Surveillance Guideline for MALARIA in the Maldives

Health Protection Agency
Ministry of Health

Contents

1. Introduction

Malaria was a major public health problem since longest time in the Maldives. The disease was so common in the Maldives that it was notoriously named "Maldivie Fever" by the sea faring travellers of olden days or locally known as “Heehun” meaning fever with rigor).
Maldives is successful in proving that, it is possible for a country to be both malaria parasite and vector free. Intense malaria eradication activities resulted in halt of indigenous malaria cases in the country by 1984(Ray, 1985)(WHO, HPA, 1994).The last record of *Anopheles(An)* vectors was in 1991.Hence, for more than 30 years, Maldives has been successful in maintaining the malaria zero status and preventing the re-establishment of local transmission.

Moreover, one of the biggest achievements in the health sector has been in the area of malaria control and elimination. The official recognition of Malaria elimination was in 2015 when Dr. Poonam Khetrapal Singh, the WHO Regional Director for South-East Asia, presented the plaque certifying the Maldives as a malaria-free country.

The risk of receptivity of transmission is absent and while certainly benefiting from being a group of atolls, the Maldives has nonetheless faced both repeated re-introductions of *Plasmodium* species from endemic neighbouring countries. Although, record of reported imported cases are few, the risk of importation of malaria parasite and vector is real in the Maldives, where more than 1.5 million tourist visit annually and one third of the resident population are migrant workers especially from malaria prevalent countries.
The fight against malaria in Maldives started with WHO support in the malaria eradication era. The national Malaria control program in Maldives was carried out in four different phases.The first or preparatory phase (from 1965-1966) was about malaria situation assessments. The second or attack phase (from 1966-1968), which started with launch of the official malaria control program in May 1966. The third or consolidation and maintenance phase (from 1969-1984) assessed impact of the malaria control programs and intensified the program in high risk areas. Current or fourth phase in Maldives is to remain malaria free; to keep the country resilient to fight any resurgence of malaria(WHO, 2016).

1.1. Objective

The purpose of this guideline is to ensure effective case management, diagnostics and surveillance of malaria in Maldives.

- To strengthen Malaria surveillance
- To sustain Malaria re-introduction
- To strengthen case detection, reporting and management
- To strengthen entomological surveillance

2. Clinical Management

Malaria is a parasitic disease characterised by fever and chills. The infectious agent is a protozoan parasite, Plasmodium, the different species include;*P. vivax, P.malariae, P. falciparum, P. ovale and P.knowlesi.* The most common mode of transmission is via a bite of an infective female Anopheles mosquito (7.1). It is a serious public health problem in many parts of the world. Attacks of the disease can be severe and can lead quickly to death if untreated.

In Maldives a comprehensive malariometric survey in 1965, found *Plasmodium vivax* (63.8%) to be the predominant *Plasmodium(P)* species followed by *P.falciparum (23.4%), P. malariae (8.5%)* and mixed infection *(4.3%)* (Ramoo, 1967). Then the national parasite rate (PR) was 24.73 and the highest was reported from northern atolls (PR=51.84% being highest in Noonu atoll) (Schepens, 1981). The last indigenous*P. falciparaum* positive case was recorded on June 1975 in Ha atoll and the last *P. vivax* case was recorded 9 years later on August 1984 in Baa atoll.

Currently, a **single clinically suspected case** of Malaria is important for early detection and prevention of re-introduction of Malaria to Maldives. Refer to section 4 of this document for surveillance and reporting requirements**.**

2.1. Clinical signs

The disease is reasonably easy to recognize in people who have not had malaria before, or have had few attacks.

The common symptoms of malaria are:

- High fever
- Headache
- **Severe chills or rigor**
- Profuse sweating and general body pains

Some patients may have vomiting, cough or diarrhoea. In persistent and recurrent infections, anaemia may be present.As similar clinical signs are seen in other common diseases, further investigations are necessary before a reliable diagnosis of malaria can be made. The clinical presentation of malaria is even less clear in patients who have had a number of malaria attacks, as they generally show no clear signs or symptoms.

2.2. Case definitions

Severe malaria cases and deaths

Malaria cases can be categorized as uncomplicated or severe. The clinical features of severe malaria can are referenced in annex (7.4). In general, people with uncomplicated malaria are treated as outpatients, while those with severe malaria are managed as in-patients.

Case of malaria (as defined in elimination programmes): a case in which, regardless of the presence or absence of clinical symptoms, malaria parasites have been confirmed by quality controlled laboratory diagnosis.

Malaria infection: presence of *Plasmodium* parasites in blood or tissues, confirmed by the presence of parasites in peripheral blood by microscopy, Malaria antigenaemia by a rapid diagnostic test (RDT) or parasite DNA or RNA by polymerase chain reaction (PCR).

