Guatemala	Senegal
Belize	Guinea	Sierra Leone
Benin	Guinea-Bissau	Solomon Islands
Bhutan	Guyana	Somalia
Bolivia	Haiti	South Africa
Botswana	Honduras	South Korea - Northern Part (Republic of Korea)
Brazil	India	Sudan
Burkina Faso	Indonesia	Swaziland
Burundi	Iran (Islamic Republic of)	Suriname
Cabo Verde (Cape Verde)	Iraq	South Sudan
Cambodia	Kenya	Thailand
Cameroon	Lao PDR (Laos)	Timor Leste
Central African Rep.	Liberia	Togo
Chad	Madagascar	Turkey
Colombia	Malawi	Tanzania
Comoros	Malaysia	Uganda
Congo	Mali	Vanuatu
Cote d'Ivoire (Ivory Coast)	Mauritania	Viet-Nam
Costa Rica	Mayotte	Venezuela (Bolivarian Republic of)
Djibouti	Mozambique	Yemen
Democratic Republic of Congo	Myanmar	Zambia
Dominican Republic	Mexico	Zimbabwe
Ecuador	Namibia	
Egypt	Nepal	
Equatorial Guinea	Niger	
Eritrea	Nigeria	
Eswatini	Nicaragua	
Ethiopia	North Korea	
French Guiana	Pakistan	
Gabon	Panama	
Gambia	Papua New Guinea	
	Peru	
	Philippines	
	Rwanda	

Annex II. Severe malaria

Definitions Severe falciparum malaria: For epidemiological purposes, severe falciparum malaria is defined as one or more of the following, occurring in the absence of an identified alternative cause and in the presence of *P. falciparum* asexual parasitaemia (WHO, 2022).

- **Impaired consciousness**:
  A Glasgow coma score < 11 in adults or a Blantyre coma score < 3 in children

- **Prostration**:
  Generalized weakness so that the person is unable to sit, stand or walk without assistance

- **Multiple convulsions**: More than two episodes within 24 h

- **Acidosis**:
  A base deficit of > 8 mEq/L or, if not available, a plasma bicarbonate level of < 15 mmol/L or venous plasma lactate ≥ 5 mmol/L. Severe acidosis manifests clinically as respiratory distress (rapid, deep, laboured breathing).

- **Hypoglycaemia**: Blood or plasma glucose < 2.2 mmol/L (< 40 mg/dL)

- **Severe malarial anaemia**:
  Haemoglobin concentration ≤ 5 g/dL or a haematocrit of ≤ 15% in children < 12 years of age (< 7 g/dL and < 20%, respectively, in adults) with a parasite count > 10 000/μL

- **Renal impairment**: Plasma or serum creatinine > 265 μmol/L (3 mg/dL) or blood urea > 20 mmol/L

- **Jaundice**: Plasma or serum bilirubin > 50 μmol/L (3 mg/dL) with a parasite count > 100 000/ μL

- **Pulmonary oedema**:
  Radiologically confirmed or oxygen saturation < 92% on room air with a respiratory rate > 30/min, often with chest indrawing and crepitations on auscultation

- **Significant bleeding**: Including recurrent or prolonged bleeding from the nose, gums or venepuncture sites; haematemesis or melaena.

  Shock: Compensated shock is defined as capillary refill ≥ 3 s or temperature gradient on leg (mid to proximal limb), but no hypotension. Decompensated shock is defined as systolic blood pressure < 70 mm Hg in children or < 80 mmHg in adults, with evidence of impaired perfusion (cool peripheries or prolonged capillary refill).

- **Hyperparasitaemia:** *P. falciparum* parasitaemia > 05 %* or 200,000 parasites/ul
  Severe *P. vivax* and *P. knowlesi* malaria: defined as for falciparum malaria but with no parasite density thresholds.
  Severe *P.knowlesi* malaria is defined as for *P.falciparum* malaria but with two differences:
  P. knowlesi hyperparasitaemia: parasite density > 100 000/μL
  Jaundice and parasite density > 20 000/μL.

*The threshold of 10% parasitaemia in WHO Guidelines for the Treatment of Malaria 2022 has been lowered in consideration of the experience with severe malaria in travelers in Sri Lanka.

Annex III. Telephone numbers related to Anti Malaria Campaign

Anti Malaria Campaign Headquarters: Hotline: 0117 626 626/ 071 284 1767	
Tele:	(011) 2104951, (011) 2104952, (011) 2104953, (011) 2104035
Fax:	(011) 2368360
e-mail:	antimalariacampaignsl@gmail.com
Website:	http://www.malariacampaign.gov.lk/en/

Regional Malaria Offices

Ampara	(063) 2223464	Kandy	(081) 2210687	Monaragala	(055) 2276698
Anuradhapura	(025) 2221844	Kegalle	(035) 2223480	Mullaitivu	(021)2060007
Badulla	(055) 2229560	Kilinochchi	(021) 2285517	Polonnaruwa	(027) 2226018
Batticaloa	(065) 2222931	Kurunegala	(037) 2222193	Puttalam	(032) 2265319
Hambanthota	(047) 2258135	Maho	(037) 2275254	Ratnapura	(047) 2230301
Jaffna	(021) 2227924	Mannar	(023) 2051520	Trincomalee	(026) 2222584
Kalmunai	(067) 2220206	Matale	(066) 2222295	Vavuniya	(024) 2222954
Gampaha	(033) 2222874	Colombo	(0112) 519284	Kalutara	(034) 2222610
Galle	(091) 3096814	Matara	(041) 2222200	Kalmunai	(067)2220206
				Kalutara NIHS	(034)2222001 EX-202