Patients likely to have malaria

Malaria **should be suspected** in:

1. Any febrile individual (including foreign nationals):
    a. With unexplained fever and a history of recent travel (within 1 year) to a malaria endemic country (esp. India, Pakistan, Haiti and African countries). Refer Annex II for a list of countries where malaria transmission occurs).

b. belonging to high risk groups e.g. businessmen, pilgrims and seamen returning from malaria endemic countries, re-settled communities, skilled and unskilled foreign workers, illegal/irregular migrants, refugees, asylum seekers, security forces returning from peace keeping missions etc.
c. with a history of malaria infection within the past 3 years
d. with fever of unknown origin

2. Any individual presenting with clinical features of severe malaria
3. Patients with anaemia of unknown cause
4. Patients with hepatomegaly and/or splenomegaly
5. Recipients of blood or blood products who develop fever within 3 months of transfusion

Please note:

- Malaria can present with non-specific symptoms even if there is no fever.
- Thrombocytopaenia has been a frequent finding among patients with malaria reported in the recent years, yet a diagnosis of malaria has not been considered as a result of them being misdiagnosed as having dengue. This had led to a delayed malaria diagnosis resulting in adverse sequel.
- To ensure an effective parasitological response to the anti-malarial drugs, a blood smear should be obtained daily and examined over the three day that the patient is admitted. If parasitaemia persists beyond 3 days blood smears should be taken daily until parasitaemia clears. In severe malaria cases, blood smears have to be taken at a higher frequency.
- Care must also be taken to establish whether the patient has taken antimalarial medicines before going to hospital, as this can modify the clinical presentation.

2.3. Diagnosis of Malaria

Early and accurate diagnosis of malaria is essential for both rapid and effective disease management and malaria surveillance. WHO recommends prompt malaria diagnosis either by microscopy or malaria rapid diagnostic test (RDT) in all patients with suspected malaria before treatment is administered. In some settings asymptomatic *P. falciparum* infections may persist at very low parasite densities, below the threshold of detection by microscopy or RDTs, and can be detected only by molecular methods such as PCR.

> 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. Treating malaria based on clinical suspicion without laboratory confirmation should be avoided.
>
> If there is a strong clinical suspicion of malaria, and the **blood smears/RDT are negative** at the time of initial testing, a **minimum of three consecutive blood smears/RDT** should be done prior to concluding that the patient is negative for malaria.

2.3.1. Microscopy

Microscopy remains the mainstay of malaria diagnosis in most large health clinics and hospitals but the quality of microscopy-based diagnosis is frequently inadequate. It is the only widely available method of differentiating between all major Plasmodium species, *P. falciparum, P. vivax, P. malariae and P. ovale*, as well as for detecting gametocytes of *P. falciparum* and mixed infections (Microscopic identification of parasite,Page 20).
Microscopy can provide parasite counts (i.e. estimates of parasite density in peripheral blood) and can therefore be used to monitor response to treatment.

2.3.2. Rapid diagnostic tests (RDTs)

Malaria RDTs detect specific antigens (proteins) produced by malaria parasites, which are present in the blood of infected or recently infected individuals (other "RDTs" that detect antibodies are used for screening blood for evidence of recent infection). Some RDTs can detect only one species (*Plasmodium falciparum*) some detect more than one species. Blood for the test is commonly obtained from a finger prick. RDTs are an alternative to diagnosis based on microscopy; especially in islands with limited access to good quality microscopy services. The test kit is available in all atoll hospitals and from Health Protection Agency.

2.3.3. PCR tests

New methods for routine PCR-based surveillance of malaria infections are being used for research and field studies, which are more sensitive than light microscopy or RDTs in detecting submicroscopic infections, especially with rare species (*P. malariae, P. ovale and P. knowlesi*), mixed infections and low-density infections.

2.4. Treatment

Malaria is a preventable and treatable disease. Specific treatment and management of malaria will depend on the parasite species causing infection, severity of disease and the biological factors of the patient.

Objectives of the treatment

- **The primary objective of treatment** is to ensure complete cure that is the rapid and full elimination of the *Plasmodium* parasite from the patient's blood, in order to prevent progression of uncomplicated malaria to severe disease or death, and to chronic infection that leads to malaria-related anaemia.
- **From a public health perspective:** to reduce transmission of the infection to others by reducing the infectious reservoir and to prevent the emergence and spread of resistance to anti-malarial medicines.

All confirmed malaria patients should be admitted to a medical institution for a minimum of 3 days to be managed under supervision. If facilities are available, a test for G6PD deficiency should be carried out prior to administration of primaquine.

Licence to import antimalarial drugs is authorised for Health Protection Agency by Maldives Food and Drug Authority. Drug stock is maintained and available only in the national program at HPA. The anti-malaria drugs are administrated in accordance with WHO standard regimen and are supervised by national Programme. Health care providers are to strictly follow the guidelines by national program to avoid practitioners to use different regime to treat malaria (WHO, Guidelines for the treatment of malaria, 2015). The national programme keeps the record of recent updates in malaria treatment regimes.

2.4.1 Treating uncomplicated *Plasmodium falciparum*

- Treat children and adults with uncomplicated *P.falciparum* malaria (except pregnant women in their first trimester), with artemisinin based combination therapy(ACT).
    - ACT; artemether and lumefantrine.

- Artemisinin and its derivatives should never be used as monotherapy.
- ACT regimens should be provided for 3 days treatment with an artimisine based derivative.

ACT should be taken immediately after a meal or drink containing at least 1.2g of fat (e.g. a glass of milk) since its absorption is enhanced by co-administration with fat. As low blood levels of ACT with treatment failure could potentially result from inadequate fat intake, it is essential that patients or carers are informed of the need to take with milk or fat containing food, particularly on the second or third day of treatment.

- Primaquine: A weight appropriate single dose of primaquine (0.25mg/kg bw) with ACT to patient with *P.falciparum* (except pregnant women in their first trimester, infants aged<6months and women breatfeeding infants aged <6months), to be administered on day 3 of treatment or prior to discharge from hospital to destroy gametocytes preventing transmission.

2.4.2 Treating uncomplicated *P. falciparum* malaria in special risk groups

- **First trimester of pregnancy**
  - Treat pregnant women with uncomplicated *P. falciparaum* malaria during first trimester with 7 days of quinine and clindamycin.
- **Infants less than 5kg body weight**
  - Treat infants weighing <5kg with uncomplicated *P. falciparaum* malaria with ACT and at the same mg/kg bw target dose as for children weighing 5kg.
- **Patients co-infected with HIV**
  - In people who have HIV/AIDS and uncomplicated *P. falciparaum* malaria, avoid artesunate + SP if they are being treated with co-trimoxazole and avoid artesunate+amodiaquine if they are being treated with efavirenz or zidovudine.

2.4.3 Treating uncomplicated *P.vivax, P.ovale, P.malariae or P.knowlesi* malaria

- If the malaria species is not known with certainty, treat as for uncomplicated *P. falciparum* malaria.
- Treat children and adults with either ACT (except pregnant women in their first trimester) or chloroquine.

2.4.4 Treating severe malaria

Treat adults and children with severe malaria (including infants, pregnant women in all trimesters and lactating women) with ***intravenous or intra muscular artesunate*** *for atleast 24h and until they can tolerate oral medication. Once a patient has received at least 24hrs of parental therapy and can tolerate oral therapy, complete treatment with 3 days of ACT*(add single dose of ***primaquine*** in areas of low transmission).

Parenteral alternatives where artsunate is not available use artemether in preference to quinine for treating children and adults with severe malaria.

3. Chemoprophylaxis for malaria

Chemoprophylaxis is not needed for visitors to Maldives and anyone living within the country including pregnant women. As Chemoprophylaxis is recommended for travellers to malaria endemic countries (Countries where malaria transmission occurs, page 21) to the latest WHO International travel health (ITH)website (http://www.who.int/ith/ith-country-list.pdf?ua=1). Contact Health Protection Agency or nearest health facility to get more information on chemo-prophylactic drugs and for further details. The recommended type of prevention is different to each country based on the risk as shown in diagram below (***Figure 1: Malaria risk and types of prevention***).

Figure 1: Malaria risk and types of prevention

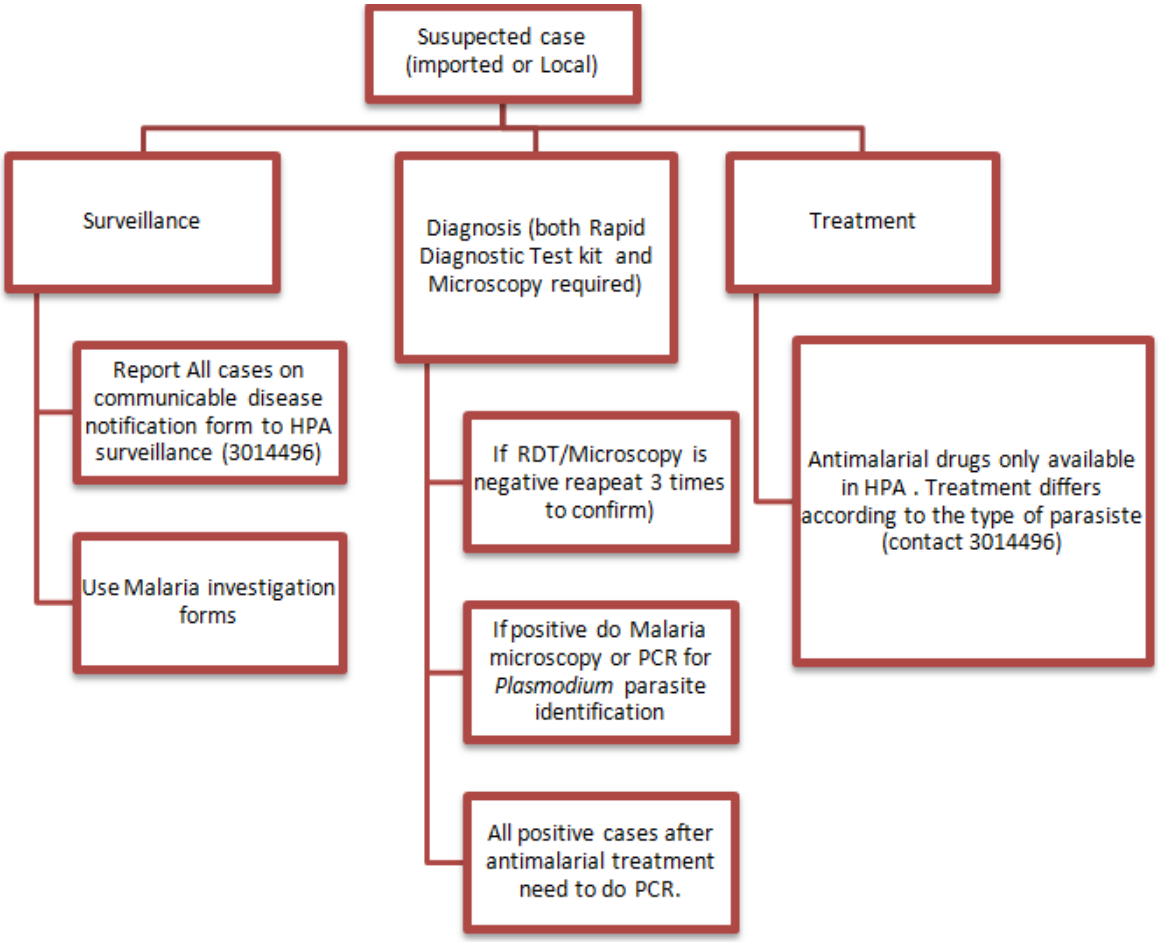
Malaria risk	Type of prevention
Very limited risk of malaria transmission	Mosquito bite prevention only
Risk of *P. vivax* malaria only	Mosquito bite prevention plus chloroquine chemoprophylaxis[a]
Risk of *P. falciparum* malaria, in combination with reported chloroquine and sulfadoxine–pyrimethamine resistance	Mosquito bite prevention plus atovaquone–proguanil or doxycycline or mefloquine chemoprophylaxis (select according to reported side-effects and contraindications)[a]
Risk of *P. falciparum* malaria in combination with reported multidrug resistance	Mosquito bite prevention plus atovaquone–proguanil or doxycycline or mefloquine chemoprophylaxis (select according to reported drug-resistance pattern, side-effects and contraindications)[a,b]

[a] Alternatively, for travel to rural areas with low risk of malaria infection, mosquito bite prevention can be combined with standby emergency treatment (SBET).
[b] In certain areas with multidrug-resistant malaria, mefloquine chemoprophylaxis is no longer recommended. At present these areas include Cambodia, south-eastern Myanmar and Thailand.

4. Surveillance and public health response

Malaria is a notifiable disease in Maldives and any suspected or positive malaria case should be notified based on the case definition (Clinical Management, Page4) Health Protection Agency, Ministry of Health, within 24 hours. For this the ‘‘Communicable Disease Reporting Form’’ (Case Notification form, Page16). After a case has been investigated, it is classified into one of the categories(Classification of malaria cases, Page18). All atolls in the Maldives are known as cleared Foci (i.e. no cases of malaria over the past 3 years). Any confirmed case of malaria requires Foci investigation.

Figure 2: Summary chart of surveillance and case management



5. Entomological investigation

The two *Anopheles(An)* vectors in the Maldives were *An. tesselatus* and *An. Subpictus*(WHO, 1988)(Schepens, 1981). The last records of these vectors were on 1984 and 1991 respectively.(HPA, Global Malaria Report, 2004). The favourable breeding habitats for *An.tesselatus* were fresh water bodies, mainly wells, Pits (if not polluted) and for *An.subpictus* on brackish water of saline swamps, salinity ranging between 5%-18%swampy areas (husk pits, colocasis pits, Manmade watering pits for agricultural purpose, slightly polluted water.

At present, Health Protection Agency is working towards to **prevent re-emergence** or **reintroduction** of any malaria vectors and any malaria suspected or confirmed cases should lead to an entomological investigation.

Objectives of malaria entomological investigations

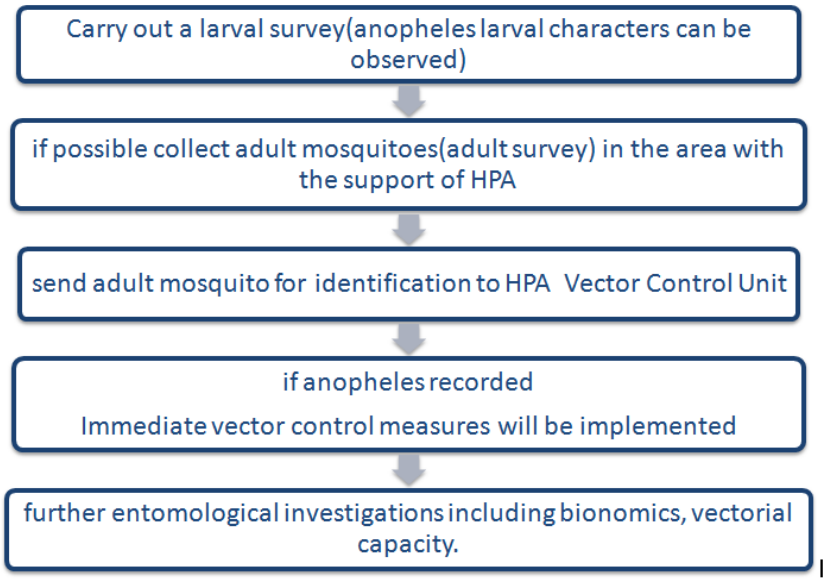
- Information on any anopheles species
- Their distribution and density if prevalent
- Monitoring of potential vectors and the role they could play in disease transmission.
- Understanding of the spatial and temporal changes in vector species
- Prevention of re-emergence and reintroduction of malaria vectors.

Entomological field techniques

The entomological field techniques for identification of any *anopheles* species should be followed by standard larval or adult collection techniques used by the nation vector control programme. The collected samples through standard surveys, including larvae and adult identification will be coordinated by the Public health entomologist at Health Protection Agency.

- Larval surveys (collection and identification of larvae)
- Adult survey (collection identification of adult mosquito)

Steps to follow when Suspect local/imported case reported



The usual **routine entomological surveillance** for malaria should be carried out in integration with dengue vectors and should observe for presence of any*Anopheles* species.

Identification Keys for adult and larvae:

- Christophers, S. R. (1933). The fauna of British India including Ceylon and Burma. Taylor And Francis, Red Lion Court, Fleet Street, London.
- WRBU:http://www.wrbu.org/mqID/keysMQZoogeo.html

6. Bibliography

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Ray, K. (1985). *Premilinary seroogical survey in Maldives.* World Health Organization.

Schepens, J. (1981). *Assignment Report on Malaria Control, Maldives, October 1974-July1980.* Regional office for SEAR.

Shaheem, I. (2011). *Malaria Control To Malaria Eradication, Community Support and participation an excellent example.* Maldives.

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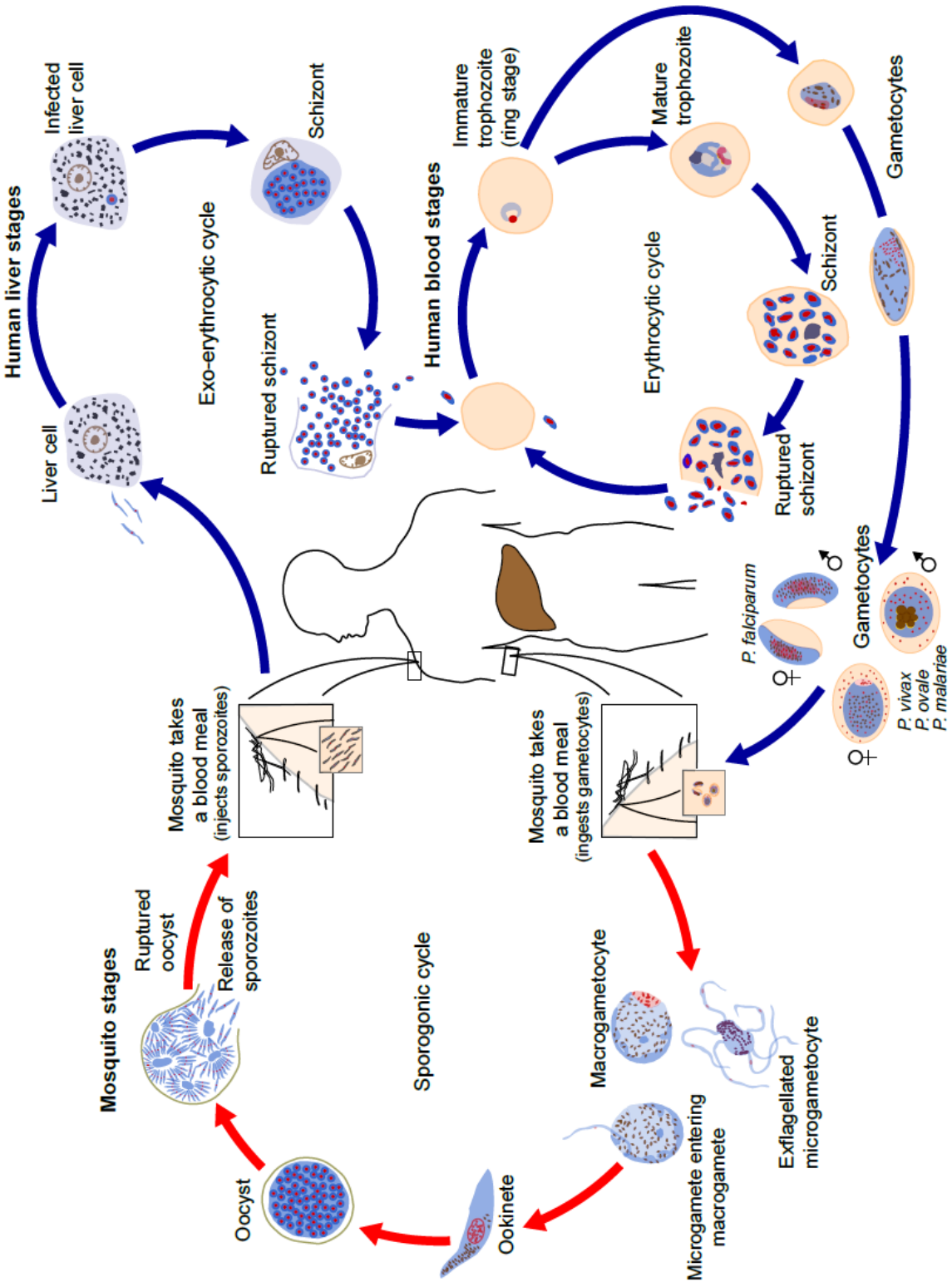
7. Annex

7.1. Malaria transmission cycle



7.2. Case Notification form

Communicable Disease Notifying Form

Health Protection Agency
Male', Republic of Maldives

FORM 001
HPA/2015

Reporting Facility

☐ *Re-notification (required for changes in diagnosis (e.g. Dengue Fever to DHF), case confirmation or outcome (e.g. death).

Notifiable Diseases (place ✓appropriately)

Immediately notifiable via form and Telephone (☎)+960 3014496)	Notifiable within 24 hrs to HPA
☐ Acute Flaccid Paralysis (use Polio investigation form) ☐ Cholera ☐ Diphtheria ☐ Encephalitis (specify organism if known)_____ ☐ Food Poisoning (use investigation form) ☐ Measles (complete measles investigation form) ☐ Meningitis (specify organism if known)_____ ☐ Mumps ☐ Rabies ☐ Rubella / ☐ Congenital rubella syndrome ☐ Tetanus / ☐ Neonatal tetanus ☐ Tuberculosis (use TB investigation form) ☐ Whooping Cough ☐ Yellow Fever	☐ Chikungunya ☐ DF/☐DHF/☐DSS ☐ Filariasis ☐ Hepatitis A / B/ C/ D/E (circle appropriately) ☐ Leprosy ☐ Leptospirosis ☐ Malaria ☐ Plague ☐ Scrub Typhus ☐ SARI (Severe Acute Respiratory Infection = ARI requiring hospital admission) ☐ Typhoid/ ☐Paratyphoid (complete case investigation form) ☐ Toxoplasmosis/ ☐ Congenital toxoplasmosis ☐ Other emerging disease (specify)_____

Case Details (Mandatory fields are marked with (*) and underlined. Please make sure to complete them.

1-*Case classification: Suspect ☐ Probable ☐ Confirmed ☐ (as per surveillance case definition)

2-*Patient Nation ID No: A_____ For foreigners include passport number	3-*Patient Name:	4-*Age: YY / MM	5-*Sex: ☐M ☐F If pregnant ☐

6- *Patient's residential Address (pls confirm with patient.)	7-*Atoll/Island	8-Contact number☎	9-Foreigners country of origin

10-*Date of onset of illness: DD / MM / YYYY	11-Date of consultation: DD/ MM /YYYY
12-*Patient category ☐Out-patient ☐In-patient: ☐ Ward _____ Bed _____ ☐ICU _____ Bed _____	13-*Case outcome: ☐ Death ☐ On treatment ☐ Referred to higher center ☐ Recovered with disability ☐ Recovered fully
14- Recent travel history if relevant (include countries visited)	15- Date of arrival in Maldives: DD/ MM/ YYYY
16-Clinical details (include risk factors, mode of transmission, etc.) 17- Condition of patient: ☐ Stable ☐ Sick ☐ Critically ill	18-Laboratory Confirmation: ☐ Confirmed: Test specifics_____ ☐ If Requested, Date: DD/ MM /YYYY ☐ Not Requested
Notifier details (eg:Dr, Nurse ,HW or other designated person) Name:_____ Designation: _____ Signature: _____ Date: DD/ MM/ YYYY	Data entry use (use by PHUs and entry users) Date received: DD/ MM/ YYYY Date of entry: DD/ MM/ YYYY Checked and entered by: _____

For further information or inquiries, please contact:
Health Protection Agency, Ministry of Health,
Roshanee Building, Sosun Magu, Male'.
Telephone: +960-3014 496, Hotline: +960-3014 333, Fax: +960-3014 484 email: hpa@health.gov.mv
Forms and case definition booklet are available on http://www.hpa.gov.mv , http://www.health.gov.mv

Revised 21st Jun2015

7.3. Case investigation form

Malaria Investigation Form

Reporting Facility:			**Malaria ID:**
Case Details (Mandatory fields are marked with (*) and underlined. Please make sure to complete them.			
1-*Case classification: Suspect ☐ Probable☐ Confirmed ☐			
2-*PatientID No: For foreigners include passport number	**3-*Patient Name:**	**4-*Age:** YY / MM	**5-*Sex:**☐M ☐F If pregnant☐
6- *Patient's residential Address (pls confirm with patient.)	**7-*Atoll/Island**	**8-Contact number)**	**9-Foreigners** ☐ Yes ☐ No

10. Country of residence:	**11. Country of Origin (Nationality):**
12-*Date of onset of illness: DD / MM / YYYY	**13-Date of consultation:** DD/ MM /YYYY
14-*Patient category ☐Out-patient ☐In-patient: ☐Ward _____ Bed _____ ☐ICU _____ Bed _____	**15-*Case outcome:** ☐ Death☐ On treatment ☐ Referred to higher center ☐Recovered with disability☐Recovered fully **16. Referral details:**
17- Recent travel history: if relevant ☐Past two weeks: ☐Six months: ☐One year:	**18- Date of arrival in Maldives:** DD/ MM/ YYYY **19. Blood transfusion within past 3 months:** **20. Previous history of malaria, if any (when, where, parasite species, treatment given, etc.)**
21. Travel companions: if relevant	**22. Current location of the patient:**
23. Clinical details: (include risk factors, mode of transmission, etc.)	**24. Laboratory Confirmation:** Test specifics: Microscopy:☐ RDT:☐
25. Condition of patient: ☐ Stable ☐ Sick ☐Critically ill	**26. Diagnosis status:** ☐ Suspect ☐ Confirmed

27. Parasite species:
☐ *P. falciparum* ☐*P. vivax* ☐*P. malariae*
☐*P. ovale* ☐Mixed Specify: ☐ Others specify:

28. Treatment **Drugs:** **Dosage:** **Treatment start Date:** DD / MM / YYYY	**29. Classification:** ☐Imported☐Introduced ☐Indigenous ☐Relapsing ☐ Recrudescent ☐Induced ☐ ☐Other** *Comment on evidence used for case classification:* ** Outside the district/province, from other country (please specify)* ***This may be poor compliance or failure to follow up.*
30. Notifier details (eg:Dr,Nurse ,HW or other designated person) Name:_____ Designation: _____ Signature: _____Date: DD/ MM/ YYYY	**31. Case Investigator Details** Name:_____ Designation: _____ Signature: _____Date: DD/ MM/ YYYY

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Health Protection Agency, Ministry of Health,
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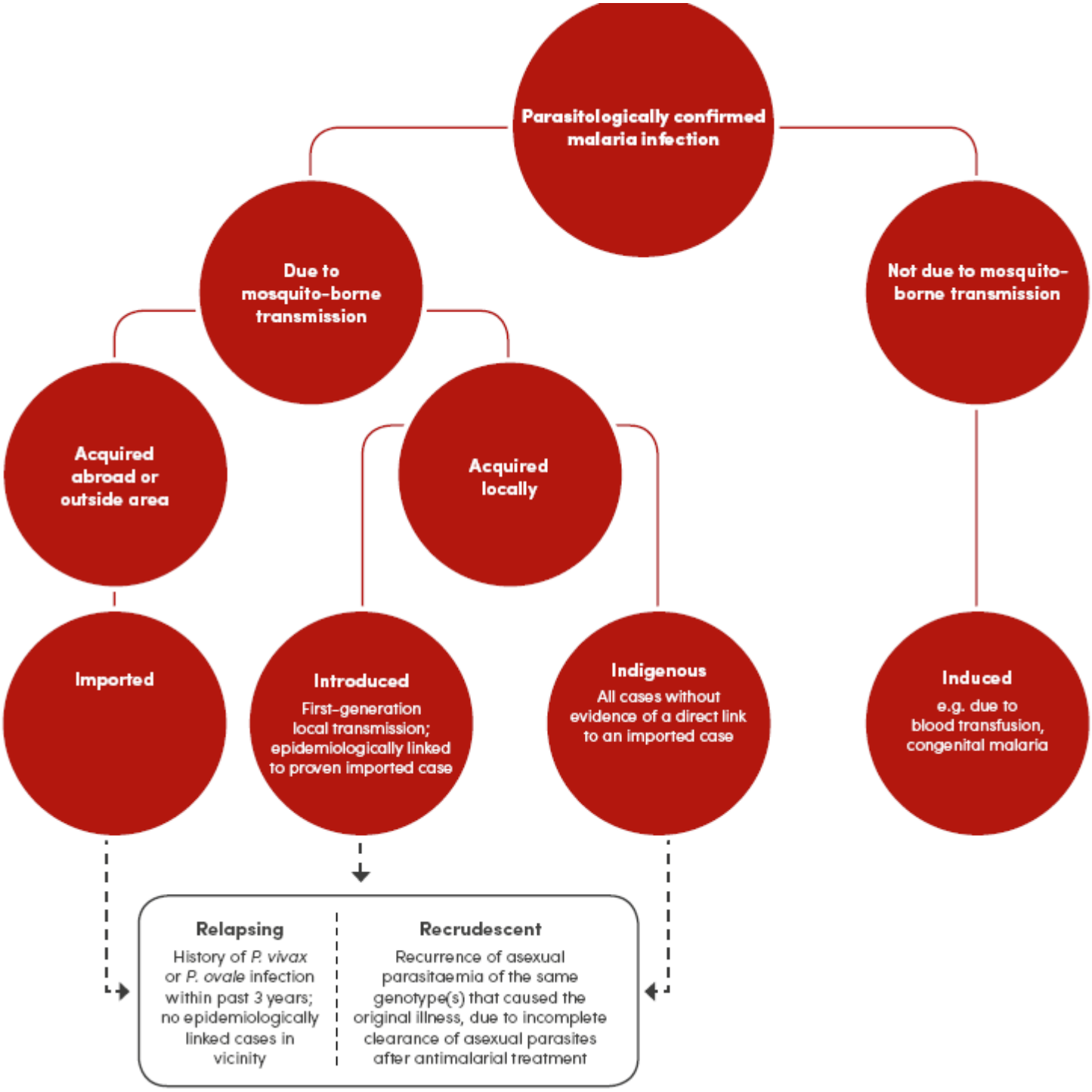
Tel:+960-3014 496, Hotline: +960-3014 333, Fax: +960-3014 484
Forms and case definition booklet are available on http://www.hpa.gov.mv , http://www.health.gov.mv

7.4. Classification of malaria cases



7.5. Severe *falcipraum* 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 ans in the presence of pf asexual parasitimia.

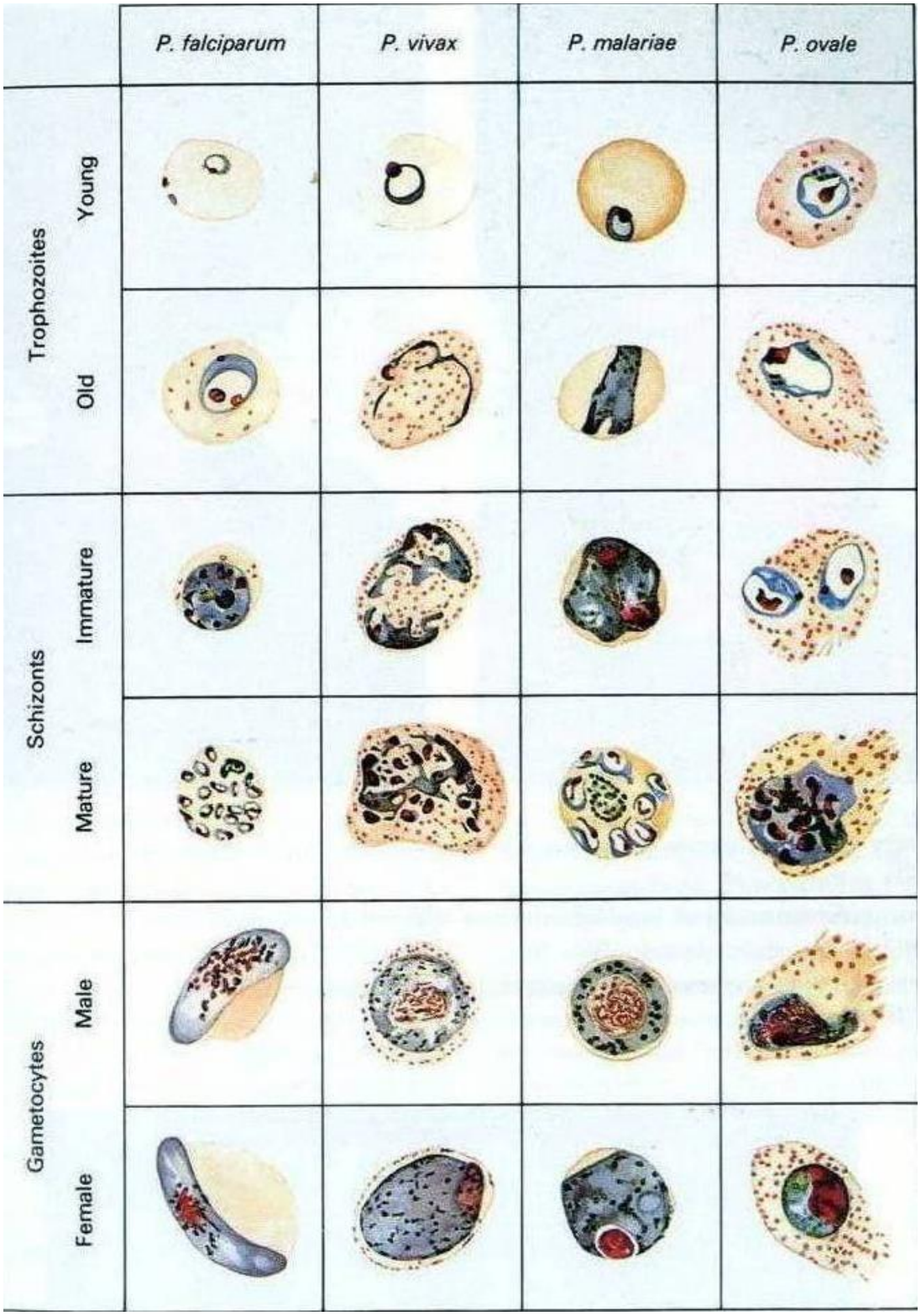
- Impaired consciousness: A Glasgow coma score <11 in adults or a Blantyre coma score <3 in children.
- Prostration: Generalized weakness so that the person is unable to sit, stand or walk without assistance.
- Multiple convulsions: More than two episodes within 24h
- Acidosis: A base deficit of >8mEq/L or, if not available, a plasma bicarbonate level of <15mmol/L or venous plasma lactate ≥5mmol/L. Severe acidosis manifests clinically as respiratory distress(rapid, deep, laboured breathing).
- Hypoglycemia: Blood or plasma glucose <2.2mmol/L(<40mg/dL)
- Severe malarial anemia: Hemoglobin concentration ≤5g/dL or haematocrit of ≤15% in children <12years of age (<7g/dL and <20%, respectively in adults with a parasite count >10 000µL
- Renal impairment: Plasma or serum creatinine > 265µmol/L(3mg/dL) or blood urea >20mmol/L
- Jaundice: Plasma or serum bilirubin >50µmol/L(3mg/dL) with a parasite count >100000/ µL
- Pulmonary oedema: Radiologically confirmed or oxygen saturation <92% on room air with a respiratory rate>30min, often with chest indrawing and crepitations or auscultation
- Significant bleeding: Including recurrent or prolonged bleeding from the nose, gums or venepuncture site; haematemesis or melaena
- Shock: Compensated shock is defined as capillary refill≥3s or temperature gradient on leg (mid to proximal limb) but no hypotension. Decompensated shock is defined as systolic blood pressure <70mmHg in children or <80mmHg in adults, with evidence of impaired perfusion(cool peripheries or prolonged capillary refill)
- Hyperparasatimia: pf parasatimia>10%

Reference:

WHO, 2012, *Management of severe malaria, A practical handbook*, 3rd Ed., World Health Organization

7.6. Microscopic identification of parasite

Malaria parasites take up stain in both thick and thin blood films thatenables to distinguish the various parts of the parasite. The lab technicians are to follow the basic malaria microscopy 2010 – 2nd edition in which clear steps on Microscopy(detailed methods, preparing and examining blood films with malaria parasites and how to maintain records is detailed, which can be accessed through *http://apps.who.int/iris/bitstream/10665/44208/1/9789241547826_eng.pdf)*



7.7. Countries where malaria transmission occurs

Afghanistan	Dominican Republic	Madagascar	Saudi Arabia
Angola	Ecuador	Malawi	Senegal
Bangladesh	Equatorial Guinea	Malaysia	Sierra Leone
Belize	Eritrea	Mali	Solomon Islands
Benin	Ethiopia	Mauritania	Somalia
Bhutan	French Guiana	Mayotte	South Africa
Bolivia	Gabon	Mozambique	Sudan
Botswana	Gambia	Myanmar	Swaziland
Brazil	Ghana	Mexico	Suriname
Burkina Faso	Guatemala	Namibia	Thailand
Burundi	Guinea	Niger	Timor Leste
Cambodia	Guinea- Bissau	Nigeria	Togo
Cameroon	Guyana	Nepal	Tajikistan
Central African Rep.	Haiti	Nicaragua	Turkey
Chad	Honduras	Pakistan	Uganda
China	India	Panama	Tanzania
Colombia	Indonesia	Papua New Guinea	Vanuatu
Comoros	Iran	Peru	Vietnam
Congo	Iraq	Philippines	Venezuela
Costa Rica	Kenya	Paraguay	Yemen Socotra Island
Cote d'Ivoire	Lao PDR	Rwanda	Zambia
Djibouti	Liberia	Sao Tome & Principe	Zimbabwe

Note: There are some other countries with very limited malaria risk. For more details please refer International Travel and Health-2012 at http://www.who.int/ith/chapters/ith2012en_countrylist.pdf